The addictive potential of lottery gambling

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Abstract

Objective: Lottery gambling has enjoyed great popularity around the world for many years and is generally seen as a socially acceptable form of gambling. Apart from aspects such as effects on charities, pathological lottery gambling and its addictive nature have often been discussed recently but rarely investigated. **Methods**: In the present study lottery gambling was investigated with respect to criteria of pathological gambling and addiction using a standardized questionnaire on gambling behavior that also assesses diagnostic criteria of addiction according to the DSM-IV. **Sample**: 171 active lottery gambling subjects (40 females, 131 males) participated in the present study. **Results**: 15.2% of the subjects fulfilled the criteria of pathological lottery gambling. Pathological lottery gamblers differed significantly from nonpathological lottery gamblers concerning the diagnostic criteria for addiction. **Conclusion**: An extension of the diagnosis "pathological gambling" to "behavioral addiction" seems to be appropriate for excessive lottery gambling.
Key words: behavioral addiction, lottery, pathological gambling, German numbers pool lottery

Introduction

Gambling is a popular leisure activity—60% to 90% of adults have gambled at least once in their lives (Ladouceur, 1991). On one hand, gambling is an enjoyable popular activity, but on the other hand, it is well known that excessive pathological gambling leads to health, financial, and social problems. Studies have shown that the current prevalence of pathological gambling varies from 1% to 2% in the US (Shaffer, Hall, & Vander Bilt, 1997), in different parts of Canada (Ladouceur, 1996, 2004), and in Europe (Becoña, 1996). The lifetime prevalence rate of pathological gambling in the US was measured using the DSM-IV and found to be 5.1% (Petry, 1999).

Decreasing numbers of casino visitors are contrasted with increasing users of national lotteries (Miyazaki, Lagenderfer, & Sprott, 1999; Wolfson & Briggs, 2002). This could be seen as a decrease in the popularity of casino gambling.

Lottery gambling has enjoyed appeal around the world for many years and is very popular (Brenner & Brenner, 1990; Wolfson & Briggs, 2002). It is relatively inexpensive to play and offers enormous and attractive jackpot prizes, but with very low odds of winning. Furthermore, it is generally seen as a socially acceptable form of gambling.

Apart from aspects such as effects on charities and redistribution of money, pathological lottery gambling as well as the addictive nature of lottery gambling are topics of recent discussions (Rogers, 1998; Welte, Barnes, Wieczorek, & Tidwell, 2004). With respect to problematic and pathological gambling, lottery ranked high compared to other games (Johannson & Gotestam, 2003), and scratch/lottery gamblers experienced some severe problems along several dimensions. Petry (2003a) showed that lottery gamblers, compared to slot machine, horse/dog track, and sports gamblers and card players, gamble more frequently and show severe alcohol and psychiatric problems.

To date in Germany there is a lack of data and only little acceptance of the classification of pathological gambling as an addiction. In general, data concerning neither the consumption level of the different gambling activities nor the number of problematic gamblers are available. Only a few studies provide data on pathological slot machine or casino gambling. Therefore, little knowledge or salience about the addictive potential of lottery gambling exists at this time.

The German Head Office for Dependency Matters presumes 180,000 gamblers who need counseling or treatment (Meyer, 2006). This corresponds with a proportion of the German population of 0.1% to 0.2%. However, these are only rough estimates. Taken together with all existing types of gambling activities (e.g., lottery, cards, sport betting, slot machine, casino) the actual prevalence of pathological gambling is probably higher. In Germany slot machine gambling is available in both casinos and public locations (e.g., bars). Two types of lottery gambling exist in Germany: German numbers pool lottery is more common than lottery gambling by drawing a lottery ticket. The lottery is exclusively offered by state-regulated providers. German numbers pool lottery and sport betting account for 30.8% of the total business volume of gambling activities in Germany, and lottery gambling by drawing a lottery ticket is responsible for an additional 5.1%. Casinos have a share of 38.4% and slot machine gambling makes up 21.3%.

Since 1980 pathological gambling has been included in the *Diagnostic Manual of Mental Disorders* (current version DSM-IV-TR, APA, 2000). Pathological gambling is listed in the category of "abnormal habits and impulse control disorder" and is currently classified with, for example, trichotillomania, pyromania, and kleptomania. Subjects have to fulfill five of ten criteria to receive the diagnosis "pathological gambler." Most of these criteria are comparable to the criteria for addiction: e.g., lack of control; development of tolerance; gambling to avoid negative feelings; neglect of occupational, social, and recreational activities and duties; and withdrawal symptoms (arousal and aggression). In addition, chasing after previously lost money, illegal activities, lying, and a strong mental involvement in lottery gambling are diagnostic criteria for pathological gambling. Furthermore, pathological gamblers expect that other people will lend them money.

