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NEW EVIDENCE FROM THE GREY AREA: DANISH RESULTS FOR AT-RISK GAMBLING

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New evidence from the grey area: Danish results for at-risk gambling

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Abstract: The paper investigates the differences between at-risk gamblers and no-risk gamblers by using a unique data set to provide a closer inspection of the characteristics and gambling behavior of at-risk gamblers. The data stem from the first Danish large-scale nationwide study conducted in 2005, followed by a second wave interview in 2006. The first wave sample consists of 4,932 current gamblers with no current gambling problems or pathology, and the second wave re-interviewed 379 of them. The analysis involves both a logistic regression and cross-tabulations. The results show that at-risk gamblers and no-risk gamblers have significantly different socio-demographic profiles and gambling behaviors. At-risk gambling is more prevalent for men, young people, and immigrants. Moreover, at-risk gamblers are more likely to have no living-at-home children, to have low income and low education. Most importantly the paper shows that playing high-risk games (i.e., games whose characteristics constitute a high-risk for vulnerable players in terms of developing problem gambling) substantially increases the odds for at-risk gambling and this finding should be used in preventive work.

172 words

Keywords: At-risk gambling; Adults; Risk factors

Introduction

Over the last several years, availability and acceptability of legalized gambling have widely expanded. As a consequence, more people are participating in gambling and more people are therefore expected to develop gambling related problems. Many countries have conducted prevalence studies to evaluate the prevalence level of gambling in the population, e.g., in the US (Gerstein et al., 1999); New Zealand (Abbott & Volberg, 2000); more recently in Europe, the UK (Orford et al., 2003); and especially in Scandinavia, Sweden (Volberg et al., 2001); and Norway (Götestam & Johansson, 2003; Lund & Nordlund, 2003; Kavli & Berntsen, 2005).

In Denmark, since 1988 and the liberalization of the Danish gambling market, the supply of legalized gambling has also widely expanded. As a result, Public authorities became more aware of possible gambling problems and also wanted to investigate the prevalence level on the Danish population. As a consequence, the first Danish large-scale nationwide study was launched in 2005 (Bonke & Borregaard, 2006), followed by a second wave interview in 2006 (Bonke, 2007). From 2002 to 2005, the gross sales in the gambling market have increased by 37 percent in Denmark (Bonke & Borregaard, 2006). Moreover, in 2006 the average gambling expenditure per inhabitant (15 years and older) is 800 EUR Denmark (Danske Spil, 2006 Annual Statistics Report www.danskespil.dk). For the sake of comparison this amount is, however, 40 percent lower than the 1,284 EUR per inhabitant in Norway (the Norwegian Gaming and Foundation authority www.lottstift.no). This apparently lower gambling involvement in Denmark may reflect the primary concern of Danish gaming law: player protection.

To identify gamblers and the degree of addiction among gamblers, prevalence studies have applied different screening tools. Volberg et al. (2001) and Abbott & Volberg (2000) used the South Oaks Gambling Screen – Revised (SOGS-R), Kavli & Berntsen (2005) used the classification system Canadian Problem Gambling Index (CPGI) and Götestam & Johansson (2003) used the Diagnostics and Statistics Manual, 4th ed. (DSM-IV). Both Lund & Nordlund (2003) and Bonke & Borregaard (2006) used the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS), (see Gerstein et al., 1999). These screening tools classify gamblers into different risk categories depending on the number of items they endorsed. No-risk gamblers have a score of zero meaning that they did not experience any adverse effect of their gambling. At-risk gamblers (moderate gamblers for CPGI) have experienced one to two adverse effects of their gambling and problem and pathological gamblers have respectively experienced three to four and five and more adverse effects of their gambling. These classifications usually both have lifetime and current (during the last 12 months) frames, and the current items are only asked if the corresponding lifetime item is endorsed.

The differences in methodology notwithstanding, one common finding of these prevalence studies is that very few gamblers are classified as problem or pathological gamblers. The prevalence for current problem and pathological gamblers is 2 percent in Sweden (Volberg et al., 2001), while figures in Norway and Denmark are respectively 0.7 percent (Lund & Nordlund, 2003) and 0.4 percent (Bonke & Borregaard, 2006). Moreover, the result for this category is very sensitive to the screening tool. In Norway, prevalence figures for gambling problems vary between 0.6 percent for the SOGS, 0.7 percent for the NODS, and up to 1.9 percent with the classification system CPGI.

