Internet Gaming Disorder: An Emerging Addiction among Pakistani University Students

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Abstract:

Internet gaming is increasing day by day with technology development. Today occurrence of IGD and its relationship with certain demographic variable will be viewed. Through the convenient sampling technique the study consisted of a sample of 315 university students of graduation level of education. The 20 item IGDT-20 was used to measure IGD. The analysis plan included correlation, t-test and ANOVA for hypothesis testing. The results indicated that males scored higher on Internet Gaming Disorder scale than females; young students spend more time on internet than others and are at high risk of developing Internet Gaming Disorder. These findings are helpful in developing a policy for the effective use of internet.

Keywords: Internet Gaming Disorder, Emotional Intelligence, Psychological Distress, University Students

1. INTRODUCTION

Daily lives of many people are becoming increasingly reliant on the internet for its use in social networking, communication, education, general awareness, online shopping, business transactions, entertainment, and many other applications. Therefore, the psycho-logical bearing of internet on mankind may not be over looked [Petry and O'brien, (2013)].

Online gamers are preoccupied with game and neglect several other important everyday activities [Chappell *et al.* (2006); Grüsser *et al.* (2006)]. Online gaming often hampers the execution of their familial,

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social, and official responsibilities due to an irrational amount of time playing on-line and offline video games [King *et al*. (2010)] hence affecting quality of life [Shahbaz and Shahbaz, (2015)]. If stopped per force, they may exhibit signs of anger, anxiety, or withdrawal. Over time, this resulted in the development of shortcomings that need to be addressed clinically. Researches with regards to several online addictions have gained momentum over the last decade.

Video gaming is the frequent web entertainment activity and can be termed addictive. The most prevalent and addictive category of web-based games is massively the multiplayer gaming. The "World of war craft" is one of such most frequently played MMORPGs. The reason for the games to be addictive is that they involve diverse objectives to complete and a variety of activities. Besides, the events in the gaming environment keep on rolling during the time the player is offline, urging them to peer every now and then to keep an eye on the developments taking place [Nakaya (2015)].

Excessive e-gaming is related to changes in the extent of indulgence with video games which is not a complication. Whereas, pathological gaming has negative psycho-social impacts and involves lack of control over disproportionate gaming activity [Lemmens *et al*. (2009)].

It is generally assumed that online games are a source of entertainment and a past time activity, but research on the other hand has exposed their negative effects on human life in general and particularly behavioural implications [Liu and Peng (2009); Van Rooij (2011)]. With the data mostly collected from countries in Asia, The APA included "Internet Gaming Disorder" in section III of DSM V with an emphasis on further research into this condition [King *et al.* (2013)].

Neuro-scientific Approaches to Internet Gaming Disorder

The studies by debate the impact of dopamine increase and that of other neurotransmitters with regards to the addiction cycle [Hollander (2006)].

Modern research has revealed that the neural substrate of cue induced game desire in internet addiction is same as the cue induced urge in psychoactive substance use [Ko *et al*. (2009)].

The neuropsychological function of IGD has been analyzed by many neurobiological and neuro-cognitive research studies [Dong *et al.* (2010); Han *et al*. (2012); Chih-Hung *et al.* (2009)]. While certain clinical reports and suggested criterion of IGD diagnosis share similarity with that of substance addiction [Chih-Hung *et al*. (2006; Ko, Yen *et al*. (2012)], so far no research study has reached a decisive conclusion that IGD and substance use disorder have a commonality of functional mechanism to certain degree. As substantial research has been carried out to address neurobiological function of substance use disorder for the last ten years [Volkow *et al*. (2010)], analysis of IGD's neurobiological functional mechanisms may uncover their similarity to those of substance use disorder [Montag and Reuter (2015)].The interconnection of addictive behaviour cycle is such that the joyful activities are trailed after by intoxication (increased dopamine). Increase in the dopamine level leads to an addictive behavior [Young and Abreu (2010)].

To provide an empirical evidence about internet gaming disorder from Pakistani population, the present study will contribute to develop an understanding of this variable among the sample at a varied level. This study can be used by researchers and psychologists to develop the preventive programmes and intervention plans in order to overcome this growing issue in the university students in particular and youth in general from our country.

In view of above mentioned literature, the current research is designed.

2. METHOD

2.1   Objectives

The objective of the study is: to study the prevalence of internet gaming disorder among university students in Pakistan.

2.2   Hypotheses

1. Prevalence of internet gaming disorder will be higher in male as compared to females.
2. Students who spend more time in playing online games will be at high risk of developing IGD than who spend less time.
3. Younger students will spend more time in playing games as compared to others.

