

Gambling disorder in financial markets: Clinical and treatment-related features

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Background and aims: To date, few studies have examined the clinical manifestation of disordered gamblers in financial markets. This study examined the differences in the clinical and treatment-related features of gambling disorder between financial markets and horse races. *Methods:* Subjects who met the DSM-IV criteria for pathological gambling (PG) and who sought treatment were assessed by retrospective chart review. One hundred forty-four subjects were included in this sample, which consisted of the following groups: financial markets ($n = 45$; 28.6%) and horse races ($n = 99$; 71.4%). *Results:* Multiple similar manifestations were found between the groups, including severity of PG, age of PG onset, amounts of gambling debts, drinking days per week, depressive mood, duration of seeking treatment after the onset of PG, and treatment follow-up duration. However, disordered gamblers who invested in the financial market were significantly more likely to be educated ($p = 0.003$), live with their spouses ($p = 0.007$), have full-time jobs ($p = 0.006$), and they were more likely to participate in the first type of gambling than the horse races group ($p < 0.001$). Furthermore, the financial markets group received the anti-craving medication less often than the horse races group ($p = 0.04$). *Discussion and Conclusions:* These findings suggest that disordered gamblers in financial markets show different socio-demographic, clinical and treatment-related features compared with the horse race gamblers, despite a similar severity of gambling disorder. Understanding these differential manifestations may provide insight into prevention and treatment development for specific types of gambling.

Keywords: gambling disorder, financial market, horse race, clinical features, treatment

INTRODUCTION

Gambling disorder is characterised by recurrent and progressive maladaptive patterns of gambling behaviours, followed by significant impairment in the financial and psychosocial areas (Griffiths, 1996a). The problems with gambling appear in different forms of gambling: playing cards for money, betting on sports, casinos, lotteries, slot machines, and betting on horse and boat races (Petry, 2003). Incidentally, gambling problems can occur either in these traditional types of gambling or as investments in financial markets such as stocks and/or commodities (Granero et al., 2012; Grant, Odlaug, Chamberlain & Schreiber, 2012).

In essence, these traditional types of gambling differ from investing in financial markets in terms of legal systems or national policies. That is, gambling as an industry is regulated by gaming control boards in nearly all countries, but investing in financial markets is promoted and protected by the government as an essential economic activity. In addition, from the personal perspective, people begin to gamble initially out of curiosity or for fun, but people who invest in financial markets expect monetary rewards. However, investing in financial markets always entails certain risks, similar to gambling (Granero et al., 2012), and gamblers and investors are essentially consistent in their risk-taking propensities. A high-risk investment is one for which there is either a large percentage chance of loss of

capital or a relatively small chance of a destructive loss. On the one hand, most investors set long-term goals for their investment, and on the other hand, some investors do not always make rational decisions in their own interest (Mayall, 2010). They risk large sums of money on short-term speculative transactions, and they have a tendency to invest with high financial risks, lack of risk calculation and failure to consider the results of the investment (Granero et al., 2012). When some investors 'play' the markets as they would bet on horse races or play at casinos, their problems become severe: they have a clinically defined gambling disorder (Granero et al., 2012). Over the last several decades, there have been a number of studies on the clinical manifestation and treatment of problem gamblers related to traditional gambling, but problem gambling in the financial markets is the least studied major area of gambling by researchers and clinicians (Griffiths, 1996b; Petry, 2003). In particular, no research to date has examined the relationships between clinical and treatment variables in disordered gamblers in financial markets.

The aim of this study was to compare socio-demographic, gambling behaviour characteristics and treatment-related

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characteristics between horse race gamblers and financial market investors who sought treatment. The examination of the similarities and differences between these types of disordered gamblers might pave the way to advancing our understanding of disorder gamblers in financial markets and have significant implications for treatment strategy.

METHODS

Participants

Subjects were drawn from a retrospective chart review of consecutive enrolments in a PG (Pathological Gambling) clinic at Kangbuk Samsung Hospital, between 2002 and 2011. All of the subjects sought treatment because of their problems related to PG. Subjects were included if they met the inclusion criteria: investing in financial markets or gambling on horse races, a primary diagnosis of current DSM-IV PG and age 18 or older. The exclusion criteria were the presence of mental retardation, substance use disorder except alcohol and nicotine dependence, and dementia or the inability to understand and consent to participate in the study. Subjects were screened by a trained psychiatrist with the aid of the Structured Clinical Interview for DSM-IV Axis I Disorders.