Another common finding is that the at-risk category is usually larger than the category of problem and pathological gamblers and therefore less sensitive to a given prevalence screening tool, making this category a reliable field of investigations. For example, prevalence rates for current pathological gamblers in Denmark and Norway show significant differences, while prevalence rates for at-risk gamblers do not, although the prevalence is slightly larger in Norway (see Bonke & Borregaard, 2006, p. 53). Differences become more significant only for lifetime prevalence.

Moreover, as Lund (2007) has emphasized, looking at at-risk gamblers is very appealing for many other reasons. In contrast to pathological and problem gamblers, the risk of underrepresentation is minimal. Indeed, pathological and problem gamblers are generally thought to be under-represented, as they are more difficult to reach by phone (Lesieur, 1994) and less willing to discuss their gambling problems. Furthermore, at-risk gamblers constitute a category of interest for preventive actions, as they might be more likely to become problem or pathological gamblers. However, very little evidence is available on their characteristics or their gambling behavior. As a consequence, studying the characteristics and game behavior of at-risk gamblers may enable the development of policy measures for preventing at-risk gamblers from becoming problem or pathological gamblers. This constitutes the main purpose of this paper.

Lund (2007) provides the first close inspection of the characteristics and gambling behavior of at-risk gamblers. The objective of this paper is to provide new evidence for the characteristics and game behavior of at-risk gamblers. The paper investigates socio-

demographics variables and game behavior of the at-risk gamblers. Moreover, it also takes advantage of a unique data set to further investigate assumed risk factors in the hope of enabling adequate preventive actions.

Method

Data

A first large-scale nationwide study was conducted in Denmark in November-December 2005 followed by a second wave interviews in May-June 2006. The classification of gamblers used in the 2005-2006 Danish gambling study is based on NODS.

In the first wave interview a representative sample (gender, age, geography and marital status) of adults Danish residents (aged 18-74) were randomly selected from the Danish central national register (CPR-register). The first wave interview was mainly conducted per telephone and not obtained interviews were followed up with face-to-face interviews. The response rate for the overall sample was 70 percent. The non-response bias turns out to be negligible (only changing the results by 0.01 percent) and it was not necessary to weight the sample (see Bonke & Borregaard, 2006). Therefore, the following analysis presents the non-weighted results.

The second wave only interviews previously identified gamblers with NODS score higher than 0 (at-risk to pathological gamblers) and a group of NODS 0 gamblers (no-risk gamblers) matching the previous group with regards to gender, age and having living-at-home children. The second wave interview was also carried out by phone. The answer rate in the second wave interview was 63 percent.

The current study focuses on current non-problem gamblers, i.e., people with a current NODS score of 1 to 2 (at-risk gambler) and people with a current NODS score 0 (no-risk gambler). The first wave sample consists of 4,932 current non-problem gamblers and 142 current at-risk gamblers, whereas the second wave sample includes 379 current non-problem gamblers (295 no-risk- and 84 at-risk gamblers).

Variables

Variables from wave 1

The analysis of the first wave data investigates socio-demographics differences between the two gambler groups by including respondents' gender, age, marital status, information on whether they have living-at-home children, education level (elementary school (*folke skole*); upper secondary school *(gymnasium*); and vocational training and further education, country of birth, and income (above or below the 25 percent percentile).

[TABLE 1 ABOUT HERE]

Gambling participation is analyzed by looking at the type of games played and the frequency of gambling.