2.3   Conceptual and Operational Definition of Variables

2.3.1 Conceptual Definition

Internet Gaming Disorder: It is characterized as persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress [Association (2013)]. IGD was measured through IGDT-20 by Pntes, Kiraly, Demetrovics, and Griffiths (2014). The cut-off score of IGD is 71 that distinguished disordered games from non-disordered gamers.

2.4   Research Design

The current research used quantitative approach with self-report instruments. The objectives of the study were achieved through four phases. Phase 1 included finalization and permission of instruments; Phase 2 included try out of the instruments; Phase 3 included pilot study while Phase 4 included the main study.

2.5.1 Sample

The sample for the present study was collected from different government/private sector renowned educational institutions/universities of Rawalpindi and Islamabad. Purposive sampling technique was used because of its cost and time effectiveness in addition to its convenience for the researcher to select required participants (with certain attributes) for the research. The sample comprised of the 161 male and 154 female university students (N = 315) enrolled at different institutes.

2.5.2   Inclusion Criteria

The inclusion criterion of participants for this research was to select those students who are involved into playing games on any kind of electronic device online and/or offline for more than an hour a day. The education level ranges from the BS/BA (Hons.) to M.Sc./MA, and MS/MPhil.

2.5.3   Exclusion Criteria

All the students spending less time (less than an hour) on any of the above-mentioned devices were excluded from the sample.

2.6   Instrument

The instrument Internet Gaming Disorder Test (IGDT-20 Test) was used and its details are given below:

Internet Gaming Disorder Test (IGD-20 Test). It includes 20 items reflecting the nine criteria of IGD as in the DSM-5 (Association (2013)) and incorporates the theoretical framework of components model of addiction (i.e., salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse) [Griffiths (2005)]. The items 1, 7, 13 for Salience, 2, 8, 14 for Mood Modification, 3, 9, 15 for tolerance, 4, 10, 16 for Withdrawal Symptoms, 5, 11, 17, 19, 20 for conflict, and 6, 12, 18 for relapse dimensions' measurement accordingly. The items number 2 and 19 follow the reverse scoring system. These items are meant to examine the severity of impairments due to gaming activity during the past year (i.e. 12 months). Gaming activity means any gaming-related activity that was played on a computer/laptop, gaming console, and/or any other kind of device online and/or offline. Items were devised based on experts' knowledge. The IGD-20 Test proved to be valid and reliable. Total scores range from 20 to 100 points and higher scores are indicative of higher degrees of gaming disorder. The suggested empirical cut-off for the test is 71 points. Scores are divided into four groups; normal (‹21), low (21-49), moderate (50-79) and severe (80-100) dependency. The IGD-20 test appeared to be an appropriate instrument for assessing IGD when administered to a large sample of heterogeneous gamers [Pontes *et al*. (2014)].

2.7   Procedure

The university administrations were informed and consent was taken from all the students. To ensure active participation of students, objectives of the study were shared with them. For collecting data 315 students from different universities were approached. The participants were ensured about the data confidentiality.

3. RESULTS

The current study was conducted to investigate the occurrence of IGD among university students in Pakistan. The research also studied the demographic variables, i.e., gender, time (hours) spent on playing games, age, time of playing games, and educational level in university students. A series of statistical analyses of the data, i.e., correlation, *t*-test and ANOVA were done through SPSS-XXIII. Cronbach's alpha coefficients were calculated to confirm the reliability Internet Gaming Disorder Test -IGDT-20 (α = .87). The frequencies and percentages along demographic variables were calculated followed by descriptive analysis, skewness, kurtosis, and inter-correlation of the IGDT.

Table 1 shows that IGDT and its subscales were normally distributed.

Table 2 indicated the bivariate correlation to explore the relationship of IGDT and its subscales. The inter-correlation analysis showed that IGDT and its subscales are positively correlated.

Table 3 shows comprehensive details of frequencies and percentages of students who are not and are at risk for developing internet gaming disorder accordingly.

Table 4 shows the mean differences on IGDT scale. The results showed that mean scores on IGDT of disordered group are highest followed by high risk group and low risk group subsequently.

In Table 5, the statistical analysis shows male university students have high score *(M = 50.93, SD = 12.63)* as compared to female university students *(M = 46.75, SD = 12.53)* at IGDT, which confirms our hypothesis that prevalence rate of internet gaming disorder will be higher among the male as compared to female university students.