We gathered clinical data from 151 participants but included only 144 participants. One patient was excluded because of the history of mental retardation and 6 patients were excluded because of the missing data for the age of onset of PG. Finally, forty five subjects (44 male; mean age, 39.9 ± 7.6 years) investing in financial markets and ninety-nine subjects (95 male; mean age, 39.6 ± 7.8 years) gambling on horse races were enrolled in this study.

Measures

Socio-demographic variables assessed in the PG clinic included gender, education, and marital and employment status. Gambling behaviour was assessed as follows: types of gambling activity, use of Internet gambling, gambling debts at first visit, and age of onset of pathological gambling. "Age of onset" was defined as the age at which subjects first met the DSM-IV criteria for PG. To evaluate the severity of gambling, the Korean version of the South Oaks Gambling Screen (SOGS) and the Korean version of the Gambling Symptom Assessment Scale (GSAS) were used. The SOGS is a 20-item self-report screening tool for gambling-related problems (Lesieur & Blume, 1987; Shin et al., 2014). A score of greater than 5 indicates probable pathological gambling. The GSAS is a 12-item self-report scale examining gambling behaviors, thoughts and urge. Each item of the GSAS is scored on a 5-point scale from 0 (no symptoms) to 4 (extreme symptoms). The total score ranges from 0 to 48 (Kim, Grant, Potenza, Blanco & Hollander, 2009).

For substance use, patients were categorised as never, former and current smokers based on their answers to questions on lifetime and current smoking status. Patients were also asked about their current alcohol drinking status and average drinking days in a week. The Korean version of the Beck depression inventory (BDI) and the Korean

version of the Beck anxiety inventory (BAI) were conducted to assess comorbid depressive and anxiety symptoms, respectively (Beck & Steer, 1984; Steer, Beck, Riskind & Brown, 1986). Adherence to treatment was measured by the follow-up treatment duration.

Procedure

The PG clinic provides individual outpatient treatment based on motivational enhancement therapy, cognitive-behavioural therapy and pharmacotherapy. The clinic also provides group therapy based on motivational and cognitive-behavioural approaches. The patients received medication if needed, and the choice of medication was based on the patient's presentation; patients who reported significant cravings for gambling were started on an anti-craving drug. Subjects who gambled to cope with anxiety or depressed mood were started on an antidepressant. The patients simultaneously received distinct therapeutic alternatives, such as Gamblers Anonymous (GA), if they chose to participate. The detailed information about the process of subject recruitment was described in the previous report (Shin et al., 2014).

Statistical analysis

Continuous variables were assessed with the independent *t*-test. Categorical variables were assessed with Pearson's chi-square test. All analyses were performed using SPSS 18 for Windows (IBM Inc., NY, USA). The alpha level for significance was 0.05, and all tests were two-tailed.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. The study was approved by the Ethics Committee of Kangbuk Samsung Hospital and Eulji University. Written informed consent could not be obtained because the present study was conducted using a retrospective chart review design.

RESULTS

Comparisons of socio-demographic data

Table 1 shows the socio-demographic data for the 2 groups of subjects. There were differences between the groups in education, marital status and employment status. As expected, the financial market group showed longer years of education compared with the horse racing group ($t(143) = 3.03, p = .003$). The financial market group was more likely than horse racing group to have been married ($\chi^2(1) = 10.54, p = 0.007$), and the horse racing group was more likely than the financial market group to be unemployed ($\chi^2(1) = 10.02, p = 0.006$).

Comparisons of gambling-related and clinical data

Table 2 shows the gambling-related and clinical variables. There was no difference between groups in SOGS and

Table 1. Socio-demographic characteristics of the patients with gambling disorder in financial markets and horse races

Demographic characteristics	Financial markets (N = 45)	Horse races (N = 99)	t or χ^2	p
Age, in years, mean (SD)	39.9 (7.6)	39.6 (7.8)	0.22	.826
Education, in years, mean (SD)	15.2 (1.7)	14.2 (2.3)	3.03	.003
Sex (Male), n (%)	44 (97.8)	95 (96.0)	0.31	.581
Marital status, n (%)				
Single	7 (15.6)	30 (30.3)		
Married	37 (82.2)	58 (58.6)	10.543	.007
Divorced	0	10 (10.1)		
Unknown	1 (2.2)	1 (1.0)		
Employment status, n (%)				
Full-time	39 (86.7)	57 (57.6)		
Part-time	1 (2.2)	12 (12.1)	10.022	.006
Unemployment	4 (8.9)	22 (22.2)		
Unknown	1 (2.2)	8 (8.1)		