In the first wave questionnaire, respondents were asked whether they have spent money during the last twelve months on fourteen different games (such as lotteries, different types of gambling machines, sports betting, scratch cards, cards and casino type games, horse gambling, sport betting, Bingo, football pools). Usually, forms of gambling

involving relatively high level of skill or an intermediate mix of skill and luck are associated with higher rate of problem gambling than those purely based on luck (see among others Griffiths, 1999). To analyze the association between the form of gambling and the degree of gambling involvement, the current study is grouping the games accordingly to their degree of riskiness as defined by the Gambling assessment Measure – Guidance about responsible design (GAM-GaRD), (see Griffiths et al., 2007; Griffiths et al., 2008). The GAM-CarD identifies risky games according to their characteristics, such as event frequency, multi-game / stake opportunities, stake size, prize-back ratio, jackpot size, near win opportunities, continuity, accessibility, currency/ease to pay, and illusion of control elements. It provides each game tested with a total score dividing games into three categories in terms of riskiness for vulnerable players. These three categories are: low-, medium- and high-risk games for vulnerable players as shown in Table 2. In the present study the low-risk games encompass lotteries and Bingo, medium-risk games are sports betting, football pools and scratch cards, while high-risk games encompass horse gambling, gambling machines and cards and casino type games. This categorization is a first attempt and a more cautious classification of games may be investigated in the future.

[TABLE 2 ABOUT HERE]

Table 3 shows that the gambling frequency was measured for all the games with responses ranging from “almost every day” to “once during the last 12 months”.

[TABLE 3 ABOUT HERE]

Variables from wave 2

In the second wave interview, respondents were asked structured multiple-choice questions and open-ended questions concerning gambling and gambling habits. These questions allow for a further inspection of assumed risk factors for at-risk gamblers. Gambling initiation age, beginners luck, gambling problems in the family, and the number of misconceptions about the chances of winning are usually closely correlated with current gambler problems (see, Johansson et al., 2009). Furthermore, Jonsson et al. (2003) show that negative life experiences are also closely correlated with current gambling problems. Attitudes towards risk play significant roles in explaining a vast range of individual choice and behavior. Bonke (2007) show that all these assumed factors were associated with lifetime NODS1^{+}gamblers (gamblers with a lifetime NODS score higher than zero). The purpose of the second wave analysis is to investigate whether these findings still hold for at-risk gamblers compared to no-risk gamblers.

As a consequence, the current study analyzes gambling initiation age, gambling problems not only in the family, but also in the acquaintance of the gambler, the gambler‘s fallacy, i.e., the false belief that the probability of an event in random sequences is dependent on preceding events, the respondents’ childhood and adolescence conditions, other risky or problematic behavior (such as smoking, alcohol and drugs consumption) and attitudes towards risk.

Gambling in the family or in the acquaintance of the respondents was looked into by asking the respondents, whether they knew someone in their family, among their friends

or their colleagues at work or education place, who was playing for a large amount. The variable gambling initiation was measured by asking the respondents how old they were when they started gambling regularly. Table 5 shows answers to these questions.

A number of questions were intended to reflect how the respondents experienced their childhood and adolescence (the first 15 years of their life) with regards to different circumstances, which should reflect whether their early years have been influenced by socially burdensome factors. Table 6 show the answers related to the childhood circumstances.

The correlation between gambling and other risky or problematic behavior was investigated by questioning respondents on their drinking and smoking habits as well as their drug-use (see Table 7).

Beliefs in the gambler's fallacy were examined by asking the respondents how much they agree with the statement: "A*fter having played many times without winning the chance for winning become larger"*. Agreement includes: totally agree, partially agree, neither agree nor disagree, partially disagree, totally disagree, and do not know (see Table 8).

The risk attitude of the respondents was studied by asking the respondents whether they will prefer to play a lottery with 25 percent chance of winning DKK 2,000 (1EUR = DKK 7.45) or receive DKK 500 without playing. Respondents preferring the lottery are qualified as risk lover as opposed to the risk averse preferring the equivalent certain

(receiving the DKK 500 with certainty), while those who did not want to answer are considered as being indifferent and therefore classified as risk neutral (see Table 9).

