

Connection between addictive behavior and investing on the stock market in Croatia

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Summary – Internet addiction and pathological gambling are nowadays becoming an increasing public health problem. It hasn't still been totally clarified whether, when dealing with no substance addiction, we are still talking about real addiction that includes the same pathophysiological processes at the biological level or we are dealing with impulse control disorder, the reason why the goal of this research has been to see whether the subjects who spend their time investing in the stock market met the criteria for addiction according to DSM-IV TR classification of psychiatric disorders. Research was conducted using a modified self-made IAT questionnaire that was available on the web portals Poslovni.hr and Moj Novac.hr. People who invest in the stock market and trade stocks online were invited to fill out this questionnaire. Questionnaire consisted of 13 questions: 3 about demographic indicator of respondents, 3 about time spent in investing in the stock market and frequency of monitoring developments in the stock market and 7 questions were prepared according to the DSM-IV criteria that define the existence of addiction. The questionnaire was fully completed by 111 respondents, the majority of which were men age 35–45 and highly educated. Most respondents invested for more than one year and were daily monitoring developments in the stock market for 1–6 hours. Regardless of the type of classification answers, most of the respondents have more than 3

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positive criteria for addiction (when taking the mild classification it is 96,4% of respondents, and according to the strict classification it is 81,1% of the respondents). According to the results of our study, the majority of respondents who spend time online investing on the stock market and trading stocks met the criteria for the existence of addiction according to DSM-IV classification of psychiatric disorders.

Key words: addiction; internet addiction; pathological gambling; poll

INTRODUCTION

Non-substance addictive behaviour, especially pathological gambling and internet addiction are becoming an increasing interest in research and health policy. Similarities and differences between these addictions and addictions to psychoactive stuff have been the subject of numerous discussions.¹ Profession still disputes as whether when we talk about non-substance addiction we talk about real addiction that includes pathophysiological processes at the biological level or we talk about impulse control disorder.²

Internet addiction is characterized by excessive or poorly controlled preoccupations, aspirations or behaviour associated with the use of computers and internet access, which lead to difficulties in daily functioning. This disorder usually occurs in the late twenties or in the early thirties, ten years after the beginning of the use of computer. Psychiatric co-morbid conditions are common, particularly bipolar disorder, mood disruption, anxiety, impaired impulse control and the use of resources that make addiction.^{3,4}

According to the activities and the content of Internet-based applications together with data provided by the therapists who treated them, Internet addicts can be grouped into several subcategories: information addicts, computer game addicts, on-line communication addicts (e-mail, chat applications), cybersex addicts, gambling addicts and shopping addicts.^{2,5}

Pathological gambling is classified according to DSM-IV TR classification as an impulse control disorder, even though it shows considerable biological, behavioral, clinical and epidemiological similarities with psychoactive substance addiction. Due to increasing availability of gambling, online betting opportunities, investment and trading, frequency of pathological gambling has been in a constant rise nowadays.^{6,7}

Due to the fact that pathological gambling is one of the impulse control disorders, and online stock trading hasn't still been recognized as a distinct subtype of internet

addiction, the aim of this study was to determine whether the respondents who spend their time investing in the stock market meet the addiction criteria according to DSM-IV TR classification of psychiatric disorders.

MATERIALS AND METHODS

This survey was conducted on an anonymous convenient sample of 111 respondents by using a modified self-made IAT questionnaire. The survey was conducted during April 2009 via web portals *Poslovní.hr* and *Moj Novac.hr*. People who invest in the stock market and trade stocks online were invited to fill out this questionnaire. The questionnaire contained 13 questions: 3 questions about demographic indicators of the respondents, 3 questions about time spent in investing in the stock market and about frequency of monitoring developments in the stock market and 7 questions composed by DSM-IV criteria by which the existence of addiction is defined. (Appendix). Answers to questions about addictions were classified into two categories: *no evidence of addiction* and *participants exhibited addiction*, while the presence of addiction is divided into milder and heavier degree of addiction.

Results have been presented in total numbers and percentages.

RESULTS

There were 95 men (85,6%) out of 111 respondents who fully responded to the survey. Most of the respondents belonged to the age group of 35–45 years old (49/111; 44,1%), followed by the group of 25–35 years old (40/111; 36,0%), and then by the group of 45–55 years old (14/111; 12,6%), and only 8 of them were younger than 25 years old (7,2%). By level of education the most frequent were highly educated respondents (64/111; 57,7%), 16/111 or 13,5% had college, 30/111 (27,0%) had high school, and one respondent had only primary school.