Table 2. Comparison of clinical features of the patients with gambling disorder in financial markets and horse races

Variables	Financial markets (N = 45)	Horse races (N = 99)	t or χ^2	p
<i>Gambling characteristics</i>				
The previous gambling activities, n (%)	financial market 41 (91.1) horse race 1 (2.2) others 3 (6.7)	horse race 67 (67.7) financial market 4 (4.0) others 28 (28.3)	117.425	< .001
Age of GD onset, mean (SD)	31.3 (8.1)	29.1 (6.8)	1.714	.089
Gambling debts at first visit, US dollars, mean (SD)	297,000 (927,000)	110,000 (149,000)	1.315	.195
Big win, US dollars, mean (SD)	84,714 (110,400)	22,331 (34,870)	1.478	.188
SOGS, mean (SD)	16.6 (1.7)	16.4 (1.6)	0.450	.655
GSAS, mean (SD)	14.9 (10.3)	15.8 (11.6)	-.352	.726
<i>Co-morbid characteristics</i>				
Smoking status, n (%)				
Non-smoker	20 (44.4)	11 (11.1)		
Current smoker	23 (51.1)	83 (83.8)	19.175	< .001
Ex-smoker	2 (4.4)	5 (5.1)		
Days of drinking, weekly, mean (SD)	1.2 (1.5)	1.7 (2.3)	-1.358	.177
BDI, mean (SD)	12 (9.2)	13.6 (10.8)	-.639	.525
BAI, mean (SD)	17.0 (8.7)	21.7 (9.4)	.587	.043

GD = Gambling Disorder, SOGS = South Oaks Gambling Screen, GSAS = Gambling Symptom Assessment Scale, BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory

GSAS scores, which reflected the severity of their gambling problems ($t(143) = 0.45$; $p = 0.655$, $t(143) = -.352$; $p = 0.726$, respectively), or in age of GD onset ($t(143) = 1.71$; $p = 0.089$). The two groups showed similar amounts of gambling debts and big wins at their first visits to the PG clinic (respectively, $t(143) = 1.315$; $p = 0.195$, $t(143) = 1.478$; $p = 0.188$). Interestingly, the previous gambling activities were financial market investment in 91% of the current financial market group, whereas the previous gambling activities were horse racing for only 67.7% of the current horse racing group ($\chi^2(1) = 117.425$; $p < 0.001$). In regard to co-morbid characteristics, the horse race gamblers were significantly more likely to be current smokers ($\chi^2(1) = 19.175$; $p < 0.001$), but there was no difference between the groups for drinking days in a week ($t(142) = -1.358$; $p = 0.177$). The two groups were statistically equal on BDI scores ($t(143) = -.639$; $p = 0.525$), but the horse race gamblers showed higher anxiety compared with

the financial market investors according to the BAI ($t(143) = 0.587$, $p = 0.043$).

Comparisons of treatment-related data

Table 3 shows the treatment-related features. Both groups of gamblers took similar durations to seek treatment after the onset of PG ($t(143) = -0.578$; $p = 0.565$), and they showed similar treatment follow-up durations ($t(143) = -0.765$; $p = 0.445$). In addition, there was no difference between groups in terms of group therapy. However, the financial market group did not attend GA significantly more than the horse racing group ($\chi^2(1) = 4.633$; $p = 0.042$). Regarding pharmacotherapy, the horse race gamblers took anti-craving medication ($\chi^2(1) = 4.624$; $p = 0.040$) and antidepressants more often than did the stock market group, but the difference was not statistically significant in terms of antidepressant prescriptions ($\chi^2(1) = 5.346$; $p = 0.096$).

Table 3. Comparison of treatment-related features of the patients with gambling disorder in financial markets and horse races

Variables	Financial markets (<i>N</i> = 45)	Horse races (<i>N</i> = 99)	<i>t</i> or χ^2	<i>p</i>
Months after GD onset when first sought treatment, mean (SD)	111.5 (88.5)	121.8 (81.5)	-.578	.565
F/U duration, months, mean (SD)	8.3 (15.1)	11.3 (24.7)	-.765	.445
GA attendance, <i>n</i> (%)				
Yes	8 (17.8)	38 (38.4)		
No	29 (64.4)	53 (53.5)	4.633	.042
Unknown	8 (17.8)	8 (8.1)		
Group therapy, <i>n</i> (%)				
Yes	4 (8.9)	15 (15.2)		
No	41 (91.1)	79 (79.8)	1.733	.371
Unknown	0 (0)	5 (5.0)		
Anti-craving drug, <i>n</i> (%)				
Yes	4 (8.9)	24 (24.2)	4.624	.040
No	41 (91.1)	75 (75.8)		
Anti-depressants, <i>n</i> (%)				
Yes	4 (8.9)	14 (14.1)		
No	41 (91.1)	85 (85.9)	5.346	.096