Statistical Analysis

The analysis uses both bivariate and multivariate methods. The multivariate method is, however, only used on the first wave sample as the second wave sample is much smaller. The analysis uses t-testing to compare means in the two groups and χ^2-testing or Fisher exact test for cross tabulation and Gamma and Kendall's tau-b for testing ordinal association of variables. The first wave analysis enables the identification of the socio-demographic risk factors, as well as some gambling behaviors, while the second wave analysis investigates the distribution of risk factors for the two groups, according to gambling initiation, gambling problems in the acquaintance of the gamblers, their childhood and adolescence circumstances, as well as other risky or problematic behavior (e.g. alcohol, smoking and drugs consumption), misconceptions about the chances of winning and risk attitudes.

Results

Classification and Gambling behavior (Wave 1)

The data of the current study are collected at two points in time, however, it is not possible to observe changes in the prevalence level of at-risk gamblers and no-risk gamblers, as the questions relative to the NODS classification were only asked in the first wave. Nonetheless, the risk a substantial changes in the gamblers situation is minimal because of the relatively short period between the two interviews (around six months).

Jonsson et al., (2003) observed an interchange of people between the group of pathological gamblers and problem gamblers, when they re-interviewed at-risk and problems and pathological gamblers after two-years and a half.

In the first wave interview, respondents were also classified according to the NODS lifetime classification, and 92 percent of the current at-risk group had never experienced more serious problems than now. Only 8 percent of the current gamblers had previously been problem or pathological gamblers, meaning that their current situation constitutes an improvement. The proportion of current gamblers in the lifetime at-risk group is high around 56 percent (130 out of 231).

Table 1 shows that at-risk gamblers represent 2.88 percent of the first wave sample. The average age for the no-risk gamblers is 44.5 years, while at-risk gamblers are close to 32 years on average. Similarly to Lund (2007) the current study finds that at-risk gambling was more prevalent for men, young people, and singles.

Additionally, at-risk gambling is more prevalent for people having no living-at-home children, low education (elementary school as their highest degree) and a low income (below the 25 percent percentile).

Table 1 also shows a large variation in the size of the groups, explaining that 56 percent at-risk gamblers belongs to the group of people having an income above the 25 percent percentile, as this group is three times larger than the group of people with income below the 25 percent percentile. Moreover, the prevalence for cohabitating is very high, but the

size of the group is so small that at-risk gambler is still characterized as a single person. Likewise, the prevalence level for people born abroad is high, but at-risk gambler is still characterized as an ethnic Dane because of the small size of the group of people born abroad. Hence, a typical at-risk gambler emerges as a single young to middle-aged man with no living-at-home children.

Table 2 shows that at-risk gamblers play significantly more high and medium-risk games, while no-risk gamblers play significantly more low-risk games. The most popular games for the two groups are, e.g., lotteries played by 81.74 percent of the no-risk-gamblers and 75.35 percent of the at-risk gamblers. Table 2 also shows that at-risk gamblers played on average 4.62 games, while no-risk gamblers play 2.69 games on average (standard deviations are indicated in brackets). For the sake of comparison, Bonke & Borregaard (2006) find that problem and pathological gamblers ($NODS3^{+}$) play on average 5.1 games.

Turning to frequency of gambling participation, Table 3 shows that 9.2 percent of the at-risk group had gambled daily and more than one third of them had participated in gambling at least once a week. Participation of no-risk gamblers was much less frequent. There is a positive ordinal association between the level of gambling participation and the degree of prevalence (ordered from high to low) (T-test for gamma and Kendall's Tau-b, p-value for the 2-sided alternative equals 0, see Table 3). As expected, at-risk gamblers have a higher frequency of gambling participation than no-risk gamblers.

Logistic Regression (Wave 1)

Volberg et al. (2001) found that male, aged below 30 years, low income and single marital status are common factors for problem gambling. Ladouceur et al. (1999) and Winters et al. (1993) identified further additional factors, like less formal education or low grades. Of course, most of these risk factors are inter-related, a young people are most often single, have lower income and are under education. The study therefore uses multivariate analysis to figure out the most important factors increasing the likelihood of being at-risk gambler.

