

Youth gambling as risky business: An examination of risk perception and perception of skill and luck among Danish adolescents

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Abstract

This study reports the findings from a national survey on gambling behaviour among students in Danish primary schools, with a special emphasis on risk perception, perceptions of skill and luck, and irrational beliefs. Two thousand two hundred and twenty-three (2,223) primary school students ranging in age from 11 to 17 years completed a questionnaire containing a gambling screen (SOGS-RA) and items measuring gambling behaviour, social networks, and cognitive perceptions. The results showed that the more frequently the individual gambles, the less risky he or she perceives gambling to be. Compared to females, males were less likely to regard frequent gambling as a risky activity, and had more confidence in their own gambling skills. The implications of the findings for further research and preventive measures are discussed.

Résumé

Cet article présente les résultats d'une enquête nationale sur les comportements de jeu dans les écoles danoises, en ce qui touche notamment les perceptions à l'égard du risque, des habiletés au jeu et de la chance, ainsi que la pensée irrationnelle. On a demandé à 2 223 élèves âgés de 11 à 17 ans de répondre à un questionnaire comportant un instrument de dépistage du jeu compulsif (SOGS-RA) et des questions sur les comportements de jeu, le réseau social et les perceptions cognitives. Les résultats montrent que plus on s'adonne au jeu, moins on en perçoit les risques. Les garçons sont moins enclins que les filles à considérer la fréquence de jeu comme un risque et manifestent une plus grande assurance quant

à leurs habiletés au jeu. Les pistes de recherche qui se dégagent de ces observations et la question des mesures de prévention sont abordées en conclusion.

Introduction

Despite the relatively high prevalence rates of gambling problems among youth (Hardoon & Derevensky, 2002; Volberg, Gupta, Griffiths, Ólason, & Delfabbro, 2010), only very limited research has been produced that explores how young people evaluate the risks associated with gambling behaviour, how they evaluate and understand the elements of skill and luck involved in various types of gambling activities, how they assess their own gambling skills, and how these factors are associated with gambling problems. Based on a survey among 302 undergraduates with a mean age of 20.5 years focusing on perceived availability, risks and benefits of gambling, Emerson et al. (2007) found that, in general, this subpopulation rated gambling as being less risky than cigarettes or alcohol. With regard to perceived risk, no correlation between perceived risk and gambling problems was identified.

However, it was also concluded that perceived risk was a significant predictor of regular gambling. Based on a survey among 926 young Australians with a mean age of 14.5 years, Delfabbro, Lahn, and Grabosky (2006) concluded that positive assessment of one's own gambling skills, the importance of gambling skills in general, and the profitability of gambling were all significantly more prevalent among problem gamblers compared to non-problem gamblers. But problem gamblers did not in fact show a lack of understanding of the actual probabilities involved in gambling activities. In a similar vein, Gupta and Derevensky (1998) reported that young problem gamblers in high school show greater trust in their own gambling skills than do non-problem gamblers, and that boys perceive themselves as skilled gamblers more frequently than do girls. Similar findings have been reported by other researchers (see Griffiths, 1995; Ladouceur, 2004; Lund & Nordlund, 2003).

The correlations between erroneous beliefs and adolescent gambling problems have been the subject of some studies. Turner, Macdonald, Bartoshuk, and Zangeneh (2007) surveyed 900 Canadian school students from four educational levels (junior, intermediate, junior high and senior high). It was concluded that, in general, participants maintained a poor understanding of random chance. They did, however, recognize that success in gambling owes itself primarily to luck. In addition, this study found that problem gambling was negatively correlated with the participant's understanding of random chance. Recently, Tang and Wu (2012) investigated the associations between gambling-related cognitive biases and levels of gambling problems among Chinese youth. Analysis of a sample of 2,825 youths and

934 young adults showed that some cognitive biases (with perceived inability to stop gambling and positive gambling expectancy as the most prominent ones) were correlated with pathological gambling in these age groups.

In general, then, research on gambling-related cognitions and perceptions of skill and luck in youth populations is relatively limited, and several important research issues remain to be investigated in detail. Examinations of gender differences constitute an important area. Research among adults provides mixed results in terms of gender differences in gambling-related cognitive biases (see Raylu & Oei, 2004; Toneatto, Blitz-Miller, Calderwood, Dragonetti, & Tsanos, 1997). Furthermore, investigations in youth populations would provide valuable information to determine the role of gambling cognitions and risk perception in the development of gambling problems. Another important issue is how cultural and structural conditions relate to gambling-related cognitions and risk perceptions. At present, the majority of research on gambling-related cognitions and perceptions of risk, skill and luck have been conducted among Caucasian adults in countries such as Australia (Joukhador, Blaszczynski, & Maccallum, 2004), United Kingdom (see Griffiths, 1995), Canada (Ladouceur, 2004), and Norway (Lund, 2011). Some adult studies have also involved Chinese populations (Lau & Raynard, 2005; Oei, Lin, & Raylu, 2008; Tang & Wu, 2012). At present there is a knowledge gap in terms of information on gambling-related cognitions, and perceptions of skill and luck among youth in a Scandinavian context.