There are seven diagnostic criteria for addiction (DSM-IV-TR, 2000), three of which must be fulfilled to receive the diagnosis "substance dependence." A characteristic feature of addictive behavior is the lack of control over this behavior. Subjects cannot control the beginning and end of their consumption nor the amount they consume, and they cannot stop their drug intake. In addition, drug craving is a central criterion that has recently been intensely discussed in the literature about the mechanisms underlying the development and maintenance of addictive behavior.

Currently, gambling-related disorders are being discussed more in the context of addictive behavior (Shaffer & Kidman, 2003). Biobehavioral researchers in neuropsychological, psychophysiological, neuroimaging, neurochemical, and genetic studies have been investigating biobehavioral dysfunctions in pathological gamblers as well as the mechanisms underlying the development and maintenance of pathological gambling. Results of these studies fit in with recent theoretical models of addiction, which stress the role of the reward system and the frontal cortex (Everitt, Dickinson, & Robbins, 2001). Moreover, the described concept of response inhibition fits in with models of pathological gambling as well as addiction (for an overview see Goudriaan, Oosterlaan, de Beurs, & Van den Brink, 2004; Potenza, 2002; Potenza & Winters, 2003). Furthermore, understanding the neural mechanisms of decision-making has direct implications for understanding disorders of pathological gambling and addiction. The same is true for the switch from controlled to

noncontrolled compulsive behavior (Bechara, 2003). Therefore, the disorder may not be entirely or accurately characterized by DSM criteria for pathological gambling (e.g., Lesieur & Rosenthal, 1991; Petry, 2003b).

To date, "non-substance–related behavioral addictions" (Holden, 2001; Marks, 1990; Shaffer & Kidman, 2003) are not listed in the two international diagnostic manuals for mental disorders, neither in the DSM-IV-TR (2000) nor in the ICD 10 (World Health Organisation, 1992), which is similar to the DSM-IV-TR (2000) with the exception of a few criteria.

However, based on the internationally established diagnostic criteria of addiction, only a few studies focus on the particular aspect of the addiction potential of these gambling activities, especially with regard to Europe (e.g., Grun & McKeigue, 2000; Lesieur & Rosenthal, 1991; Petry, 2003b; Potenza, 2002; Reid, Woodforst, Roberts, Golding, & Towell, 1999; Shaffer & Kidman, 2003). Therefore, the objective of the present study was to examine the gambling behavior of lottery gamblers concerning the German numbers pool lottery and to investigate if pathological lottery gamblers (PLG) fulfill the diagnostic criteria of addiction.

Method

Sample

171 adult subjects (23.6% females, 76.4% males) gambling the German numbers pool lottery ("Lotto") participated in this study (age in years *M* = 40.28, SD = 13.22). 42.1% of the subjects (*N* = 72) participated only in the numbers pool lottery and 57.9% were involved in sport betting activities as well. We excluded subjects with regular slot machine or casino gambling activities. Participants were randomly recruited in major streets in Berlin (Germany). The inclusion criterion was regular lottery gambling (at minimum once a week). Lotto drawings are conducted twice a week. Most of the gamblers playing Lotto regularly participate in one drawing a week. Therefore, we chose lottery activity of at least once a week as the inclusion criterion. Nevertheless, lottery tickets can be purchased every day, independent of the drawing. About 72% of the contacted regular lottery gamblers agreed to participate in the study. Subjects were remunerated for their participation with 10 Euros. Neutral locations such as cafés were chosen to conduct the interviews in order to avoid any influence by surroundings (e.g., stimuli-induced conditioned reactions) associated with lottery gambling.