[TABLE 4 ABOUT HERE]

Categorical variables with constant reference categories marked "(ref)" are gender, age, education, country of birth, income (above or below the 25th percentile), having no living-at-home children, the type of games played (high, low or medium-risk games), being single (including divorced, widowed), and having experienced gambling problems in the past (i.e., having a higher NODS lifetime score). The variables measuring frequencies of gambling is transformed in a semi-continuous variable, computed from the categorical answers given by the respondents. Daily or almost daily gambling correspondents to 312 times per year, i.e., an average of 5-7 times per week; once or several times a week equals 130 times, i.e., an average of 1-4 times per week; 1 to 3 times per month equals 24 times, i.e., an average of 1-3 times per month (the same transformation as in Lund, 2007).

The results from the binary logistic regression confirm most of the earlier bivariate results regarding the importance of demographic risk factors. Table 4 shows that gender, age,

country of birth and playing high-risk games were important factors, with men, young to middle-aged people (18-44 years) and people born abroad being more at risk of becoming at-risk gamblers. In addition, low level of education —elementary school— (at 10 percent level), low income – below the 25th percentile — and no living-at-home children (at 10 percent level). Playing high-risk games, having a high frequency of gambling and previous experiences as problem gamblers significantly increase the odds of being at-risk gamblers. Moreover, playing at-risk games appears as the most important risk factors (Odds ratio =6).

Distribution of assumed risk factors (Wave 2)

The second wave interview is a subsample of the first wave and consists of 295 current no-risk gamblers and 84 current at-risk gamblers. 9.5 percent of the current at-risk gamblers have experienced a higher NODS lifetime classification.

Tests show significant differences between the two groups regarding age. The current at-risk group is significantly younger than the no-risk group: 30.9 years compared to 38.8 years (T-test, p-value =0). Gender, education and the country of birth are equally distributed among the two groups.

Looking at gambling in the family or close friends, the study finds that at-risk gamblers, contrary to problem gamblers, (see Bonke, 2007), do not appear to know more gamblers among their relatives ($\chi^2(1)=1.13$, p-value=0.287). However, Table 5 shows that at-risk gamblers both know more friends ($\chi^2(1)=25.20$, p-value=0) and work colleagues who are gambling for a large amount of money ($\chi^2(1)=8.17$, p-value=0.004). These findings may

play an important role in the maintenance of gambling. Furthermore, current at-risk gamblers have a slightly younger initiation age 17 years compared to 18.5 years.

[TABLE 5 ABOUT HERE]

Table 6 shows no significant differences in the two groups of gamblers regarding the circumstances of their childhood and adolescence. Moreover, the average years spent with both parents during the first 15 years was 12.7 years for no-risk gamblers and 13 years for at-risk gamblers (T-test, p-value= 0.2033). Consequently, no significant differences in the childhood conditions of the two groups could be established. Bonke (2007) finds that lifetime no-risk gamblers (NODS0) had significant better childhood and adolescence circumstances than lifetime NODS1^{+} gamblers, for questions 1 to 3 and 5 to 6 in Table 6.

[TABLE 6 ABOUT HERE]

Looking at the correlation with other risky behaviors, the current study shows that the two groups were similar with regards to alcohol consumption, and smoking. The only significant difference at 5% and 1% level is found for life time drugs consumption and last year drugs consumption, respectively (see Table 7).

[TABLE 7 ABOUT HERE]

Previous findings related to problems gamblers (Jonsson et al., 2003) show that the gambling problem group reported depressive reactions, higher degree of risky or

problematic drinking habits compared to the control group composed of at-risk gamblers. However, no differences related to the general health or smoking. A larger number of problem gamblers had used drugs at some time or another, but there was no difference concerning the current drug abuse. Bonke (2007) found that smoking and taking drugs are significantly different for no-risk and problem gamblers ($NODS1^{+}$). Apparently, at-risk gamblers behaviors in terms of other risky behavior (alcohol, cigarettes and drug consumption) are different than previous findings for problem and pathological gamblers.

[TABLE 8 ABOUT HERE]

In a critical review of risk factors for problematic gambling, Johansson et al. (2009) show that having misconceptions about winning chances is a well established risk factor for problem gamblers. Moreover, Lund (2007) finds that a high number of misconceptions about the chances of winning increases the probability of being at-risk gambler. However, the current study cannot conclude that at-risk gamblers are more subject to the gambler's fallacy. The statistic test for ordinal association between the prevalence level and the degree of belief in the gambler's fallacy is equal to 0.78 with a p-value=0.2177 (see Table 8). Bonke (2007) found by testing this question on lifetime no-risk and lifetime problem gamblers ($NODS1^{+}$) a p-value =0.12. Apparently, believes in the gambler's fallacy are more pronounced for problem and pathological gamblers.