GD = Gambling Disorder, F/U = follow-up, GA = Gamblers Anonymous

DISCUSSION

To date, few studies have examined the clinical manifestation of disordered gamblers on the basis of the type of gambling activity, focusing on financial markets. One possible reason for this is that there are relatively few people who seek treatment for financial-market-related gambling (Granero et al., 2012). This study included clinical subjects who visited the largest gambling clinic in Korea for the treatment of gambling problems between 2002 and 2011.

In this study, disordered gamblers in the financial market were significantly more educated, more likely to live with a partner and more likely to have full-time jobs than were the disordered horse race gamblers. These findings are consistent with previous research on the topic (Granero et al., 2012). This may be related to the fact that investing in financial markets is a socially acceptable economic activity and investors are regarded as people with economic knowledge. These positive aspects cause the disordered gamblers in financial markets to attribute their problems to their external financial environments, not to their personal factors. This propensity may lead to the under-diagnosis and under-treatment of gambling in financial markets (Granero et al., 2012).

In terms of gambling behaviour, there was no difference between the groups in the age of GD onset or in the SOGS and GSAS scores, which reflected the severity of their gambling problems. Both groups also showed similar amounts of gambling debts and big wins at their first visits to the GD clinic. However, we found differences in relation to their previous gambling activities. That is, the previous gambling activities were financial market investment in 91% of the financial market gamblers, whereas the previous gambling activities were horse racing for only 67.7% of the horse race group. This finding may be because investors in financial markets tend to be motivated by monetary gain when they initially become involved in financial markets, and their behaviours and motivations do not change easily. On the contrary, horse race gamblers may have other motivations such as pleasure, sensation seeking or escape

from stress, so that they may change their preferences to more addictive forms of gambling.

Regarding co-morbid features, disordered gamblers in the financial market were less likely to smoke cigarettes compared with disordered horse race gamblers, although the 51% among the financial markets is higher than the national average of 25.4% based on a nationwide survey on the prevalence of smoking in Korea in 2011 (Shin et al., 2013). Cigarette smoking is also derived from multiple causes such as socio-environmental, psychological and biological factors. In addition, numerous epidemiological and clinical studies have found that tobacco smoking and gambling frequently co-occur, and reasons for gambling that focused on positive reinforcement/reward and negative reinforcement/relief were all associated with smoking (McGrath, Barrett, Stewart & McGrath, 2012). In addition, the BAI scores were lower in the financial market gamblers compared with the horse race gamblers, whereas the BDI scores were not significantly different. Taken together, these findings suggest that disordered gamblers in the horse gambling group who were current tobacco smokers or who reported higher anxiety might need unique or enhanced treatment strategies (Grant, Kim, Odlaug & Potenza, 2008).

In terms of treatment-related features, it took approximately 10 years to seek treatment for GD in both disordered gambling groups, regardless of the type of gambling. Furthermore, the mean treatment durations for the two groups were approximately 8 and 11 months, which is not significantly different. It is well known that many gambling addicts do not seek treatment. The financial market gamblers did not seek treatment as often as the horse race gamblers did, and they could not maintain follow-up over 1 year.

Regarding treatment modalities, all subjects in both groups attended group therapy at the clinic and took antidepressant medication, such as selective serotonin reuptake inhibitors, similarly frequently. However, opiate antagonist drugs were more often prescribed for the horse race gamblers in the study. Unfortunately, we could not measure the subjects' cravings and temperaments, such as levels of impulsivity, and

therefore, we could not determine the direct relationship between cravings or impulsivity and anti-craving medication prescriptions. However, we can cautiously assume that this might be related to the preference for the anti-craving drug naltrexone to treat the stronger gambling urges, current smoking, and higher sensation-seeking among horse race gamblers according to previous studies (Grant, Kim & Hartman, 2008; Grant, Kim, Hollander & Potenza, 2008; Kim, Grant, Adson & Shin, 2001; Shin et al., 2014).