Measures

Non-substance-related addiction was determined according to the internationally established criteria for addiction and pathological gambling of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR, 2000) using the Questionnaire of Differential Assessment of Addiction (QDAA, Grüsser, Wölfling, Düffert, Mörsen, & Flor, 2004). The QDAA is a valid and reliable self-rating instrument for assessing the criteria for addiction, patterns of addictive behavior, and addiction-related variables such as current mood state, current stress perception, and addiction-related beliefs. The diagnostic criteria for substance dependence—craving, withdrawal symptoms, tolerance, lack of control, neglect of social or occupational commitments and other leisure activities, and ongoing substance use in spite of aversive consequences—are assessed according to the DSM-IV and ICD-10. The QDAA also includes a submodule assessing different aspects of craving such as the intention to carry out the addictive behavior/use the substance (compulsive craving, almost irresistible urge to carry out the addictive behavior/use the substance) and expectation of positive

reinforcing effects (reward craving, euphorigenic effects) and of negative reinforcing effects (relief craving, avoiding withdrawal symptoms, tension reduction). The subscales show good internal consistency ranging from .82 to .92 and adequate validation coefficients (r = .72–.95 for the diagnostic scale and r > .40 for different subscales; Grüsser et al., 2004). In order to assess non-substance-related addictive behavior, the QDAA was modified for pathological gambling regarding the subscales to diagnose addictive behavior. Further questions assessing the criteria of pathological gambling according to the DSM-IV and questions assessing specific gambling aspects were added (DSM-IV-TR, 2000). The specific questions refer to gambling-related cognitive factors such as the belief that the chance of winning is better compared to other games, that lottery gambling is less harmful than other gambling, and that "lucky" numbers (e.g., the gambler's own birth date) have a better chance of winning; the tendency to change the pattern of numbers when playing the lotto; and the expectation of the addictive potential of playing Lotto. Furthermore, arousal during the drawing of the numbers and during thinking about lottery gambling is assessed retrospectively. The gambling version of the QDAA has not yet been validated for use in clinical groups of pathological gamblers. None of the dependent participants fulfilled the criteria for addiction to a psychotropic substance, except for tobacco smoking.

Data analyses

Data were analyzed with the Statistical Program for Social Scientists (SPSS, 11.0). In order to analyze continuous data, group differences were calculated using T-tests for independent samples. The Chi-square test for independent samples was used to analyze the categorical data.

Results

According to the criteria of pathological gambling (DSM-IV-TR, 2000), 26 subjects (15.2%) of the sample fulfill the criteria of pathological lottery gambling, since five or more questions of the QDAA referring to these criteria were answered positively. Regarding sociodemographic variables, PLG and nonpathological lottery gamblers NPLG do not differ significantly concerning age and net income. Gender, educational levels, and marital status are equally distributed across the groups (all p > .05).

Compared to NPLG, PLG gamble significantly more times a week, place significantly more bets per drawing, and have significantly higher monthly debts. Furthermore, significantly more PLG tried to win back the money they had lost previously in lottery gambling (chasing). PLG are significantly more strongly involved in lottery gambling and are significantly more aroused when they think about lottery gambling, or while lottery numbers are being drawn, than NPLG (see Table 1).

NPLG and PLG differ significantly with respect to cognitive factors related to lottery gambling: the belief that their "lucky" numbers have a good chance of winning and the thought that compared to other games the chances of winning are better. However, PLG and NPLG do not differ significantly in the tendency to use the same pattern of numbers when playing Lotto. Compared with NPLG, significantly more PLG are likely to believe that lotteries are less harmful than other types of gambling. However, the expectation of an addictive potential of playing the lottery is equally distributed among NPLG and PLG (see Table 1).

PLG meet the addiction criteria in the following list significantly more often than NPLG: 1. craving for lottery gambling (PLG: 92.3%; NPLG: 46.8%; $\chi^2(1) = 18.29$, $p < .01$), 2. loss of

control over the gambling behavior regarding time and amount of money (PLG: 88.0%; NPLG: 31.6%; $\chi^2(1) = 27.89$, $p < .01$), 3. development of tolerance (PLG: 95.0%; NPLG: 26.6%; $\chi^2(1) = 35.24$, $p < .01$), 4. neglect of social or occupational obligations (PLG: 54.2%; NPLG: 8.6%; $\chi^2(1) = 31.56$, $p < .01$), 5. negative social consequences (PLG: 15.4%; NPLG: 1.4%; $\chi^2(1) = 12.26$, $p < .01$), and 6. two or more withdrawal symptoms developing within hours or days (e.g., restlessness, irritability, being in low spirits) when gambling activities were reduced (PLG: 72.0%; NPLG: 12.9%; $\chi^2(1) = 42.41$, $p < .01$). While NPLG report anger and being nervous on the day of the drawing when they had missed that game, PLG report nervousness and arousal, restlessness, stress, and even panic as withdrawal symptoms, even if they had intended not to play. With respect to craving and craving-related processes, PLG report a significantly stronger craving for gambling, stronger intention to gamble, stronger expectation of reinforcing effects such as a positive outcome, and stronger avoidance of negative feelings or withdrawal symptoms (see Table 1). Comparisons of the measure of the diagnostic criteria for pathological gambling and of criteria for addiction revealed that all PLG fulfill three or more diagnostic criteria for addictive gambling according to the diagnostic criteria of addiction. Analysis of the sample of NPLG shows that an additional 14.3% ($N = 20$) do not fulfill the criteria of pathological gambling.

