

# Are Irrational Beliefs and Depressive Mood More Common Among Problem Gamblers than Non-Gamblers? A Survey Study of Swedish Problem Gamblers and Controls

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**Abstract** This study tests the hypothesis that problem gamblers are more prone to have irrational beliefs and depressed mood than non-gamblers. Irrational beliefs refer to fallacious opinions about probabilities. Gamblers like to believe that chance games (i.e., roulette and lottery) can be controlled and that the outcome of such games is dependent on the patterns of previous outcomes. The empirical material consists of responses to a survey that 302 individuals have answered. Half of the respondents were deemed to be problem gamblers. The results showed that compared to the controls, the problem gamblers were more inclined to show illusion of control due to their skill and reported more depressive mood. The results are discussed in terms of difficulties to know the “hen and the egg” regarding depressive mood, and in terms of intermittent reinforcement to continue gambling.

**Keywords** Gambling · Cognitive strategies

## Introduction

Prior research indicates that problem gamblers (PGs) tend to have irrational beliefs and misconceptions of chance (Ladouceur et al. 2001; Ferland et al. 2002). In particular, PGs have been found to be victims of the following beliefs: exaggeration of their own gambling

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skills, superstitious beliefs and illusory correlation, gamblers fallacy (= the belief in a negative autocorrelation between similar independent events), cognitive entrapment (= the tendency to stick to an old successful strategy), perceived luckiness, “near misses” (= the belief that the chances to win increases if one has been previously close to win) and a belief in “hot outcome” (= the belief in a positive autocorrelation between similar independent events) (Toneatto 1999; Rogers 1998). There is, however, a vast amount of literature showing that most people (including those who do not gamble) tend to have irrational beliefs about probabilities, randomness, and gambling (Fischhoff et al. 1977; Ayton et al. 1989; Gilovich 1991; Cantinotti et al. 2004; Sundali and Croson 2006). For example, an irrational belief that is often observed in both PGs and non-problem gamblers (non-PGs) is the “hot hand” fallacy. This tendency refers to the situation when a person has successfully won a couple of consecutive bets and then believes that he/she is hot and will continue to win (Sundali and Croson 2006). It is important to distinguish between the gambler’s fallacy and the hot hand fallacy: While the former concept concerns beliefs about outcomes of random devices, the latter concept refers to beliefs about outcomes of the individual (Sundali and Croson 2006). Despite evidence that irrational beliefs could be universal, it seems reasonable to assume that such beliefs should be more prevalent among PGs than non-PGs.

A common denominator in the aforementioned irrational beliefs distortions is argued to be an impulse control disorder forming a cognitive style characterized of an illusion of being able to control random events (Specker 1995; Grant and Kim 2003; Goodie 2005). Goodie (2003) showed the existence of paradoxical gambling in that PGs tended to gamble on unfavourable bets due to a feeling of controlling the game. In addition, Burns and Corpus (2004) conducted a study where the perceived randomness of runs of events was manipulated. The study showed that the feeling to be in control of such events resulted in the opposite phenomena of “gamblers fallacy” and belief in “hot outcomes” (Burns and Corpus 2004). These phenomena seem to affect the tendency to continue gambling.

Research on problem gamblers has shown that irrational beliefs are due to misuse of information and superstitious thinking rather than inadequate knowledge of statistics and probabilities (Joukhador et al. 2003, 2004). People who have poor knowledge of such issues might be at greater risk to become problem gamblers. Compared to non-problem gamblers, problem gamblers tended to misperceive a causal association between two independent events (Delfabbro 2004). Delfabbro and Winefield (2000) observed that when 20 regular gamblers were gambling on slot machines, 75% of the thoughts they expressed were deemed to be irrational. In general, the gamblers tend to believe that they could control the outcome of the slot machine and attributed human qualities to the machine (= personification). Using a sample of 926 adolescents, Delfabbro et al. (2006) showed that problem gamblers compared to non-problem gamblers had a higher belief in their ability to control the game and thought gambling to be a profitable activity. However, the knowledge of the objective probabilities did not differentiate between PGs and non-PGs. The results of Delfabbro et al. (2006) indicates that the existence of irrational illusions could explain gamblers misperceptions. According to Ladouceur et al. (2001) gamblers scored lower on a gambling screening test (i.e., SOGS) after being corrected for illusion of control and random events. In addition, Ferland et al. (2002) showed that a video designed to increase knowledge about gambling and misconceptions was effective in preventing gambling problems. However, even if some studies show that illusion of control is positively associated to gambling problems, there is evidence that real control over the game was negatively associated to amount of money gambled (Dannewitz and Weatherly 2007).