The Present Study

This study adds to the research in gambling-related cognitions and risk perceptions in several ways. First, it contributes to filling the general knowledge gap in the field of gambling-related cognitions in youth populations. Internationally-generalized knowledge is important in the development of age-specific intervention and treatment programs. Second, it is the first study in a Scandinavian context to explore gambling-related cognitions in different types of games across various groups of gambling severity. This study, then, adds meaningfully to the existing body of literature. It does so by exploring constructs of risk perception, in relation to gambling, among youth living in a part of the world that differs—in terms of gambling legislation, gambling culture, and prevalence of gambling problems—from the most well-researched national contexts, contexts that include Canada, the United States, the United Kingdom and Australia. Third, it investigates gender differences in gambling-related cognitions and risk perceptions among youth.

Objectives and Research Questions

The two main questions asked in this study are: (1) how does gambling frequency correlate with the perception of skill and luck involved in gambling? and (2) how do conceptions of skill and luck involved in different types of games differ across groups of gambling severity? The exploration of the correlations between gambling

frequency and the perception of skill and luck involved in gambling is relevant to our understanding of gambling since it may add to our knowledge of how misconceptions among gamblers develop. Such knowledge might be important in programs aiming at reducing youth gambling problems, preventing those problems, or both.

A few notes on the national gambling context are appropriate. In Denmark, certain kinds of money gambling have been offered on legal grounds for decades, and Internet gambling has been legal since 2002. At present, Denmark is the only Nordic country that has opened the slot machine market to private actors. Among the adult population, the most popular games are scratch cards, Lotto, and lottery tickets, while among youngsters scratch cards, gambling machines, and Lotto and sport betting games are most popular (Nielsen & Heidemann, 2008). Compared to adults, access to gambling on the part of the young is restricted by legislation. Thus, adolescents aged 11 to 17 do not have access to all available games. The age limit for gambling in casinos, on slot machines, and on the Internet, is 18 years, and is 16 years for other kinds of gambling (Örnberg, 2006). According to the rules employed by Danske Spil, no games are sold to youngsters below 16 years of age, and registration as an Internet gambler on the agency's website is not allowed for adolescents below 18 years of age. Similarly, participation in Internet gambling is restricted by credit card rights. In Denmark, credit cards—such as Visa, which enables money transfers to Internet gambling sites—are issued only to persons 18 years of age or higher (Nielsen & Heidemann, 2008).

Method

Sample and Participants

This study was based on data from a national survey on youth gambling behaviour and risk perceptions. According to the project plan and the budget for data collection, the first objective was to produce a specific and designated representative sample. That sample was to be of approximately 2000 students, aged 11 to 17 years, from all existing Danish school types—public schools, private and free schools, youth schools, and continuation schools—and from each of the main regions of the country. Accordingly, the necessary proportion of schools and students from each school type and from each region was calculated. The total number of Danish municipalities was stratified by the three main Danish regions—Jutland, Sealand and Funen—and within each stratum municipalities were randomly selected. From the selected municipalities schools were randomly selected. The random selection followed the procedure of simple random sampling using a random number grid. From each selected municipality, four schools from each type were selected. Two major urban municipalities were strategically selected to secure representation of students living in major urban areas. In total 24 schools participated. In the participating schools, classes were selected by the local school authorities. The participation rate was approximately 91%. Only nine students chose not to

participate in the study, and on average only two students per class were not in attendance at the time of the data collection. These absentees were not contacted, and because of the budget for data collection, no follow-up visits were subsequently arranged. In one instance, a completed questionnaire from an absent student was forwarded to the research team by the school authorities. Participants included 2,223 pupils from each of the grades from six to ten; 79% were classified as being of Danish origin (both parents born in Denmark) and 21% were of other origin (one or no parents born in Denmark). The proportion of students from youth schools and continuation schools were strategically oversampled to achieve a reasonable sample size from these school types. We did so to allow separate analyses of this particular group of students, and for comparative purposes. To compensate for this oversampling, we performed corrective weighting on the school-type variable in subsequent analyses. Minor deviations between the achieved sample and the known population on other background variables (e.g., gender) were also observed. Since these deviations were minor and not caused by strategic oversampling, no further corrective weighting was consequently performed.

Data Collection

Senior researchers or research assistants on the study team administered the self-completion questionnaires to students during normal school lessons. The teacher remained in the classroom during completion of the questionnaires, and provided help occasionally, but only to students with poor reading skills. A member of the research team explained the main purpose of the study. The concept of gambling was explicitly defined as an activity where money is wagered and where money is either won or lost. Examples of gambling activities were mentioned for illustration purposes. Students were ensured confidentiality and were also instructed that they could refuse to answer specific questions and terminate their questionnaire at any time. In only one instance, this procedure was not possible, and questionnaires were instead administered by a teacher who had been instructed in introducing the questionnaire. Students required 15 to 25 minutes to complete the document. Prior to data collection, a letter describing the research project (aims and procedures) was sent to the school authorities (headmaster and school board). In those schools that chose to participate, a copy of the survey instrument was sent for inspection and final consent on behalf of the students. Subsequently, data collection was arranged with the local school authorities. Data was collected over a three-month period from August to October 2008. In Denmark, no ethics approvals for school surveys such as this present one are required. The study was compliant with research protocols.