Table 1: Mean, Standard Deviation, Skewness, and Kurtosis of IGDT
and its Subscales (N=315)

Variable	No. of Items	M	SD	Skewness	Kurtosis	α
IGDT	20	48.88	12.74	.04	-.73	.87
Salience	3	7.08	2.79	.29	-.67	.61
MM	3	9.15	2.25	.19	.12	.36
Tolerance	3	7.17	2.69	.33	-.32	.56
Withdrawal	3	6.73	2.73	.15	-1.03	.57
Conflict	5	11.79	3.70	.28	-.45	.64
Relapse	3	6.96	2.67	.15	-.78	.55

Note = IGDT = Internet Gaming Disorder, MM= Mood Modification.

Table 2: Inter-Correlation of IGDT and its Subscales (N = 315)

Scale	1	2	3	4	5	6
IGDT						
Salience	-	.78***	.53***	.77***	77***	.82***
MM		-	.32***	.56***	.55***	.51***
Tolerance			-	.35***	.35***	.21***
WD				-	.58***	.45***
Conflict					-	.56***
Relapse						-

Note = IGDT = Internet Gaming Disorder; MM = Mood Modification;
WD= withdrawal; ***p<.001.

Table 3: Frequencies and percentages regarding prevalence of internet
gaming disorder among university students (N=315)

Category	f	%
Not at Risk	155	49.2
At Risk	160	50.8
Low Risk	92	29.2
High Risk	51	16.2
Disordered	17	5.4

Table 4: Mean differences on IGDT in the prevalence of internet
gaming disorder based groups among university students (N=315)

	Low Risk (n = 92)		High Risk (n = 51)		Disordered (n = 17)					
Scales	M	SD	M	SD	M	SD	SS	Mean Squares	p	F
IGDT	54.4	3.0	63.4	2.9	73.7	3.2	6570.04	3285.02	.00	36.88

Note = IGDT = Internet Gaming Disorder.

In Table 6 the statistical analysis shows that all students' weekly game play time does have an effect on findings as reveal significantly higher score on IGDT ($p = .00$, F = 6.05) and it's almost all subscales, i.e., salience ($p = .00$, F = 5.05), tolerance ($p = .00$, F = 4.76), withdrawal ($p = .00$, F = 4.10), conflict ($p = .04$, F = 2.33), relapse ($p = .00$, F = 4.82) except mood modification ($p = .06$, F = 2.12).

In Table 7, the one-way ANOVA revealed significant differences among the university students from the groups based on weekly game-play time ($p = .000$, F = 5.13) who are at risk of IGD.

Table 8 revealed significant differences among university students from categories of risk on the groups based on weekly game-play time *($p = .000$, F = 5.88).*

Table 9 shows that the younger group (17 – 20 Years) has higher score on the scales of IGDT *(M = 50.69, SD = 12.19, F = 3.7, p = .025)* as compared to the older students' groups.

4.   DISCUSSION

The current study had the objective to determine the "Internet Gaming Disorder and its prevalence among university students in Pakistan. There is a need for reexamination of conceptualization of IGD in the light of demand of technology [Soper and Miller (1983)]. Video gaming is identified as a strong predictor of consistent internet and computer use [Morahan-Martin (1998)] ad later to online gaming. The psychological negative outcomes of IGD indicates problems in empathizing ad emotional deregulation [Kuss (2013)].

Table 5: Mean differences, standard deviation, and t value among male and female university students on the scales of IGDT and their subscales (N=315)

Variable	Male (n=161)		Female (n=154)		P	t	95% CI		Cohen's d
	M	SD	M	SD			LL	UL	
IGDT	50.93	12.63	46.75	12.53	.004	2.94	1.38	6.96	0.33
Salience	7.55	2.78	6.58	2.74	.002	3.09	.35	1.57	0.35
MM	9.35	2.31	8.93	2.18	.094	1.68	-.07	.92	0.18
Tolerance	7.57	2.83	6.75	2.48	.006	2.74	.23	1.42	0.31
Withdrawal	6.93	2.72	6.54	2.75	.211	1.25	-.22	.99	0.14
Conflict	12.25	3.67	11.32	3.68	.025	2.26	.12	1.75	0.25
Relapse	7.27	2.64	6.64	2.66	.034	2.13	.05	1.22	0.23

Note = IGDT = Internet Gaming Disorder.