Taken together, our findings suggest that gamblers with different problematic forms of gambling vary with respect to demographic characteristics and gambling-related features, as well as other treatment-related features (Odling, Marsh, Kim & Grant, 2011; Petry, 2003), although the severity of disordered gambling was similar between the horse race and financial market gamblers. Knowledge of different types of gambling and how they differ may be essential in developing patient-tailored treatments.

Financial markets are not the same as casinos or horse racing tracks. In the real clinical setting, however, we also see disordered gamblers who should receive treatment for their gambling problems in financial markets (Engwall, Hunter & Steinberg, 2004; Shin et al., 2014). Recent advances in brain imaging techniques enable investigators to visualise changes in neural activity during financial decisions. Using these methods, it has been shown that during financial investment and anticipation of monetary reward, the ventral striatum in the brain, which is innervated by dopaminergic fibres from the ventral tegmental area, is activated (Hollander et al., 2005; Knutson & Bossaerts, 2007; Miyapuram, Tobler, Gregorios-Pippas & Schultz, 2012). Because of the anticipation of monetary reward and its underlying neurochemical changes, intensive trading or investing could be a risk factor for gambling addiction. Another study explains that the irrational behaviour in financial markets is attributable to the fact that the profits and losses incurred by investors can be attributed mainly to their decision-making processes (Cui, Chen, Wang, Shum & Chan, 2013; Dymond, Lawrence & Yuen, 2013). On a related note, behavioural economists, such as Daniel Kahneman and Amos Tversky believe that behavioural biases such as overconfidence, herding, regret aversion, and the gambler's fallacy affect investors' decision-making processes, leading to speculative investing that is identical to gambling (Mohacsy & Lefer, 2007; Shiller, 2003; Tversky & Kahneman, 1981).

This study has a number of limitations. First, it was a retrospective chart review, and thus, we could not evaluate clinical changes on a regular basis, and the raters were not blind to the treatment received. Second, we included treatment-seeking participants only, so our results should not be applied to all disordered gamblers. Despite these limitations, the findings of the study have heightened the need for identifying and evaluating gambling in financial markets and have significant implications for tailoring treatment strategies for the most socially accepted form of gambling.

CONCLUSIONS

Multiple similar manifestations were found between the horse race and financial market gamblers, including severity

of PG, age of PG onset, amounts of gambling debts, drinking days per week, depressive mood, duration of seeking treatment after the onset of PG, and treatment follow-up duration. However, disordered gamblers who invested in the financial market were significantly more likely to be educated, live with their spouses, have full-time jobs, and they were more likely to participate in the first type of gambling than horse races group. Furthermore, the financial markets group received the anti-craving medication less often than the horse race group in terms of pharmacotherapy. These findings suggest that disordered gamblers in financial markets show different socio-demographic, clinical and treatment-related features compared with the horse race gamblers, despite a similar severity of gambling disorder. Understanding these differential manifestations may provide insight into prevention and treatment development for specific types of gambling.

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REFERENCES

- Beck, A. T. & Steer, R. A. (1984). Internal consistencies of the original and revised Beck Depression Inventory. *Journal of Clinical Psychology*, 40(6), 1365–1367.
- Cui, J. F., Chen, Y. H., Wang, Y., Shum, D. H. & Chan, R. C. (2013). Neural correlates of uncertain decision making: ERP evidence from the Iowa Gambling Task. *Frontiers in Human Neuroscience*, 7, 776.
- Dymond, S., Lawrence, N. S. & Yuen, K. S. (2013). Neurocognitive mechanisms of impaired decision making in pathological gambling. *Frontiers in Psychiatry*, 4, 12.
- Engwall, D., Hunter, R. & Steinberg, M. (2004). Gambling and other risk behaviors on university campuses. *Journal of American College Health*, 52(6), 245–256.
- Granero, R., Tarrega, S., Fernandez-Aranda, F., Aymami, N., Gomez-Pena, M., Moraga, S. L., Custal, N., Orekhova, L., Savvidou, L. G., Menchón, J. M. & Jimenez-Murcia, S. (2012). Gambling on the stock market: An unexplored issue. *Comprehensive Psychiatry*, 53(6), 666–673.
- Grant, J. E., Kim, S. W. & Hartman, B. K. (2008). A double-blind, placebo-controlled study of the opiate antagonist naltrexone in