Data on the duration and frequency of investment are shown in Table 1 and include the questions 4–6 from the questionnaire. Majority of them, 106 or 95,5% invested for more than one year. Likewise, most of them daily follow the events (98/111; 88,3%), out of which most of the respondents spend 1–6 hours a day in such activities (63/111; 63,6%).

Table 2 presents data of the answers to the survey questions(7–13) related to the characteristics of addiction according to DSM-IV criteria. Questions were composed

Table 1. Data on the duration and frequency of investment.

Question in the questionnaire	N = 111
How long have you been investing on the stock market? (N, %)	
< 1 year	5 (4,5%)
1–3 years	52 (46,9%)
> 3 years	54 (48,6%)
How often do you follow the events in the stock market? (N, %)	
Daily	98 (88,3%)
1–2 times a week	7 (6,3%)
Once a month	6 (5,4%)
If you follow the market daily, how much time do you spend following the developments in the stock markets? (N, %)	
< 1 hour	15 (16,2%)
1–6 hours	63 (63,6%)
> 6 hours	20 (20,2%)

to cover the basic criteria according to DSM addiction criteria: craving, withdrawal symptoms, tolerance and daily activities disruption.

If they were not able to follow the events on the stock market, 74,8% or 83 respondents felt tension, out of which 20 (18.9%) felt it very often and 63 (56,8%) sometimes. Most respondents (102/111) thought that the daily news might affect the stock market developments, 49 (44,1%) of them thought it very often, and 53 (47,8%) thought it sometimes. Responding to major changes of value of shares, only 13 respondents (11,7%) did not feel any emotional changes. Less than half of the respondents came into conflict with the environment and families because of dealing with shares (37/111; 33,3%) and had trouble sleeping during the tumultuous events on the stock market (49/111; 44,1%). With bigger drops of stock values, 93 (83,8%) respondents did not intend to give up dealing with stocks and 90 respondents (81,1%) continued to buy shares regardless of the losses.

Answers to questions 7–11 about indicators of addiction according to DSM-IV criteria have been divided into two categories: *there are no indicators of addiction* and *participants exhibited addiction* (questions 12 and 13 have only two answers offered even in the original questionnaire). Two classifications have been made: milder, in which any presence of symptoms was considered to be a positive indicator of addiction (moderately and significantly expressed), and stricter, in which symptoms were considered positive only if they were significantly expressed, while moderately expressed symptoms were considered negative (Table 3).

Table 2. Data on characteristics of addiction according to DSM criteria for the subjects included in the research

Question in the questionnaire	N = 111
Do you feel tense if you can not keep track of daily events on the stock market? (N, %)	
Often	20 (18,0%)
Sometimes	63 (56,8%)
Never	28 (25,2%)
Do you think that daily news might affect the stock market developments? (N, %)	
Often	49 (44,1%)
Sometimes	53 (47,8%)
Never	9 (8,1%)
How do you react when major changes of value of shares occur? (N, %)	
I react excitedly (euphoria/depression)	10 (9,0%)
I'm tense (happy/concerned)	88 (79,3%)
I do not care	13 (11,7%)
Have you come into conflict with the environment and families because of dealing with the shares? (N, %)	
Often	4 (3,6%)
Sometimes	33 (29,7%)
Never	74 (66,7%)
Did you have trouble sleeping in times of tumultuous events on the stock market? (N, %)	
Often (2 and more times a week)	7 (6,3%)
Sometimes (2–3 times a month)	42 (37,8%)
Never	62 (55,9%)
Did you want to quit dealing with stocks after greater losses on the stock market? (N, %)	
Yes	18 (16,2%)
No	93 (83,8%)
Do you still buy shares regardless of the losses? (N, %)	
Yes	90 (81,1%)
No	21 (18,9%)

According to DSM-IV criteria, addiction exists if the subjects show 3 or more indicators for addiction. If we look at the less severe classification, 3 or more positive in-

Table 3. Classification of the answers to the questions 7–11 under milder and more stringent criteria.

	Positive symptoms of addiction include the following responses:	
	Milder criteria	Stringent criteria
Do you feel tense if you can not keep track of daily events on the stock market?	Often Sometimes	Often
Do you think that daily news might affect the stock market developments?	Often Sometimes	Often
How do you react when major changes of value of shares happen?	I react excitedly (euphoria/depression) I am tense (happy/concerned)	I react excitedly (euphoria/depression)
Have you come into conflict with the environment and families because of dealing with the shares?	Often Sometimes	Often
Did you have trouble sleeping in times of tumultuous events on the stock market?	Often (2 or more times a week) Sometimes (2–3 times a month)	Often (2 or more times a week)

dicators have been present in even 107/111 or 96,4% of the respondents, which means that they met the criteria for the presence of addiction. 18 respondents (16,2%) were positive on symptoms expressed by all 7 criteria, and all subjects (100%) had at least one positive indication of addiction. (Figure 1)

When using the severe classification of symptoms, the criteria for addiction (3 or more positive symptoms) were met by 90/111 (81,1%) subjects, and only 2 of them had all positive indicators of addiction. (Figure 2).