[TABLE 9 ABOUT HERE]

Table 9 shows the risk attitude of the respondents for at-risk and no-risk gamblers. In Bonke (2007), 45 percent of the lifetime problem gamblers (respectively 25 percent of the lifetime no-risk gamblers) choose to play the lottery instead of receiving the equivalent certain, i.e., they were classified as risk lover. In the present study of current gamblers, only 38 percent of the current at-risk gamblers can be classified as risk lover (respectively 32 percent of the current no-risk gamblers). On the one hand, the relatively young age of the sample of current at-risk and no-risk gamblers may explain the higher proportion of risk lovers among the current no-risk gamblers, as younger people are usually more risk lover. On the other hand, the exclusion of problem and pathological gamblers from the current sample may explain the lower proportion of at-risk gamblers among risk lovers. However, proper investigation of risk attitudes will require a more thorough approach.

Discussion

The present study finds that at-risk gamblers are more likely to be men, younger people and immigrant. These findings are very similar to the first inspection of at-risk gamblers provided by (Lund, 2007). These results confirm the resemblance between at-risk gamblers and problem gamblers in terms of demographic variables, (see Johansson et al., 2009 for a critical review of well established risk factors).

The current study further establishes that people with low income and low education have a higher risk of being at-risk gamblers, these two factors are somewhat less well established for problem gamblers, (see Johansson et al., 2009).

Another usual assumed factor for problem gamblers is an earlier age of gambling initiation (see Volberg et al., 2001; Bondolfi et al., 2000). The current study also finds that at-risk gamblers start at a slightly, but significant, younger age. However, the study could not establish a significant difference between the at-risk and the no-risk groups with regards to misconception about winning chances and the laws of statistics. The study, however, only examines one misconception: the gambler's fallacy, contrary to Lund (2007) who looks at five different types of misconception about winning chances and the laws of statistics.

Interestingly, gambling in the acquaintance of the gamblers (friends and colleague at work and education place) is more significant than gambling within the family. The initiation for starting gambling may also be influenced by these relations, as well as the maintenance of gambling behavior. However, the study cannot establish whether knowing acquaintance who gambles for a large amount is the cause or the consequence of the respondent's gambling behavior.

The results related to initiation age, gambling frequency and the number of games played show that at-risk gamblers are situated somewhere between no-risk gamblers and problem gamblers (see Bonke & Borregaard, 2006). Negative life experiences during childhood and adolescence, attitudes towards risk and over risky problematic behavior could not differentiate at-risk gamblers from no-risk gamblers (with the exception of drug consumption). Consequently, the total gambling involvement appears highly correlated with the prevalence level.

The study further shows that the most important risk factor —identified by the logistic regression— is the type of games played. Playing high-risk games increases considerably the odds of being at-risk gamblers. Moreover, cross-tabulations show that at-risk gamblers play significantly more high-risk games, while no-risk gamblers play significantly more low-risk games. The games were classified into the category of low-, medium- and high-risk games by using GAM-GaRD (Griffiths et al., 2007; Griffiths et al., 2008). This way of classifying games relies on the structural and situational characteristics of games and can be used to identify games presenting the greatest risks for excessive and/or vulnerable player. Cornish (1978) already drew attention to the reinforcement effect resulting from the structural characteristics of a particular gambling activity. Griffiths & Wood (2001) further observe that structural characteristics may be an important factor in the maintenance of gambling behavior. Moreover, it is important to keep in mind that new forms of structural and situational characteristics are likely to emerge with the development of Internet gambling. There are different ways of tackling the possible harming effects of high-risk games. The most harmful features could be adjusted by introducing market protection, e.g. by limiting the online access to some hours during the day or avoiding placing gaming machines closed to young players or in socially deprived areas. There are already some initiatives towards reducing the gambler involvement by studying player's real gaming behavior. The Swedish Gaming Institute has recently introduced a tool called Playscan, as a mean of preventing undesirable effects of gambling (see Griffiths et al., 2007).