- the treatment of pathological gambling urges. *Journal of Clinical Psychiatry*, 69(5), 783–789.
- Grant, J. E., Kim, S. W., Hollander, E. & Potenza, M. N. (2008). Predicting response to opiate antagonists and placebo in the treatment of pathological gambling. *Psychopharmacology (Berl)*, 200(4), 521–527.
- Grant, J. E., Kim, S. W., Odlaug, B. L. & Potenza, M. N. (2008). Daily tobacco smoking in treatment-seeking pathological gamblers: Clinical correlates and co-occurring psychiatric disorders. *Journal of Addiction Medicine*, 2(4), 178–184.
- Grant, J. E., Odlaug, B. L., Chamberlain, S. R. & Schreiber, L. R. (2012). Neurocognitive dysfunction in strategic and non-strategic gamblers. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 38(2), 336–340.
- Griffiths, M. (1996a). Pathological gambling and treatment. *British Journal of Clinical Psychology*, 35(Pt 3), 477–479.
- Griffiths, M. (1996b). Pathological gambling: A review of the literature. *Journal of Psychiatric and Mental Health Nursing*, 3(6), 347–353.
- Hollander, E., Pallanti, S., Baldini Rossi, N., Sood, E., Baker, B. R. & Buchsbaum, M. S. (2005). Imaging monetary reward in pathological gamblers. *The World Journal of Biological Psychiatry*, 6(2), 113–120.
- Kim, S. W., Grant, J. E., Adson, D. E. & Shin, Y. C. (2001). Double-blind naltrexone and placebo comparison study in the treatment of pathological gambling. *Biological Psychiatry*, 49(11), 914–921.
- Kim, S. W., Grant, J. E., Potenza, M. N., Blanco, C. & Hollander, E. (2009). The Gambling Symptom Assessment Scale (G-SAS): A reliability and validity study. *Psychiatry Research*, 166(1), 76–84.
- Knutson, B. & Bossaerts, P. (2007). Neural antecedents of financial decisions. *The Journal of Neuroscience*, 27(31), 8174–8177.
- Lesieur, H. R. & Blume, S. B. (1987). The South Oaks Gambling Screen (SOGS): A new instrument for the identification of pathological gamblers. *The American Journal of Psychiatry*, 144(9), 1184–1188.
- Mayall, M. (2010). A feeling for finance: Motivations for trading on the stock exchange. *Emotion, Space and Society*, 3(2), 103–110.
- McGrath, D. S., Barrett, S. P., Stewart, S. H. & McGrath, P. R. (2012). A comparison of gambling behavior, problem gambling indices, and reasons for gambling among smokers and non-smokers who gamble: Evidence from a provincial gambling prevalence study. *Nicotine & Tobacco Research*, 14(7), 833–839.
- Miyapuram, K. P., Tobler, P. N., Gregorios-Pippas, L. & Schultz, W. (2012). BOLD responses in reward regions to hypothetical and imaginary monetary rewards. *Neuroimage*, 59(2), 1692–1699.
- Mohacsy, I. & Lefler, H. (2007). Money and sentiment: A psychodynamic approach to behavioral finance. *Journal of the American Academy of Psychoanalysis and Dynamic Psychiatry*, 35(3), 455–475.
- Odlaug, B. L., Marsh, P. J., Kim, S. W. & Grant, J. E. (2011). Strategic vs nonstrategic gambling: Characteristics of pathological gamblers based on gambling preference. *Annals of Clinical Psychiatry*, 23(2), 105–112.
- Petry, N. M. (2003). A comparison of treatment-seeking pathological gamblers based on preferred gambling activity. *Addiction*, 98(5), 645–655.
- Shiller, R. J. (2003). From efficient markets theory to behavioral finance. *Journal of Economic perspectives*, 83–104.
- Shin, D. W., Suh, B., Chun, S., Cho, J., Yoo, S. H., Kim, S. J., Oh, B. & Cho, B. (2013). The prevalence of and factors associated with the use of smoking cessation medication in Korea: Trend between 2005–2011. *PLoS One*, 8(10), e74904.
- Shin, Y. C., Choi, S. W., Ha, J., Mok, J. Y., Lim, S. W., Choi, J. S. & Kim, D. J. (2014). Age of pathological gambling onset: Clinical and treatment-related features. *Journal of Addiction Medicine*, 8(3), 205–210.
- Steer, R. A., Beck, A. T., Riskind, J. H. & Brown, G. (1986). Differentiation of depressive disorders from generalized anxiety by the Beck Depression Inventory. *Journal of Clinical Psychology*, 42(3), 475–478.
- Tversky, A. & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–458.