Measures and Screening Instrument

The questionnaire used in this study contained series of questions clustered in three major domains and a gambling screen, the South Oaks Gambling Screen-Revised for Adolescents (SOGS-RA) (Winters, Stinchfield, & Fulkerson, 1993a, 1993b). The SOGS-RA is a widely used and youth-adapted version of the South Oaks Gambling

Screen (Lesieur & Blume, 1987). This particular instrument is widely used and has been used in various social and cultural contexts (Langhinrichsen-Rohling, Rohling, Rohde, & Seeley, 2004). The dimensions of problem gambling included in the scale are (1) chasing losses, (2) lying, (3) loss of control, and (4) borrowing or stealing money to cover gambling debts. The reliability and validity of the SOGS-RA has been assessed in a number of studies. Ladouceur et al. (2000) have argued that, because of an acquiescence bias, the SOGS-RA may lead to inflated prevalence rates. However, other authors (e.g., Derevensky, Gupta, Dickson, Hardoon, & Deguire, 2003) have instead contended that no psychological *a priori* reason would account for positively biased responses on ambiguous gambling survey questions. And still others (e.g., Poulin, 2002) have found the SOGS-RA to have adequate stability and good internal consistency. Finally, a number of studies (i.e., Derevensky & Gupta, 2000; Hodgins, 2004; Ólason, Sigurdardottir, & Smari, 2006) have suggested that the validity of the scale may differ according to gender and therefore be less sensitive to female gambling problems. The literature is thus somewhat inconsistent in terms of the validity and reliability of the SOGS-RA. To date, however, no perfect and universally adaptable screening tool has been proposed. Therefore the current instruments all need refinement (Derevensky & Gupta, 2004a). The SOGS-RA screen was translated into Danish from a Norwegian version of the SOGS-RA (Gyllström, Hansen, Skaug, & Wenzel, 2004), and then controlled against the original American version. Changes in relation to the American and Norwegian versions were made to accommodate to a Danish context (i.e., the list of available games and the wording of specific items). No SOGS-RA scoring questions or items were changed significantly or omitted. In terms of scoring procedure, the *narrow criteria* (see Stinchfield, 2010:82) have been used. Thus, those participants who scored 0–1 were classified as non-problem gamblers, those scoring 2–3 were classified as at-risk gamblers, and a cut score of 4 or more was used for the classification of problem gamblers. It is, however, important to note that these classifications merely *indicate* levels of gambling problems. To assess the level and scope of gambling problems we recognize that in-depth clinical interviews are necessary.

To eliminate potential problems of interpretability we conducted two separate pilot studies. First, questionnaires were distributed and collected in three different school classes, specifically grades 6, 7 and 8. A total of 56 completed questionnaires were collected. In each class, the questionnaire was discussed and evaluated by a member of the research team. Second, a focus group interview with five participants (two males and three females) aged 12 to 16 years was conducted. Each member of the focus group was administered a questionnaire, together with a description of the study and definition of gambling, and then asked to complete the questionnaire individually. After completing the questionnaire, all members of the group were asked to comment on the questionnaire, and to point out the questions that they found difficult to understand or answer. Both pilot studies revealed only minor problems with regard to the wording of the questionnaire and changes were made accordingly. Overall, the present researchers contend that the pilot test revealed that

the wording of the questionnaire was age-appropriate and reflected the specific context of this specific youth population.

In addition to the SOGS-RA items, the questionnaire included series of questions on the respondents' (1) gambling behaviour, including types of games played, gambling frequency, age of debut, gambling partners and gambling motives, (2) social networks and family gambling, including gambling behaviour of parents and friends, and (3) cognitive perceptions including notions of skill versus luck in relation to gambling, the understanding of probabilities, and risks involved in gambling relative to other activities, such as smoking or drinking alcohol. Perceptions of benefit and misconceptions of the chances of winning were measured by the question "Do you think that one day you will win a large sum of money by way of gambling?" with the answer categories (1) "Yes" (2) "No" and (3) "Don't Know." In addition, respondents were asked to consider the two following statements: "People who gamble usually lose" and "People who gamble often can become addicted to gambling." Respondents were then asked to agree, on a 4-point scale, with the answer categories "Completely Agree," "Agree," "Disagree" and "Completely Disagree." Assessments of the importance of skill versus luck in various games were measured by asking "Is it skill or luck that determines the outcome in these games?" Respondents were requested to provide their respective answers on a five point scale with the following answer categories: "Only Luck," "Mostly Luck," "Both Skill and Luck," "Mostly Skill" and "Only Skill." Risk perception was measured by the question "Is it risky for children or adolescents to gamble with money several times a week/a few times a month?" The term *risky behaviour* was defined in the questionnaire as "acts that may lead to loss or to addiction." Respondents were asked to indicate answers on a three point scale with the following answer categories: "Not Risky at All," "Slightly Risky" and "Very Risky." Two questions measured understanding of probability. The first question was: "Imagine you have flipped a coin ten times and had 'heads' ten times in a row, what is the most likely result if you flip the coin again?" The four answer categories for this question were: "Heads," "Tails," "Both Are Equally Likely" and "Do Not Know." The second question was: "If you roll a normal dice, what is the most likely result?" The eight answer categories for this question were: "1," "2," "3," "4," "5," "6," "All Are Equally Likely" and "Do Not Know."