Another issue is to establish whether at-risk gamblers are more likely to become problem gamblers because they play high-risk games. The similarity of at-risk and problem

gamblers profiles could mean that at-risk gamblers may become potential problem gamblers. In the current sample 56 percent of the lifetime at-risk gamblers are current at-risk gamblers and they are relatively young, meaning that many of the at-risk gamblers are recent at-risk gamblers. The same finding is also true in Lund (2007). The established reliability of the NODS instrument (Gerstein et al., 1999) may rule out the hypothesis of under reporting by at-risk gamblers. Moreover, the study finds that the degree of involvement of at-risk gamblers is consistent with their prevalence level, and logically lies between no-risk and problem gamblers.

Further research is therefore requires to analyze the dynamic of becoming problem gamblers by not only measuring the prevalence level at different time, but also by observing changes in behavior and type of games played.

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TABLES

Table 1 Association between socio-economic group and risk category

Demographics	At risk	No risk	Proportion of at-risk group	N
Total	2.88	97.12	1	4932
Gender ***				
Men	4.45	95.55	0.82	2675
Women	1.15	98.85	0.18	2260
Age ***				
18-24	9.89	90.11	0.32	455
25-44	3.68	96.32	0.56	2149
45-64	0.85	99.15	0.11	1880
65-74	0.45	99.55	0.01	448
Average (years)***	44.55	31.88	t-test p-value=0	
Marital Status ***				
Widowed	0.69	99.31	0.01	144
Divorced	2.12	97.88	0.06	424
Married	1.38	98.62	0.27	2825
Cohabiting	7.69	92.31	0.01	13
Single	6.03	93.97	0.65	1526
Living-at-home children**				
Yes	2.24	97.76	0.32	2053
No	3.33	96.67	0.68	2879
Education ***				
Elementary School	4.65	95.35	0.31	947
Upper secondary school	7.28	92.72	0.15	302
Further and higher education	2.06	97.94	0.54	3683
Country of birth ***				
Denmark	2.69	97.31	0.90	4750
Other	7.69	92.31	0.10	182
Income ***				
Below 25% percentile	5.21	94.79	0.44	1189
Above 25% percentile	2.14	97.86	0.56	3743

P<(χ^2) and Fisher exact test for marital status, *P< 0.05, *** P<0.001.

Table 2 Associations between participation in type of games and risk category

	At risk	No Risk	Total	P
N	142	4790	4932	
High-risk games	82.4	24.0	25.7	***
Medium-Risk Games	75.4	54.5	55.1	***
Low-risk Games	83.1	91.8	91.5	***
No. of games played per gambler	2.69 (1.65)	4.62 (2.58)		***

***P<0.001, P<(χ^2) for type of games, t-test for the no. of games played

Table 3 Associations between frequency of gambling participation and risk category

Gambling Frequency	At risk	No risk	Total
N	142	4790	4932
Almost every day	9.2	0.6	0.9
One or more times per week	29.6	7.8	8.4
1-3 times per month	20.4	27.1	26.9
A few times last 12 months	16.2	29.2	28.8
Less	24.6	35.3	35.0

Pearson chi2(4) = 204.1851 Pr = 0.000
gamma = 0.3994 ASE = 0.063, p-value =0
Kendall's tau-b = 0.0879 ASE = 0.015, p-value =0

Table 4 Logistic regression first wave sample, the dependent variable being last year at-risk gambler