Irrational illusions suggest that emotions interact with cognitions in gambling situations. There is evidence that depressive mood is associated to gambling. Kim et al. (2006) suggest that nearly half the population of problem gamblers are also depressed. Hills et al. (2001) evaluated the association between prior mood and persistence in gambling. In their experimental study, they manipulated mood in three manners: depressed, neutral and happy. Participants were 60 regular gamblers (RGs) and 60 non-regular gamblers (NRGs). Hills et al. (2001) showed that persistence in gambling of NRGs was lower during depressive mood, while the persistence in gambling of RGs was not dependent upon their mood. In addition, mood was associated with the outcome of the gamble among RGs but not among NRGs probably due to RGs attribution to their skill. Hills et al. (2001) suggested that depression was a factor to be considered in problem gambling. To further evaluate the association between emotions and gambling Gee et al. (2005) asked gamblers to report their feelings by mobile telephone before, during and after a gambling episode. Gamblers reported more feelings of general anxiety/arousal during and after the episode than before it. Losing was associated with increase in anxiety/arousal and winning was associated with a mitigation of this feeling. This indicates that higher general anxiety/arousal results from the gambling episode sooner than gambling should result from anxiety/arousal. Ladouceur et al. (2006) showed that pathological gamblers being in-patient service had more severe gambling problems and were more depressed than gamblers in outpatient service. This implies an association between gambling problems and depression. Dannewitz and Weatherly (2007) also showed evidence that depression was not associated to gambling in a sample of depressed and non-depressed subjects.

In sum, previous research suggests that several irrational beliefs prevail in problem gamblers. Despite some contradictions, mainly the belief of being in control and depressive mood, are reported to differentiate between problem gamblers and non-problem gamblers. The aim of the present study is to evaluate and compare irrational beliefs and depressed mood among problem gamblers and matched controls, screened-out from the general Swedish population. The hypothesis is that problem gamblers, in comparison to non-problem gamblers, should exhibit more tendencies towards irrational beliefs and be in a more depressive mood.

## Method

### Participants and Dropouts

A sub-sample of 578 individuals was selected from a larger pool of 9917 subjects from the Swedish general population, previously used to study the prevalence of problem gambling in Sweden (Volberg et al. 2001; Rönnerberg et al. 1999). Half of the individuals were deemed to be problem gamblers having scores of 3 or more on South Oak Gambling Screen- Revised (SOGS-R, Lesieur and Blume 1987, further described under the Instruments heading). The other half were used as matched controls which scored below 3 on SOGS-R. It was possible to use responses from 302 of the individuals, leading to a response rate of 52.2%. Respondents were 232 men aged 15–67 ( $M = 29.1$   $SD = 12.8$ ) and 70 women aged 15–62 ( $M = 24.5$   $SD = 11.4$ ). According to SOGS-R, 151 persons reported that they had had gambling problems. Demographic data of the sample is shown in Table 1. As controls were matched regarding age and gender there were no significant differences in distribution between problem gamblers and controls regarding education, place of birth or residence.