DISCUSSION

The main finding of this study is that the respondents who spend time online investing on the stock market and trading stocks frequently meet the criteria for addiction according to DSM-IV classification of psychiatric disorders. The more strict criteria that take into account the significantly expressed symptoms show 81,1% of the respondents who meet the criteria, while in mild criteria, where the moderately expressed symptoms are considered positive, that percentage goes up to even 96,40%.

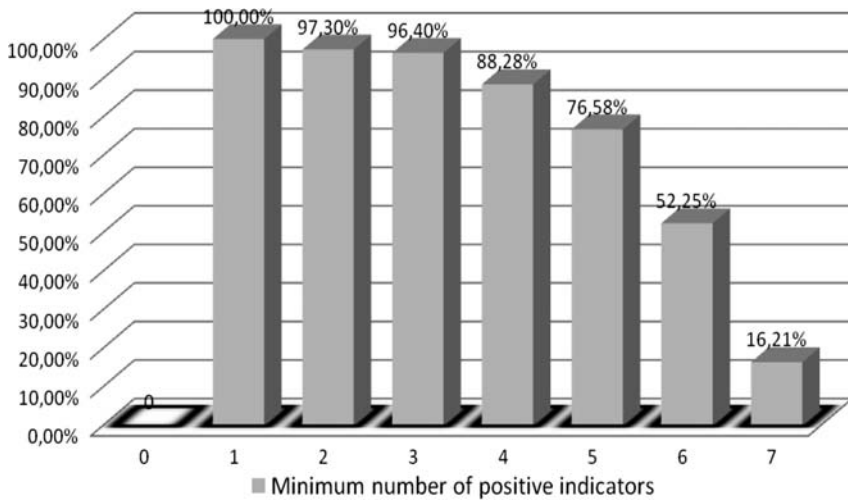


Fig 1. Number of positive criteria for addiction according to milder criterion

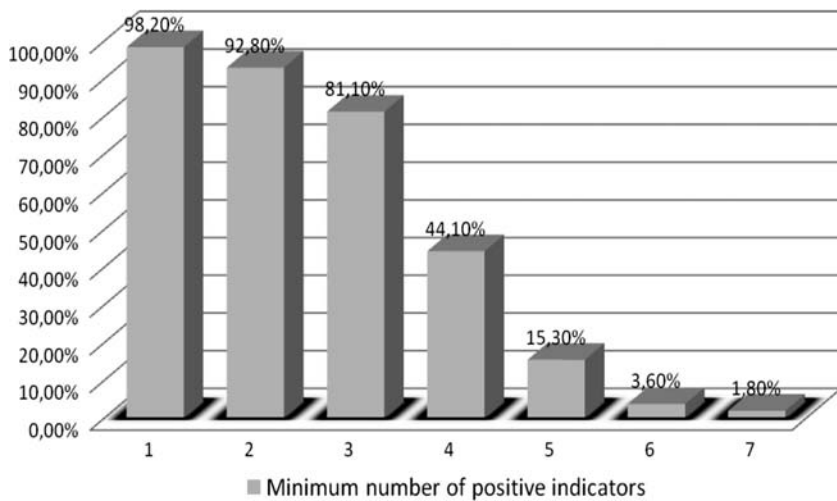


Fig 2. Number of positive criteria for addiction according to stringent criterion.

According to the available literature, investing on the stock market, as a separate web application, has still not been recognized as a separate subtype of Internet addiction. This is the first such study conducted in Croatia.

Numerous studies have primarily examined, the potential of forming addiction in some network applications, and secondarily, the characteristics of those where the

presence of addiction indicators of internet have been observed. In research conducted by the University in Turk (Finland), Finnish version of the IAT questionnaire (eng. *Internet addiction disorder*) for testing the existence of Internet addiction was used. IAT score on the questionnaire indicated the level of addiction. Total IAT score was associated with applications relating to adult entertainment, games, chat conversations and discussions. It was observed that men had a significantly higher average score on the test than women.⁸ Due to the very small number of women in our study, we could not examine whether there is statistically significant difference in the number of positive indicators of addiction between sexes.