Table 1.

Comparison between PLG and NPLG concerning gambling-associated variables

N = 171	**NPLG** *n* = 145	**PLG** *n* = 26		
	M (*SD*)	*M* (*SD*)	*t* (*df*)	*p*
Gambling frequency (times/week)	1.43 (0.78)	1.87 (1.32)	–2.16 (143)	.032
Amount of placed bets (/drawing)	2.48 (2.50)	3.94 (3.09)	–2.15 (142)	.034
Monthly debts due to lottery gambling (in Euros)	0.21 (1.43)	46.75 (113.97)	–4.09 (145)	< .001
Preoccupation with lottery gambling[1]	21.04 (25.61)	56.08 (32.34)	–6.02 (159)	< .001
Arousal while lottery numbers are being drawn[2]	40.51 (30.97)	72.12 (28.89)	–4.82 (160)	< .001
Belief in "lucky" numbers[3]	21.69 (26.83)	34.04 (37.67)	–2.01 (161)	.047
Belief in better chances of winning[4]	36.79 (36.80)	61.31 (36.44)	–2.12 (160)	.036
Tendency to use the same pattern of numbers[5]	62.07 (35.18)	62.85 (34.12)	–0.10 (153)	.918

Craving for gambling[6]	31.17 (25.44)	65.50 (25.14)	–6.33 (163)	< .001
Intention to gamble[7]	37.99 (29.74)	69.12 (25.49)	–5.00 (162)	< .001
Expectation of positive reinforcing effects[8]	36.85 (33.056)	68.40 (27.15)	–5.16 (38.14)	< .001
Expectation of negative reinforcing effects[9]	21.38 (27.31)	43.50 (29.58)	–3.74 (162)	.003
	N (%)	*N* (%)	χ^2 (*df*)	*p*
Ever tried to win back previously lost money (yes/no)	20 (13.79)	19 (73.08)	41.68 (1)	< .001
Belief that lottery is less harmful than other gambling (yes/no)	69 (40.35)	16 (61.53)	4.10 (1)	.042
Expectation of an addictive potential of playing the lottery (yes/no)	98 (57.34)	15 (58.33)	0.01 (1)	.931

[1] How strongly are you preoccupied with lottery gambling during a normal day

(e.g., thinking about the numbers or the drawing)? (visual analogue scale, 0 = "never" to 100 = "the whole day")

[2] How strongly are you usually aroused while lottery numbers are being drawn?

(visual analogue scale, 0 = "not at all" to 100 = "very strongly")

[3] How strongly do you believe that a special set of numbers ("lucky numbers") has a better chance of winning?

(visual analogue scale, 0 = "not at all" to 100 = "very strongly").

[4] How strongly do you believe that the chance of winning the lottery is higher than that of other gambling activities?

(visual analogue scale, 0 = "not at all" to 100 = "very strongly")

[5] How strongly did you tend to use the same pattern of numbers in each drawing?

(visual analogue scale, 0 = "not at all" to 100 = "very strongly")

[6] How strong is your craving for gambling? (visual analogue scale, 0 = "not at all" to 100 = "very strong")

[7] How strong is your intention/plan to gamble? (visual analogue scale, 0 = "not at all" to 100 = "very strong")

[8] Do you expect a positive effect by playing the lottery (e.g., euphorigenic effects)?

(visual analogue scale, 0 = "not at all" to 100 = "very strongly")

[9] Do you expect relief from withdrawal symptoms or aversive affective states by playing the lottery

(e.g., lower stress experience)? (visual analogue scale, 0 = "not at all" to 100 = "very strongly")