**Table 1** Demographic data of the gambling problem group and the matched control group. Significance according to Goodness of fit Chi-Square test

	Problem gamblers (n = 151)	Controls (n = 151)	
<i>Gender (n)</i>			n.s
Men	116 (77%)	116 (77%)	
Women	35 (23%)	35 (23%)	
<i>Age (years)</i>			n.s
All	29.7	29.8	
Men	30.8	30.8	
Women	26.1	26.1	
<i>Education (%)</i>			n.s
Primary school	52.3	51.0	
Secondary school	36.4	35.1	
University	11.3	13.9	
<i>Place of birth (%)</i>			n.s
Sweden	91.4	87.4	
Abroad	8.6	12.6	
<i>Residence (%)</i>			
Large city	19.2	23.2	
Other	80.8	76.8	
<i>Mean score on SOGS-R</i>			***
Life time	4.27	0.44	
Current	2.48	0.23	

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ;

\*\*\*  $p < 0.001$

An analysis of the 276 dropouts suggested that half of them had gambling problems. The most frequently reported reasons for dropout were: unwillingness to participate, lack of time to participate, secret telephone number meaning that no reminders could be made, and non-responses. In all, there were 115 problem gamblers and 122 controls that completed the questions regarding depressive mood. The non-responses to the instrument “Beliefs about Gambling” (see below) concerned only a few respondents.

### Instruments

Data were collected by self-report questionnaires that were administered during a clinical interview. Gambling problems was measured using South Oaks Gambling Screen- Revised (SOGS-R, Lesieur and Blume 1987). This instrument is a 20-items questionnaire that asks the respondent to report behaviours exhibited in situations associated with gambling in the last twelve months. The recommended cut-off for problem gambling is 3 points or more and for pathological gambling 5 points or more (Schaffer et al. 1997). In this study, problem gamblers were defined as equal and above 3 in SOGS-R.

### Irrational Beliefs

Irrational beliefs about gambling was measured by a questionnaire called “Beliefs about gambling” (Table 2) that was developed by two psychologists, Jonsson and Nilsson in connection with a previous study (Jonsson et al. 2003). This questionnaire consists of 14 items that according to a principal components analysis could be divided into four

**Table 2** Items of the Beliefs-about-Gambling-Questionnaire, response alternatives, and proportion of irrational responses by problem gamblers (PG) and controls (non-PGs)

Factor/item	Response alternative	Percentage of irrational responses	
		PG	Non-PG
<i>Factor 1: Skill</i>			
1. Imagine a win in your favorite game. What are your thoughts afterwards?	0 = It was mainly due to luck 1 = It was mainly due to skill (IR)	20.9	7.9***
4. Imagine that you were near to win on your favorite game, how do you think thereafter?	0 = It was mainly due to bad luck 1 = It was mainly due to poor skill (IR)	9.3	1.3
8. Imagine that you gamble regularly during several years. How do you think?	0 = Gambling will probably make me poorer 1 = Gambling will probably make me richer (IR)	15.2	9.3
10. On which factors do you base your gambling?	0 = Chance or nothing particular 1 = Knowledge and experience (IR)	35.1	21.2**
14. How do you think about your favorite game?	0 = I can probably not affect my chances to earn money on it; 1 = Skill increases the chances to earn money on it (IR)	34.4	15.2***
<i>Factor 2: Belief in randomness</i>			
6. Imagine playing Roulette or any other games where you can play on certain numbers or colors. What would you do?	0 = I would play on any numbers or colors 1 = I would play on certain numbers or colors to increase my chances to win (IR)	41.7	37.5
11. Consider the following numbers: 11, 12, 13, 14, 15, 16, and 17.	0 = I would play on them as well as on other numbers; 1 = I would prefer numbers that are more dispersed to increase my chances to win (IR)	46.4	53.0
12. Imagine you are buying a lottery ticket. The salesman asks if you or he will choose the ticket.	0 = It does not matter who will choose 1 = I want to choose myself to increase my chances to win (IR)	21.9	19.2
13. Imagine that you toss a coin. Crown has been up four times in a row. On what outcome would you bet the next time?	0 = I would bet on tail as well as on crown 1 = I would bet on tail (IR)	32.5	39.1
<i>Factor 3: Superstition</i>			
7. Some days I can feel that I will win on gambling.	0 = disagree 1 = agree (IR)	76.8	79.5
9. I have things (a seat, a number, a certain pen, etc.) that bring me luck.	0 = disagree 1 = agree (IR)	6.6	6.6
<i>Factor 4: Expectations</i>			
2. Imagine four consecutive losses. How do you think about the next bet?	0 = My chances to win are the same as before; 1 = My chances to win have increased (IR)	14.6	7.3*
3. Imagine that you had been gambling for a while. How do you think?	0 = I think that my chances to win is the same; 1 = I think that my chances to win have increased (IR)		
3. Imagine that you had been gambling for a while. How do you think?	0 = I think that my chances to win is the same; 1 = I think that my chances to win have increased (IR)	24.5	23.2