Table 6: Mean differences on the scales of IGDT and its subscales in the weekly game play time based groups among university students (N=315)

Scale	1 (n = 180)		2 (n = 64)		3 (n = 39)		4 (n = 14)		5 (n = 4)		6 (n =1 4)		p	F
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD		
IGDT	45.91	12.32	51.33	10.05	52.59	13.19	55.21	11.83	64.25	10.84	55.00	17.66	.00	6.05
Salience	6.46	2.62	7.78	2.74	8.05	2.82	7.71	2.43	10.25	2.87	7.50	3.50	.00	5.05
Mood Modification	8.86	2.18	9.31	1.87	9.33	2.53	10.07	2.70	10.50	1.73	10.21	3.09	.06	2.12
Tolerance	6.57	2.65	7.75	2.32	7.85	2.58	8.50	2.53	8.75	2.22	8.50	3.63	.00	4.76
Withdrawal	6.27	2.70	6.86	2.25	7.44	2.85	7.93	2.95	9.75	1.89	8.21	3.40	.00	4.10
Conflict	11.32	3.60	12.28	3.34	12.44	3.82	12.07	4.55	16.25	2.36	12.36	4.63	.04	2.33
Relapse	6.42	2.59	7.34	2.34	7.49	2.84	8.93	2.09	8.75	1.71	8.21	3.42	.00	4.82

Note = IGDT = Internet Gaming Disorder; 1 = < 7 hours a week; 2 = between 8 and 14 hours a week; 3 = between 15 and 20 hours a week; 4 = between 21 and 30 hours a week; 5 = between 31 and 40 hours a week; 6 = > 40 hours a week.

Table 7: Mean differences in the weekly game play time based groups among university students who are at risk of developing internet gaming disorder (N=160)

Variable	N	M	SD	95% CI LL	95% CI UL	p	F
< 7 hours a week	76	1.39	.59	1.26	1.53	.000	7.12
B/w 8 and 14 hrs a week	41	1.41	.59	1.23	1.60		
B/w 15 and 20 hrs a week	21	1.81	.68	1.50	2.12		
B/w 21 and 30 hrs a week	10	1.60	.84	.99	2.20		
B/w 31 and 40 hrs a week	3	2.67	.58	1.23	4.10		
> 40 hours a week	9	2.11	.93	1.39	2.82		

Note: IGDT = Internet Gaming Disorder.

Table 8: Mean differences on the risk defined categories on the IGDT scale in the weekly game play time based groups among university students (N=315)

Category	n	Not at Risk (n = 155) M	SD	Low Risk (n = 92) M	SD	High Risk (n = 51) M	SD	Disordered (n = 17) M	SD	p	F
< 7 hours a week	76	37.09	7.20	54.45	2.96	62.95	3.12	73.00	5.35	.000	5.88
B/w 8 and 14 hrs a week	41	40.82	5.67	52.92	2.65	63.61	2.84	71.50	2.12		
B/w 15 and 20 hrs a week	21	39.82	5.88	56.71	2.62	63.45	2.58	76.66	1.52		
B/w 21 and 30 hrs a week	10	40.50	5.06	56.16	2.92	63.00	.000	74.00	1.41		
B/w 31 and 40 hrs a week	3	49.00	5.40	56.66	2.30	64.00	2.21	72.00	1.21		
> 40 hours a week	9	34.40	7.30	54.37	3.02	66.50	3.53	73.75	2.50		

Note = IGDT = Internet Gaming Disorder.

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Table 9: Mean differences on the scales of IGDT and its subscales in age based groups among university students (N=315)

Scale	17 – 20 Years (n = 78)		21 – 25 Years (n = 165)		26 – 54 Years (n = 72)		SS	p	F
	M	SD	M	SD	M	SD			
IGDT	50.69	12.19	49.54	12.53	45.43	13.31	1184.62	.025	3.7
Salience	7.17	2.62	7.28	2.83	6.51	2.86	30.18	.145	1.94
Mood Modification	9.15	2.01	9.34	2.35	8.69	2.25	20.86	.129	2.06
Tolerance	7.29	2.29	7.32	2.73	6.69	2.98	20.98	.237	1.45
Withdrawal	7.45	2.77	6.79	2.65	5.83	2.69	98.84	.001	6.83
Conflict	12.33	3.89	11.79	3.61	11.24	3.66	45.10	.193	1.65
Relapse	7.29	2.84	7.02	2.61	6.46	2.56	27.55	.144	1.95

Note: IGDT = Internet Gaming Disorder.

The descriptive analysis of IGDT (*M = 48.8*) (*SD = 12.74*) and their subscales depicted through table 1 confirms that the instruments have appropriate descriptive properties for current research study. The reliability analysis shows that alpha coefficients for the IGDT manifests excellent reliability and low alpha reliabilities of the subscales of the IGDT specifically of mood modification and conflict, appears to be due to the less number of items in these subscales. The IGDT-20 was used in its original form developed by Pontes *et al*. (2014).