In the gambling literature, there is a lack of consensus regarding the nomenclature used to categorize children and young people who report personal problems related to gambling. It has been argued that the term *probable pathological gambler* is the description most appropriate to describe adult gamblers who have developed pathological gambling patterns over a period of several years. In other words, the term is, by definition, not appropriate as a classification for those young people who might have experienced gambling problems, but who cannot also reasonably be considered pathological gamblers (Derevensky & Gupta, 2004a). Following this argument, and acknowledging the lack of consensus in this matter, the terms *at risk gambler* and *problem gambler* are used in this paper. It need be stressed, however,

that these terms do not in fact reflect diagnostic assessment. They instead refer to a distinction made by a specific gambling screen administered by a specific research team (not by treatment professionals) and in an everyday life context (and not in a clinical setting) (Fisher, 1999).

Statistical analyses were carried out using SPSS. Chi-square tests were conducted to measure significant associations among categorical variables. To determine the strength of the observed significant associations and when the expected number of cases in every cell could not be expected to be more than five, we used Cramer's V. Being a contingency coefficient derived from Pearson chi-square analysis, Cramer's V is suitable for nominal data, especially when one or both variables have three or more categories. Similarly, gamma tests (γ) were used to measure the strength of the associations between ordinal variables. Multinomial logistic regression analysis was employed in exploring probabilities of gambling frequencies.

Results

Prevalence of Gambling and Problem Gambling

The vast majority of respondents had gambled. A total of 84% of the entire sample ($N = 2,223$) reported having gambled at least once in their lifetime while 70.1% had gambled during the past year. A minority of 3.6% reported gambling on a daily basis while 16.3% reported gambling "a few times a month." The sample ($N = 2,216$) was categorized into three gambling groups according to the score on the SOGS-RA. (A total of 2,223 students participated in the study. However seven of them gave invalid answers to one or more of the SOGS-RA items and could therefore not be categorized in accordance with the SOGS-RA scoring list.) Those who scored 0 to 1 were categorized as non-problem gamblers ($N = 2,088$); those scoring 2 to 3 as at-risk gamblers ($N = 100$) while those scoring 4 or more were allocated into the problem gambler-category ($N = 28$). The overall prevalence rate of problem gambling was 1.3%; the rate of at-risk gambling was 4.5% while 94% reported no gambling problems. Compared to girls (1.1%) boys were more likely (5.7%) to gamble either every day or several times a week. In general, the boys gambled significantly more often than did girls ($\gamma = -0.348, p = 0.000$). There was a weak, significant relation between age and the SOGS RA score ($\gamma = 0.162, p = 0.046$). Thus older respondents tended to report more gambling problems than did younger ones, but more than 90% of respondents in all age groups indicated no gambling problems. However, more at-risk gamblers were found among the 14–15 year olds (5.3%) and the 16–17 year olds (6.7%) compared to the 11–13 year olds (3.4%) whereas only minor differences were determined between the age groups in terms of the proportion of problem gamblers.

These gender and age effects on gambling frequency were further analyzed using a multinomial logistic regression analysis involving the following independent variables: gender, age, ethnicity, type of school, and social class. (The variable

was the question “How often do you gamble?” The reference category was “never gambles” and the dependent measure was “gambling frequency). The analysis showed that gender was the strongest explanatory variable, followed by age, while none of the other variables showed significant impact on gambling frequency. Boys thus had six times higher odds of being a daily gambler compared to girls ($\text{Exp}(\beta) = 6.36, p = 0.019$). Similarly, the odds of being a daily gambler doubled with each year of increase in age ($\text{Exp}(\beta) = 2.06, p = 0.038$).

Types of Gambling Activities

The three most popular gambling activities among male respondents were scratch cards (67.7%), cards (41.3%) and sports pool betting (40.1%). For female respondents, the three most popular games were scratch cards (62%), lotto (26.4%) and cards (16.7%). No major differences in terms of preferred types of games were identified across the three gambling groups (Table 1).

There was a statistically significant relationship between the number of games played and gambling severity. Problem gamblers reported having experienced significantly more different gambling activities compared to at-risk gamblers, who in turn had experienced more gambling activities than had non-problem gamblers (Table 2).