**Table 2** continued

Factor/item	Response alternative	Percentage of irrational responses	
5. Imagine a win at a place you have never been before. Where do you play next game?	0 = Where I usually gamble 1 = Where I played last (IR)	20.5	18.5

\*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$

Responses that indicate irrational beliefs are marked with (IR). Asterisks denote that the difference between the groups is statistically significant. Item number refers to position in the questionnaire

dimensions hypothesized to be latent factors behind gambling problems: Superstition, skill, belief in randomness, and expectations. For information about the items, see Table 2. Together those dimensions explained 51.5% of the variance in the responses, which were given on a dichotomous scale whereby one response alternative is defined as irrational. For each respondent, the number of irrational responses was calculated. In the present study, the questionnaire was administered as a “paper and pen” test during the interview. The internal consistency was acceptable for the whole scale (Cronbach’s alpha = 0.65), good for the subscale skill (0.72), but lower and inappropriate for subscales belief in randomness (0.48), superstition (0.38), and expectations (0.36).

### Depressive Mood

Beck Depression Inventory (Beck and Steer 1987) was used to measure depressive mood. This instrument, which will be henceforth referred to as BDI, consists of 21 groups of four statements and respondents are instructed to choose the statement in each group that best describes his/her feelings of the past week. The statements ask about feelings of, for example, sadness, discouragement about the future, failures, satisfaction, guilt, punishment, and disappointment. Each statement is scored from 0 to 3. The whole scale is scored 0–63 points, where a higher score indicates a more depressive mood. The test was shown to have good reliability in a Swedish setting (Wennberg et al. 2005; Beck and Steer 1996).

### Results

As shown in Table 3, problem gamblers exhibited a significantly larger number of irrational beliefs than non-problem gamblers. However, the number was significant between PGs and non-PGs only at one dimension; skill ( $\chi^2_5 = 21.5$   $p = .001$ ). An analysis of each item showed that the groups differed significantly with respect to items 1, 2, 4, 10 and 14. Except for item 2 denoting gamblers fallacy, these items together made up the skill dimension. This feeling of skill probably gives an illusion of control in gambling situations.

Problem gamblers tended to believe that their own skills affected the chance to win but a lack of skill led to near misses. They also thought that they based their gambling decisions on knowledge and experience. Furthermore, they seemed to be victims of gambler’s fallacy. Specifically, the proportion of problem gamblers who agreed with the irrational answer of item 2 was significantly larger than non-gamblers. Noteworthy, the two groups did not differ with respect to the other item representing gambler’s fallacy (see item

**Table 3** Median values and inter-quartile ranges of number of irrational beliefs about gambling as measured by the 14-items-scale as well as of scores on Beck Depression Inventory (BDI)

Questionnaires		Problem gamblers	Non-problem gamblers	Mann-Whitney U
Beliefs about gambling	Median	4.0	3.0	5244.0***
	Inter-quartile range	4.0	3.8	
BDI	Median	3.0	2.0	5449.5**
	Inter-quartile range	6.0	4.0	

\*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$

13 in Table 2). As regards the other items, the differences between groups were insignificant.

Table 3 indicates that there was a small but statistically significant difference in depressive mood. As expected and in line with previous studies (Hills et al. 2001), problem gamblers tended to express more depressive mood compared to the controls.