Independent variables	Parameter est.	Std.Err	P-value	Odds Ratio	95% Conf. Interval	
Constant	-4.719	0.467	0.000	0.009	-5.716	-3.882
Gender						
Men (ref.)						
Women	-0.489	0.243	0.044	0.612	-0.965	-0.013
Age						
45-64 (ref.)						
18-24	1.155	0.372	0.002	3.174	0.427	1.883
25-44	1.190	0.299	0.000	3.288	0.602	1.778
65-74	-0.860	0.771	0.264	0.423	-2.371	0.651
Marital Status						
Non single (reference)						
Single	0.210	0.231	0.364	1.233	-0.243	0.662
Living-at-home children						
No (reference)						
Yes	-0.245	0.247	0.107	0.782	-0.729	0.238
Education						
Vocational training & further (ref.)						
Elementary School	0.391	0.238	0.101	1.479	-0.077	0.860
Upper secondary school	0.161	0.318	0.612	1.175	-0.462	0.784
Country of birth						
Other (ref.)						
Denmark	-1.225	0.344	0.000	0.293	-1.901	-0.550
Income						
Above the 25th percentile (ref.)						
Below the 25th percentile	0.479	0.247	0.052	1.614	-0.005	0.962
Previous gambling problems						
No (reference)						
Yes	1.211	0.270	0.000	3.357	0.681	1.741
Gambling Frequency	0.008	0.001	0.000	1.008	0.006	0.011
Type of games						
Low-risk games (ref.)						
High-risk games	1.794	0.253	0.000	6.012	1.298	2.290
Medium-risk games	0.179	0.218	0.411	1.196	-0.243	0.662
N=4932						
Adjusted R2	0.2779					
Log likelihood	-464.828					
-2LL= 357.76						

Table 5 Gambling in the family or in the acquaintance and initiation age for at-risk and no-risk gamblers

	At risk	No risk	P-value
Knowing family or relatives playing for large amount	0.23 (N=80)	0.14 (N=280)	0.287
Knowing friends playing for large amount	0.61 (N=80)	0.30 (N=282)	0
Knowing colleagues at work or education place playing for large amount	0.31 (N=75)	0.16 (N=258)	0.004
Mean years Gambling initiation	17	18.5	0.059

χ^2 for gambling in the family or in the acquaintance of the gambler and t-test for gambling initiation.

Table 6 Associations between childhood development and risk category

	At risk	No risk	Fisher exact test
1.) Secure & safe childhood	0.90 (N=83)	0.96 (N=292)	0.598
2.) Stabile conditions (economic, social, relational)	0.92 (N=83)	0.91 (N=292)	1
3.) Solitary and left out feelings	0.08 (N=83)	0.07 (N=288)	0.813
4.) Being bullying during childhood	0.24 (N=83)	0.23 (N=290)	0.884
5.) Felt understood	0.92 (N=79)	0.91 (N=280)	0.456
6.) Alcohol, drugs, medicine, or gambling abuses in the family	0.14 (N=83)	0.15 (N=290)	1
			T-test
7.) Mean no. of years with both parents	13	12.7	0.2033

Table 7 Drug consumption, drinking and smoking for at-risk and no-risk gamblers

	At risk	No risk	P-value (χ^2)
Have ever tried hash or other drugs	0.52 (N=81)	0.39 (N=293)	0.055
Took hash or other drugs in the last 12 months	0.14 (N=81)	0.05 (N=293)	0.012
Alcohol consumption in the last 12 months	0.77 (N=81)	0.79 (N=294)	0.696
Smoking in the last 12 months	0.37 (N=81)	0.38 (N=294)	0.862

Table 8 Gambler's Fallacy for at-risk and no-risk gamblers

	At risk	No risk	Total
N	82	276	358
Totally agree	0.11	0.09	0.09
Partially agree	0.05	0.08	0.08
Neither agree nor disagree	0.11	0.05	0.06
Partially disagree	0.06	0.05	0.06
Totally disagree	0.67	0.72	0.71

gamma= 0.0909 ASE = 0.116, p-value=0.2177
Kendall's tau-b = 0.0387 ASE = 0.051, p-value=0.2236

Table 9: Gamblers risk aversion for at-risk and no-risk gamblers

	At risk	No risk	Total
N	295	84	379
Risk Lover	0.38	0.32	0.33
Risk neutral	0.02	0.02	0.02
Risk averse	0.60	0.66	0.65

Pearson chi2(2) = 1.2385 Pr = 0.538

gamma = 0.1361 ASE = 0.121, p-value = 0.1314
Kendall's tau-b = 0.0564 ASE = 0.052, p-value = 0.1401