In 2012, 90% of all Danish households had access to the Internet and 96% of the population aged 16 to 89 years owned a mobile phone (Statistics Denmark, 2012). At present, nearly all Danish children and youngsters aged 8 to 13 years own a mobile phone or a tablet (Rydahl & Lauritsen, 2010). The majority of the respondents had never tried mobile phone gambling or online gambling. Of the entire sample, 91.7% had never tried mobile phone gambling and 78.4% had not gambled online. In total, 18.6% had gambled online a few times and 1.1% gambled online several times a week. Similar to land-based games, a tendency emerged for chance games (e.g., bingo) to be more popular among girls than were games that

Table 1
Five most popular games across gambling groups (lifetime)

Activity (#)	Gambling groups (%)		
	Non-problem gamblers	At-risk gamblers	Problem gamblers
Scratch cards*	63.6 (1)	82.5 (1)	93.1 (1)
Gambling machines*	48.6 (2)	68 (2)	88.9 (2)
Lotto*	28.2 (3)	54.3 (3)	60.7 (4)
Cards*	27.2 (4)	50.5 (5)	78.6 (3)
Sports betting*	23.4 (5)	54.1 (4)	59.3 (5)

Note. *Statistically significant ($p < 0.01$) as tested by Pearson chi-square analysis.

Table 2
Number of different gambling activities across gambling groups (lifetime)

Number of gambling activities*	Gambling groups (%)		
	Non-problem gamblers	At-risk gamblers	Problem gamblers
0 games	18.0	0	0
1–4 games	60.4	47.2	22.2
5–8 games	20.5	40.4	44.4
9–12 games	1.1	12.4	33.3

Note. *Statistically significant ($p < 0.01$) as tested by Gamma test ($\gamma = 0.714$, $p = 0.000$). Percentages are column percentages.

required a degree of skill or knowledge (e.g., sports betting), whereas the opposite was observed among the boys. There was a significant relationship between gambling behaviour and both mobile phone gambling and online gambling: Compared to non-problem gamblers, at-risk gamblers and problem gamblers played to a greater extent via their mobile phones ($\gamma = 0.679$, $p = 0.000$) and on the Internet ($\gamma = 0.618$, $p = 0.000$). For all three gambling groups, the most popular online games were card games followed by sports betting. However, for problem gamblers online casino gambling was equally popular.

Risk Perceptions

A total of 45.9% of the respondents thought that it was “very risky” to gamble several times a week, 31.4% thought it was “slightly risky” and 2.9% thought there was “no risk at all.” In total, 16.6% thought that “no risk at all” was involved in gambling a few times a month, 51.2% thought that was “slightly risky” and 8.2% “very risky.” However, a significant correlation did emerge between how often the individual gambles and whether he or she thinks that there is a risk involved in gambling. The *more frequently* the individual gambled, the *less risky* he or she perceived gambling (see Table 3). However, it should be noted that more than 50% of the participants who gambled every day, and more than 50% of the participants who gambled several times a week, did in fact think a slight risk involved in frequent gambling existed.

A significant gender difference was observed. Compared to boys (49.5%), girls (65%) found it more risky to gamble several times a week and a few times a month ($\chi^2 = 53.906$, $df = 2$, $p = 0.000$). The vast majority of respondents either strongly agreed or simply agreed that gambling was often linked to losing money (51%) and can lead to addiction (72.6%). However, slightly more boys than girls disagreed with the statements that gamblers usually lose their money ($\chi^2 = 23.608$, $df = 3$, $p = 0.000$) and that frequent gambling may lead to addiction ($\chi^2 = 26.105$, $df = 3$, $p = 0.000$). With regard to losing money when gambling, it was observed that more younger respondents than older respondents thought that gambling was linked to losing

Table 3
Perception of risk associated with frequent gambling across frequency groups

Perception of risk associated with frequent gambling (more than once a week)	Gambling frequency groups <i>N</i> (%)					
	Every day	Several times a week	A few times a month	A few times a year	Never	Total
No risk at all*	4 (44.4)	10 (27.0)	17 (7.5)	16 (2.2)	3 (1.0)	50 (3.8)
Slightly risky*	5 (55.6)	19 (51.4)	108 (47.6)	260 (35.7)	108 (35.4)	500 (38.3)
Very risky*	0 (0)	8 (21.6)	102 (44.9)	452 (62.1)	194 (63.6)	756 (57.9)
Total <i>N</i> (%)	9 (100)	37 (100)	227 (100)	728 (100)	305 (100)	1306 (100)

Note. *Statistically significant ($p < 0.01$) ($\gamma = 0.291$, $p = 0.000$) as tested by Gamma test. Percentages are column percentages.

money ($\gamma = -0.121$, $p = 0.003$). The distribution across age groups with regard to addiction did not show significant differences. Approximately 88% of respondents in all age groups either strongly agreed or simply agreed that gambling may lead to addiction.