## Discussion

There was mixed support for the hypothesis proposed that problem gamblers (PGs), compared to controls, would show a larger number of irrational beliefs. On the one hand, some results were in line with the hypothesis. In contrast to the non-PGs, the PGs were, on average, found to have an illusion of control for gambling situations and tended to be victims of the gambler's fallacy. Those findings agree partly with Sundali and Croson (2006). The gambler's fallacy relates to beliefs in stocks of good and bad luck, meaning that after several unsuccessful bets success will follow. According to Fischhoff et al. (1977), this belief is a generally occurring phenomenon when betting on random events. Benefits are often attributed to luck rather than to chance, because luck is proposed to influence gambling behaviour (Wagenaar and Keren 1988), implying a scheme of reinforcement that makes gambling very difficult to stop. Compared to non-PGs, the PGs also expressed greater belief in their own skills as a reason for their wins and claimed to a greater extent that they used knowledge and experience when gambling. The observed tendency supports partly the idea of illusory control (see Goodie 2005).

On the other hand, some results run counter to the hypothesis. No significant differences between the PGs and the non-PGs were found in regard to irrational beliefs about randomness and superstition. Most of the items that presumably reflected flawed perception of skills and expectations did not differ between the participant groups. On balance, the groups gave roughly similar responses to eleven of the 15 items included in the scale. Given that the items are reliable and valid, such similarities may indicate that several irrational beliefs are indeed universal tendencies of human perceptions; an argument that agrees with prior research in psychology (e.g., Fischhoff et al. 1977; Ayton et al. 1989; Gilovich 1991).

However, the observed low levels of reliability of three subscales also implies a low validity. Hence, some result are difficult to interpret with respect to belief in randomness, superstition and expectations. The analyses on item level, however, supports an interpretation of higher beliefs in own skill among problem gamblers. Previous studies show that knowledge of calculation of probabilities does not matter in the presence of superstitious

thinking of the importance of skill in gambling and that gambling is a profitable activity (Delfabbro 2004).

Based on prior research (Hill et al. 2001; Gee et al. 2005; Kim et al. 2006), it was also hypothesized that problem gamblers should exhibit a more depressive mood than controls should. There was a small but significant difference in depressed mood supporting this hypothesis. However, the question of direction of causality remains to be solved. Will a depressed person gamble to mitigate the depression? Or do unsuccessful bets produce a depression? To reach an answer to those questions, a repeated measures design is necessary. Gee et al. (2005) showed that when a gambler lost a game the feeling of anxiety and arousal increased. Thus, it seems reasonable to believe that depressive mood is a consequence of gambling rather than to see gambling as a way to cope with the depressive mood.

One might argue that the different depressive mood of the PGs and non-PGs could be due to the season of data collection. However, the questionnaire data of the two respondent groups were collected throughout the year in every season in Sweden. The random selection of respondents secured a smooth spread of the sample on different areas of Sweden, so that no differences in number of sunlight days between groups could be expected. The prevalence of depression in Sweden at the time for this study was approximately 15% and for gambling the prevalence was between 2% and 4% (Volberg et al. 2001). This suggests that there are other factors involved in this relation between depression and gambling. It might be speculated that the prevalence of depression could be due to the northern latitude of Sweden. Recently, King et al. (2008) compared six different European countries regarding different mental disorders, among them major depression. They found that all disorders were most prevalent in the UK and the sunny Spain, but less common in Slovenia and the Netherlands, the latter is a country with relatively few sun hours. Thus, one can safely rule out that there would be a link between latitude and depression.

It seems plausible to assume that the illusion of control triggers gambling. Even if a larger number of irrational beliefs could be found among problem gamblers with respect to the items of the instrument “Beliefs about gambling”, the groups did not differ for many individual items. There were also relatively small proportions of respondents in both groups disclosing such beliefs. Such beliefs are difficult to change through education (Joukhador et al. 2004). It seems reasonable to suggest that the implication for treatment of gambling addicts should be not to merely emphasize changing of irrational beliefs (Ladouceur et al. 2001, Ferland et al. 2002), but focus on whatever other reinforcing factors are maintaining the problem gambling.

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