Discussion

Data analyses of the present study revealed that all PLG fulfill three or more diagnostic criteria for addiction in addition to the diagnosis of pathological gambling. Compared with the group of NPLG they differ significantly concerning all of these criteria (craving; lack of control; development of tolerance; neglect of occupational, social, and recreational activities and duties; and withdrawal symptoms). Furthermore, with respect to craving as a central criterion of addiction, PLG show significantly higher scores regarding these subscales. PLG report that their motivation for gambling is derived more from the perceived positive aspects than from the negative aspects (to avoid negative feelings). Miyazaki et al. (1999) stated that the desire to win is the most important purchase motivation of lottery gamblers. The negative reinforcing aspects (e.g., avoiding aversive feelings such as stress and sad mood) of lottery gambling are presumably not in the foreground of verbal reports. This may be because the positive effects of the gambling behavior to avoid something unpleasant are not conscious. Furthermore, due to the slow development or increase of aversive consequences, they do not serve as something unpleasant to be avoided by gambling behavior. Only 15.4% of the pathological gamblers reported that they experience negative social consequences from gambling. Nevertheless, 54.2% of them reported a neglect of social or occupational obligations due to lottery gambling.

However, the assessed negative (avoidance of negative feelings or withdrawal symptoms) and positive (expectation of a positive outcome) reinforcing aspects of lottery gambling reflect the expected function of the gambling activity. Based on integrative learning and biological models that explain the underlying mechanisms of addiction (Everitt et al., 2001; O'Brien, Childress, McLellan, & Ehrman, 1992; Robinson & Berridge, 1993), one can assume that lottery gambling becomes a misappropriated function for PLG, i.e., an inadequate stress-coping mechanism. Subjects learn to reward themselves by gambling the lottery. Repeated gambling behavior induces neuroadaptive processes of the mesolimbic reward system. As a result, the reward system becomes sensitized for this behavior and is powerfully activated only with respect to lottery gambling, which could be seen as the underlying mechanism for the development and maintenance of addictive behavior (Holden, 2001).

Gambling-related cognitive factors in pathological gamblers such as various biases and irrational thinking patterns are well described (e.g., Ladouceur, 2004; Rogers, 1998; Wolfson & Briggs, 2002). In the present study PLG believe that playing the lottery is less harmful than other types of gambling. They believe that their "lucky" numbers have a good chance of winning and that, compared with other games, the chances of winning are better.

Several authors suggest that gamblers are motivated by the need for excitement and arousal. The risk and the potential monetary loss or gain can be highly arousing (Coventry & Hudson, 2001; McDaniel & Zuckermann, 2003). In the present study PLG are strongly involved in lottery gambling and are significantly more aroused than NPLG when they think about lottery gambling or while lottery numbers are being drawn.

Presumably, some aspects of quantity and frequency are connected with the development and severity of gambling-related problems (Petry, 2003b). The present study has shown that PLG gamble significantly more frequently during a week than NPLG and significantly more PLG purchased more than one lottery ticket per drawing. Griffiths (1999) assumes that event frequency, the interval between gambling and outcome, is based on reinforcing mechanisms of operant conditioning and possibly related to the addictive properties of different forms of gambling. However, as mentioned in the introduction, Petry (2003a) showed that lottery gamblers gamble more frequently than slot machine, horse/dog track, and sports gamblers and cards players. It is still unknown how event frequency in relation to stress reduction after filling out a lottery ticket—which can be done every day independent of the event of drawing the lottery numbers—affects the reward mechanisms that lead to pathological or addictive behavior.

The fact that in the present study an additional 14.3% of the NPLG do not fulfill the criteria of pathological gambling but do fulfill the criteria of addiction points to the statement that the disorder may not be entirely or accurately characterized by DSM criteria for pathological gambling (e.g., Lesieur & Rosenthal, 1991; Petry, 2003b). The use of neurocognitive criteria could point to more accurate subtyping of addictive disorders. They may serve as a guide for more specific, and thus possibly more successful, pharmacological and behavioral interventions (Bechara, 2003). Further studies are necessary to characterize the pathology of gambling and especially of lottery gambling.

Finally, it is important to note that we do not need to know the number of criteria but which criteria are fulfilled by abnormal pathological gambling activities in order to come to an adequate diagnosis (Rosenthal, 2003). Despite the criteria for disorders, which serve as a guideline, clinical judgment must be exercised. Therefore, it is important to detect the dominance of the gambling behavior as well as negative and adverse consequences of gambling behavior in the life of the gambler that are not covered when using only the criteria of pathological gambling.

The fact that only a relatively small percentage of problematic lottery gamblers are involved in treatment may be due to diagnostic difficulties, the low cost of lottery tickets, and a lack of dominance of negative consequences that may motivate seeking treatment. Furthermore, the lottery is very popular and generally seen as a socially acceptable form of gambling (Brenner & Brenner, 1990; Wolfson & Briggs, 2002). Therefore, no awareness of the addictive potential exists.

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