Comparing responses concerning losing money and addiction across the three gambling groups it was observed that more problem gamblers compared to non-problem gamblers disagreed with the statement that gambling may lead to losing money ($\gamma = -0.204$, $p = 0.034$). This correlation was not, however, observed regarding the question concerning addiction. On this question, the majority of all three groups either simply agreed or strongly agreed. In the entire sample there were more problem gamblers who believed in their own gambling skills (Cramer's $V = 0.144$, $df = 3$, $p = 0.00$) compared to respondents with no gambling problems. Furthermore, some significant gender differences were observed. Compared to girls (0.7%), more boys (14.7%) believed that they had better gambling skills than their peers ($\chi^2 = 172.910$, $df = 2$, $p = 0.000$). Similarly, significantly more boys (32.5%) than girls (17.3%) believed that one day they would experience "the big win" ($\chi^2 = 38.176$, $df = 1$, $p = 0.000$). Across the age groups no significant differences were determined in the perception of own gambling skills and the belief in the big win.

Perceptions of Skill and Luck in Gambling Activities

Respondents were asked to assess the importance of skill and luck with regard to a number of different games. These games were then categorised into two groups: (1) chance-based games, including bingo, lotto, gaming machines, scratch card games, dice games, roulette and keno, and (2) games that required a degree of skill, including card games, horse betting, and sports betting games, including football pools.

With regard to both chance-based games ($\chi^2 = 15.757$, $df = 2$, $p = 0.000$) and games that required a degree of skill ($\chi^2 = 20.199$, $df = 2$, $p = 0.000$), boys were more likely to believe that skills are important compared to girls. However, with regard to chance games, a greater percentage of boys thought that luck was crucial whereas more girls than boys indicated that both luck and skill plays a role. Age appeared to enjoy significant importance concerning games that required a degree of skill. Here the older respondents, when compared to the younger ones, thought that skills were more important ($\chi^2 = 28.514$, $df = 4$, $p = 0.000$). No significant differences across age groups were observed for chance-based games.

The majority of respondents in all three gambling types thought that luck played a crucial role with regard to the outcome of chance games (see Table 4). However, more problem gamblers and at-risk gamblers, compared to respondents with no gambling problems, thought that skill played a crucial role compared to non-problem gamblers. With regard to games that required a degree of skill, a greater proportion of problem gamblers and at-risk gamblers compared with non-problem gamblers also thought that skill played either the only or primary role for the outcome. This correlation was not however statistically significant, however.

Respondents were asked to answer two questions concerning understanding of probability and the independence of random events. One question dealt with the probability of heads or tails when flipping a coin and the other question dealt with probability when rolling dice. The majority of the entire sample answered the coin-flipping question correctly (73.1%). Similarly, with regard to throwing dice, 78.7% of the entire sample answered correctly. Surprisingly, no significant age differences were observed. However, the older respondents (aged 14–17) showed a slight tendency to answer the questions concerning probability correctly more often than did the younger respondents. Similarly, no significant gender differences or differences were observed across gambling groups on these variables. The majority of both non-problem gamblers, at-risk gamblers and problem gamblers provided correct answer to both probability questions.

Table 4
Perception of skill and luck in chance-based games across gambling groups

Skill and luck	Gambling groups <i>N</i> (%)			
	Non-problem gamblers	At-risk gamblers	Problem gamblers	Total
Only or mostly luck*	798 (83.0)	31 (68.9)	13 (65.0)	842 (82.0)
Both*	147 (15.3)	10 (22.2)	4 (20.0)	161 (15.7)
Only or mostly skill*	17 (1.8)	4 (8.9)	3 (15.0)	24 (2.3)
Total <i>N</i> (%)	962 (100)	45 (100)	20 (100)	1027 (100)

Note. *Statistically significant ($p < 0.05$), ($\gamma = 0.404$, $p = 0.010$) as tested by Gamma test. Percentages are column percentages.

Conclusions

We investigated the gambling behaviours among Danish youth aged 11–17 years, specifically (1) how gambling frequency correlates with the perception of skill and luck involved in gambling, and (2) if conceptions of skill and luck involved in different types of games differ across groups of gambling severity. Besides some rather unsurprising results (e.g., that adolescent males gamble more frequently than females, and that males prefer skill-based games while females tend to prefer chance-based games) this study also made some interesting findings.

As the data show, it appears that that among Danish adolescents an adequate and reasonable understanding of the importance of luck versus skill involved in gambling activities does in fact exist. Among gamblers as well as non-gamblers, gambling is perceived primarily as a luck-driven activity. Another interesting finding was that respondents seemed to be well aware that both skill- and chance-based games involve high levels of luck, and they were able to differentiate between the level of skill or luck involved in these two types of games. Contrary to the findings of other studies (e.g., Turner et al., 2007), we ourselves did not find that problem gambling was negatively correlated with understanding of probabilities and the independence of random events.