The research that used the French version of the IAT questionnaire revealed a statistically significant positive correlation between IAT scores and daily time using the Internet. In addition, younger people got more points on IAT, which points to the fact that the degree of addiction was more frequently achieved in younger age groups, which is consistent with previous finding considering the Internet addiction⁹. This finding has been confirmed by an Italian study of Internet addiction conducted on 236 patients, which showed that younger users are at greater risk of developing addiction than adults. Night-users are at greater risk of developing addiction due to their reduced quality of life and a disabled control of their time.¹⁰

»Winter blues« study dealt with the role of seasonal affective disorder (SAD – seasonal affective disorder) during seasonal variations in stock market. SAD is a medical condition in which the shortness of days in fall and winter leads to depression of many people which reduces the risk appetite. Studies at different latitudes in both hemispheres provide compelling evidence of the connection between seasonal depression and seasonal variations in the stock market.¹¹ Our research was conducted in the spring. It would be interesting to repeat the study during the winter months. It is possible that the potential for addiction was less due to the reduced risk appetite.

Many authors have questioned whether in the nervous system the same pathophysiological mechanisms both occur in non- substance as well as in psychoactive drugs addictions. By using the neural imaging technique, it has been shown that during financial investment and anticipation of reward, we undergo an activation of ventral striatum in brain, which is innervated by dopaminergic fibers from the ventral tegmental area.^{12,13} The same dopamine pleasure center is also activated by taking certain types of stimulants (amphetamine and cocaine).^{14,15} Such studies support the view that the intensive stock trading, because of the constant expectation of financial reward, is a significant risk factor for the development of addiction.

This study has several limitations. The sample of respondents in our study was occasional, given the fact that the questionnaire was available on the websites men-

tioned above and thus its fulfillment was voluntary and anonymous. However, even though our sample was occasional, we believe that it reflects a good sample of people who are usually engaged in games of chance or gambling because they are normally men of younger age groups due to higher impulsiveness, extroversion, greater need for excitement and stimulation and less inhibition.⁶ Another limitation concerns the survey itself: the questionnaire used in this study was made by modifying the IAT questionnaire and was designed to cover all the addiction indicators according to DSM-IV criteria. However, it is possible that there are disadvantages of this questionnaire due to the fact that it hadn't been tested on an independent group before our research was conducted.

In conclusion, our study showed that the majority of respondents who spend time on the Internet investing in the stock market and trading stocks met the criteria for the existence of addiction. Given the growing number of daily Internet addicts and people who have problems with gambling or games of chance, we believe that the results of this research could help to warn the public and professionals of this increasingly common public health problem.

POVEZANOST OVISNIČKOG PONAŠANJA I INVESTIRANJA NA BURZI U HRVATSKOJ

Sažetak – Ovisnost o Internetu i patološko kockanje u današnje vrijeme postaju sve veći javnozdravstveni problem. Još uvijek nije do kraja razjašnjeno radi li se kod nesupstancijalnih ovisnosti radi o stvarnoj ovisnosti uz uključenje istih patofizioloških procesa na biološkoj razini ili se radi o poremećaju kontrole poriva, stoga je cilj ovog istraživanja bio je utvrditi jesu li kod ispitanika koji provode vrijeme investirajući na burzi zadovoljeni kriteriji za ovisnost prema DSM-IV TR klasifikaciji psihijatrijskih poremećaja. Istraživanje je provedeno korištenjem modificiranog IAT upitnika vlastite izrade koji je bio dostupan na internetskim portalima Poslovni.hr i Moj Novac.hr. Osobe koje investiraju na burzi i trguju dionicama *on-line* pozvane su da ispune ovaj upitnik. Upitnik je sadržavao 13 pitanja: 3 pitanja o demografskim pokazateljima ispitanika, 3 pitanja o vremenskom periodu provedenom u investiranju na burzi i učestalosti praćenja zbivanja na burzi i 7 pitanja koja su sastavljena prema DSM-IV kriterijima prema kojima se definira postojanje ovisnosti. Upitnik je u potpunosti ispunilo 111 ispitanika, od čega su većina bili muškarci dobne skupine 35–45 godina i visoke stručne spreme. Većina ispitanika investirala je dulje od jedne godine, a zbivanja na burzi prati svakodnevno u trajanju od 1–6 sati. Bez obzira na tip klasifikacije odgovora, većina ispitanika ima pozitivna više od 3 kriterija za ovisnost (prema blažoj klasifikaciji 96,4% ispitanika, a prema strožoj 81,1% ispitanika). Prema rezultatima našeg istraživanja kod većine ispitanika koji provode vrijeme na Internetu investirajući na burzi i trgujući dionicama

zadovoljeni su kriteriji za postojanje ovisnosti prema DSM-IV klasifikaciji psihijatrijskih poremećaja.