In other words, among respondents in general an adequate and relevant understanding of the level of skill and luck that are involved in various types of games does in fact operate. This finding adds an important dimension to the research literature and to the understanding of youth gambling, as it indicates that some youths have a nuanced and differentiated view of gambling activities, and that not all young problem gamblers show poor understanding of probabilities and random chance. However, across the various gambling groups, some significant differences did nonetheless appear. Thus, more at-risk gamblers and problem gamblers (who gamble frequently), compared to non-problem gamblers, believed that skill plays an important role when gambling (i.e., both in chance games and games that require a degree of skill). This finding is overall consistent with previous research that has documented correlations between gambling problems and erroneous beliefs about random events (Griffiths, 1995; Toneatto et al., 1997; Turner, Macdonald, Bartoshuk, & Zangeneh, 2007). Perception of skill and luck involved in gambling thus seem to be contingent upon gambling frequency and the severity of gambling problems. Such findings suggest that adolescents' perceptions and conceptions of skill and luck (including mistaken and faulty ones) can affect their gambling involvement. Previous and recent research among adult gamblers suggests that increased gambling frequency is positively correlated with irrational beliefs (Griffiths, 1995; Lund, 2011). In addition, gender seems to be an important contributor, as males, perhaps as part of their externalizing behaviours, tend to maintain more optimistic views regarding their risks of experiencing problems while at the same time being aware that other people might be negatively affected by their assumption of those risks. Clearly, more research among youth is needed to clarify

and understand the relationships between gambling frequency, preferred types of games, and the development of irrational beliefs among young gamblers.

In terms of self-perceived gambling skills some expected gender differences were observed. Significantly more males than females reported that they enjoyed better gambling abilities than did their peers. Gender differences also appeared in terms of perception of potential benefits (financial gain) of gambling. Likewise, significantly more males than females anticipated a future “big win”. Since male respondents tend to prefer skill-based games, these findings also seem consistent with research indicating that gamblers who prefer ability games tend to attribute their wins to their own gambling skills (Fekjær, 2003).

The majority of respondents were relatively unconcerned about the risks of occasional gambling while the concerns about the risk related to frequent gambling were more prevalent, with more than 45% of respondents perceiving it to be very risky to gamble several times a week. Thus, these findings seem to indicate a sound understanding of the relation between gambling frequency and the risk of gambling-related problems. This finding is consistent with previous research on perceived risks and benefits of gambling among youths (Emerson et al., 2007). It also seems consistent with the fact that the majority of adolescents “engage in gambling activities as part of their normal behaviour and will not be adversely affected” (Derevensky & Gupta, 2004b, p. xxii).

The current results thus suggest affirmative answers to both research questions. First, as the more frequently adolescents gamble, the less risky they perceived gambling to be. Second, and likewise, significantly more problem gamblers compared to non-problem gamblers thought they had better gambling skills than did their peers, believed that one day they will experience a big win, and did not agree with the statement that gambling may result in a loss of money.

It is conceivable that the level of gambling involvement influences both the risk perceptions and the level of illusions of control and the relative evaluation of gambling skills. However, some qualifications are needed on the possible relations between gambling frequency, risk perceptions, the evaluation of relative gambling skills, and the outcomes of gambling. Until now, little was known about these inter-relations. Some evidence now suggests, however, that specific adolescent gambling styles, preferences and behaviours lead to certain ways of perceiving risks, gambling skills and possible outcomes of gambling. Thus, previous research has concluded that adolescent problem gamblers, the majority of which are males (Jacobs, 2004), prefer those gambling types that imply various degrees of skill, whereas non-problem adolescent gamblers, and especially females, prefer games involving chance or merely luck (Wynne, Smith, & Jacobs, 1996). Similar findings were made in this study.

Additionally, male respondents in Gupta and Derevensky's (1998) study of gambling behaviour among adolescent high school students in the Montreal region reported higher levels of self-perceived gambling skills by males over females. This finding may suggest that male adolescents are attracted to those games that imply both objective levels of skills and relatively high levels of perceived skill. Some researchers have suggested that skill-based gambling (such as poker) increases the risk of illusion of control (Mitrovic & Brown, 2009). It is therefore conceivable that these observed male gambling preferences and this particular gambling style may lead to an increased level of illusions of control. Increased level of illusions of control among males adolescent gamblers may in turn lead to perceptions of gambling as a potentially controllable and thus relatively harmless activity. Thus, the observed pattern of male gambling may be an indication of a characteristic male gambling style involving preferences for certain skill-based games. This would be a style that could lead to, or enhance, both overestimations of the role of skill in relation to gambling outcome, and relatively high evaluations of personal gambling skills. At present some empirical evidence (based on adult studies) does exist, supporting the proposition that cognitive biases are salient factors in the development of gambling problems (Tang & Wu, 2012).

Further research should explore how perceptions of possessing gambling skills are associated with gambling motivations. Furthermore, how adolescent gambling styles are developed and maintained should also be explored. Exactly how gambling preferences and gambling styles are socially mediated may be a leading question for future research projects. Focusing on sports gambling, DiCicco-Bloom and Romer (2011) have shown that adolescent gambling patterns are influenced by athletic participation, indicating that certain subcultures may stimulate certain kinds of gambling. Research in such a vein, one that takes into account the social structure, symbols and status systems of the adolescent world, may lead to important insights regarding the development of adolescent gambling styles and characteristics in terms of risk perceptions, self-evaluated relative gambling skills, and illusions of control.

Summing up, this study has added to the existing knowledge on youth gambling by examining how levels of gambling severity, gambling frequency, and gender correlate with perceptions of gambling and the associated risks among Danish children and adolescents. The study has shown that youngsters are able to differentiate the various levels of skill and luck that are involved in both chance-based and skill-based games. This research has also made the following conclusion. Conceptions of skill and luck in chance-based and skill-based games are positively, though not significantly, correlated with levels of gambling problems, as more at-risk and problem gamblers, compared to non-problem gamblers, tend to think that skill plays an important role in the gambling outcome. Moreover, this study has also pointed to the international generalizability of current findings on the correlations between levels of youth gambling problems, erroneous beliefs about random events, and self-perceived gambling skills.

Limitations and Implications

Some limitations of this present study need be mentioned. First of all, the items on risk perception were relatively general in nature (e.g., “People who gamble usually lose”) and therefore possibly somewhat difficult for some adolescents to address. Therefore, this study may underestimate the level of perceived risks among adolescents. It would have been preferable to have incorporated a wider battery of actual and more specific risks in the items measuring risk perception. In addition, the term *often* in the question “People who gamble often can become addicted to gambling” is rather subjective, and readers need bear this in mind when interpreting results. Second, the design did not allow for differentiations of risk perception in relation to different types of games. The variation of available types of gambling is huge, and it is possible that adolescents’ perceptions of risk differ across various forms and social contexts of gambling activities. These qualifications need to be considered in conducting further research in this area. Third, because of the correlational approach employed in this study it is not possible to evaluate whether gambling frequency influences risk perceptions or vice versa. Similarly, it is not possible to determine whether self-perceived gambling skills and expectation of future big wins are influenced by the level of gambling involvement and the severity of gambling problems. We are not, in other words, able to make causal inferences and suggest explanatory mechanisms. In exploring further such mechanisms prospective and longitudinal research is needed. In particular, research projects based on qualitative data may provide evidence of how the identified correlations develop in the trajectories or careers of young gamblers, and thus add important elements to our understanding of the mechanisms involved in the perception of risk in gambling among adolescents.

Despite the limitations, this study offers insights that may inform future educational or preventive purposes. Recently it has been emphasised that “youth gambling research should go beyond the basic risk prevention framework to one that fosters protective factors when helping develop youth gambling prevention initiatives” (Shead, Derevensky, & Gupta, 2010, p. 52–53). In turn, the framework of Positive Youth Development (PYD) “emphasises the manifest potentialities rather than the supposed incapacities of young people” (Damon, 2004, p. 15); we contend, following the observation of Shead et al., that our own findings are employed within that framework. Findings from this study provide some evidence in terms of the cognitive competencies of young people reporting possible gambling problems. For instance, it was found that problem gamblers tend to overestimate both the strength of their gambling skills and the importance that skill exerted in various types of games; that problem gamblers were less likely to agree that gambling leads to loss of money; and that an increase in gambling frequency is associated with a decrease in the perceived risks related to gambling. Preventive programs may utilize these findings by designing training and curricula that aim specifically to improve the cognitive competencies in question (e.g., cognitive training that aims to reduce erroneous beliefs and illusions of control, information about gambling and the role

of the cognitive biases associated with problem gambling, information about gambling statistics and the chance and random element inherent in gambling).

At present, only limited research is published examining the effects of preventive programs directed at youth. Examining two separate gambling prevention programs among Canadian university and high school students (one focusing on gambling-related statistics, another designed as broader gambling awareness sessions), Williams, Connolly, Wood, Currie, and Davis (2004) found that the programs were effective in improving gambling-related cognitions and knowledge about gambling and problem gambling. Similarly, Turner, Macdonald, and Somerset (2008) have evaluated a school-based problem gambling prevention program designed to improve students' knowledge of random events, problem gambling awareness, self-monitoring and coping skills. It was found that the designed curriculum was successful in educating the targeted students in terms of knowledge of random events and their relation to problem gambling (Turner, Macdonald, & Somerset, 2008). Thus, preliminary evidence has been found that programs focusing on improving cognitive competencies and awareness of both gambling and problematic gambling may stimulate important protective factors in terms of youth gambling problems. On the basis of this finding, it is recommended that further studies be conducted to examine, longitudinally, the potential effects of cognitive improvement programs in terms of improved cognitive competencies, gambling participation and gambling-related problems.

The findings that male gamblers tend to prefer skill-based games and to express higher levels of self-perceived gambling skills than do females might indicate that male gamblers should be specifically targeted in future prevention programs. However, because of the potential stigmatizing effects of selective programs, we recommend that future PYD programs focusing on promotion of cognitive competence should be conducted as universal programs targeting the total population of students in various educational programs. In designing preventive programs, however, we also recommend that professionals pay due respect to gender-specific needs.

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