Ključne riječi: ovisnost; ovisnost o internetu; patološko kockanje; anketa

REFERENCES

1. Wöfling K, Bühler M, Leménager T, Mörsen C, Mann K. Gambling and internet addiction: Review and research agenda. *Der Nervenarzt* 2009; 80: 1030–1039.
2. Zoričić Z, Torre R, Ilić S. Ovisnost o internetu. *Alcoholism* 2001; 47(Suppl 1): 249–255.
3. Shaw M, Black DW. Internet addiction: definition, assessment, epidemiology and clinical management. *CNS Drugs* 2008; 22: 353–365.
4. Dejoie JF. Internet addiction: a different kind of addiction? *Rev Med Liege* 2001; 56: 523–530.
5. Young K, Pistner M, O'Mara J, Buchanan J. Cyber disorders: the mental health concern for the new millennium. *Cyberpsychol Behav* 1999; 2: 475–479.
6. Zoričić Z, Torre R, Ilić S. Psihofarmakoterapija patološkog kockanja. *Alcoholism* 2001; 47(Suppl 1): 257–264.
7. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). Available at: <http://allpsych.com/disorders/dsm.html>; Accessed October 24, 2011.
8. Korkeila J, Kaarlas S, Jääskeläinen M, Vahlberg T, Taiminen T. Attached to the web – harmful use of the Internet and its correlates. *Eur Psychiatry* 2010; 25: 236–41.
9. Khazaal Y, Billieux J, Thorens G, Khan R, Louati Y, Scarlatti E, et al. French validation of the internet addiction test. *Cyberpsychol Behav* 2008; 11: 703–6.
10. Ferraro G, Caci B, D'Amico A, Di Blasi M. Internet addiction disorder: an Italian study. *Cyberpsychol Behav* 2007; 10: 170–5.
11. Kramer LA, Levi MD. »Winter Blues: Seasonal Affective Disorder (SAD) and Stock Market Returns«. *American Economic Review* 2003; 93: 324–43.
12. Knutson B, Bossaerts P. Neural Antecedents of Financial Decisions. *The Journal of Neuroscience* 2007; 27: 8174–7.
13. Bechara A. Neurobiology of decision-making: risk and reward. *Semin Clin Neuropsychiatry* 2001; 6: 205–16.
14. Sulzer D. How addictive drugs disrupt pre-synaptic dopamine neurotransmission. *Neuron* 2011; 69: 628–49.
15. Leveil V. Dopamine release mediated by the dopamine transporter, facts and consequences. *J Neurochem* 2011; 118: 475–89.

APPENDIX

Questionnaire

1. Age
 - a. Less than 25 years
 - b. 25 – 35 years
 - c. 35 – 45 years
 - d. 45 – 55 years
 - e. More than 55 years
 2. Sex
 - a. Male
 - b. Female
 3. Degree
 - a. Primary school
 - b. High school
 - c. College
 - d. University
 - e. Postgraduate study
 4. How long have you been investing in the stock market?
 - a. Less than 1 year
 - b. 1 – 3 years
 - c. More than 3 years
 5. How often do you follow the events in the stock market?
 - a. Daily
 - b. 1–2 times a week
 - c. Once a month
 6. If you follow the market daily, how much time do you spend following the developments in the stock markets?
 - a. Less than an hour
 - b. 1–6 hours
 - c. More than 6 hours
 7. Do you feel tense if you can not keep track of daily events on the stock market?
 - a. Often
 - b. Sometimes
 - c. Never
 8. Do you think that daily news might affect the stock market developments?
 - a. Often
 - b. Sometimes
 - c. Never
-

Questionnaire – continued

9. How do you react when major changes of value of shares happen?
 - a. I react excitedly (euphoria/depression)
 - b. I'm tense (happy/concerned)
 - c. I do not care
 10. Have you come into conflict with the environment and families because of dealing with the shares?
 - a. Often
 - b. Sometimes
 - c. Never
 11. Did you have trouble sleeping in times of tumultuous events on the stock market?
 - a. Often (2 or more times a week)
 - b. Sometimes (2–3 times a month)
 - c. Never
 12. Did you want to quit dealing with stocks after higher losses on the stock market?
 - a. Yes
 - b. No
 13. Do you still buy shares regardless of the losses?
 - a. Yes
 - b. No
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