The prevalence of internet gaming disorder among university students in Pakistan is statistically tested. The sample of this study consisted of students involved in playing video games for past months. It was found that 50.8% of university students have either developed or are at risk of developing the symptoms of internet gaming disorder while 49.2% of university students are not at risk among the total sample. A handful of studies have reported the prevalence of IGD using nationally representative samples [Gentile (2011); Griffiths (2009)].

In with the aforementioned objective, mean differences were computed for prevalence based groups regarding internet gaming disorder. The statistical analyses showed that mean scores on IGDT of disordered group were higher of high risk group and low of low risk group. This gives us an idea from current study that disordered group experiences high level of psychological distress which can be catered for with deeper analytical work for future studies [Kirmayer *et al.* (2009)].

The students who spend more time in playing games (i.e. more than 40 hours a week) will be at high risk of developing internet gaming disorder, significant difference *(F = 6.05)* is found between those who spend more time on playing games as compared to those who spend less time at playing games (i.e. < 7 hours a week). Though at times it is suggested that playing excessively is not the criteria for internet addiction. Our research findings are also found in lieu with the previous literature findings thus confirming that those students who spend more time at playing games are high scorers on measure of IGDT [Gentile *et al*. (2011); Griffiths (2009); Hamissi *et al.* (2013)].

The hypothesis of the current study stated that prevalence rate of internet gaming disorder will be higher in male as compared to female university students. The statistical analysis of data revealed the male and

female participants differed significantly in several demographic parameters and were, therefore, analyzed independently whenever indicated. The results revealed significant gender differences exist for the IGDT. The male university students have high score at IGDT as compared to female university students [Association (2014); Bickham *et al.* (2003); Griffiths *et al*. (2003); Lee *et al.* (2009)].

To identify the mean differences among the university students regarding weekly game-play based time groups, the One-Way ANOVA was performed. These results too depicted significant findings while comparing these groups. The mean differences for groups are mentioned as students playing games: for < 7 hours a week; B/W 8 and 14 hours a week; B/W 15 and 20 hours a week; B/W 21 and 30 hours a week; B/W 31and 40 hours a week; > 40 hours a week. This further confirms the hypothesis i.e. students who spend more time (hours) in playing games will be at high risk of developing internet gaming disorder [Ramadhani (2018); Vlček (2016)].

In accordance with the hypothesis, the younger students will spend more time in playing internet games as compared to the older students, the findings suggest that the younger group (17 – 20 Years) has higher score on the scales and subscales of IGDT in comparison to the older group (26 – 54 Years). Conclusively, on the basis of the findings based on detailed analyses of data from this research, it is concluded that internet gaming disorder is prevalent in Pakistan just as many other countries across the world. The students seem to be at high risk of developing the symptoms of internet gaming disorder [Griffiths (2004); Newswire and Press (2016)].

5.   CONCLUSION

The present research was conducted to investigate the prevalence of internet gaming disorder among the male and female university students in Pakistan. The results of this study were in agreement with the findings of other studies around the world. All the results supported our objectives and hypotheses. The prevalence of the internet gaming disorder has been confirmed in our country the same as from Asia. Prevalence of internet gaming disorder was high in the male university students as compared to the female university students. The results also

depicted that the students who spent more time on playing internet games were at increased risk of developing the internet gaming disorder. The present study depicted a wide chance that the students more acquainted to internet games seem to be high at risk for developing internet gaming disorder. The evidence of the present research will help to redesign the policy, precisely addressing the issues related to students spending excessive time in internet gaming. Though the video gaming is progressing day by day, it has become a need but serious measures need to be taken to conference its results. Thus, other researchers are encouraged to carry out researches relevant to this field in order to establish the diagnostic procedures and mechanisms of rehabilitation.

REFERENCES

Association, A. P. (2013) *Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)*: American Psychiatric Pub.

Association, E. E. S. (2014) The Entertainment Software Association-Industry Facts.

Bickham, D. S., E. A. Vandewater, A. C. Huston, J. H. Lee, A. G. Caplovitz, and J. C. Wright. (2003) Predictors of Children's Electronic Media Use: An Examination of Three Ethnic Groups. *Media Psychology, 5:*2, 107-137.

Chappell, D., V. Eatough, M. N. Davies, and M. Griffiths. (2006) EverQuest—It's Just a Computer Game Right? An Interpretative Phenomenological Analysis of Online Gaming Addiction. *International Journal of Mental Health and Addiction, 4:*3, 205-216.

Dong, G., Q. Lu, H. Zhou, and X. Zhao (2010) Impulse Inhibition in People with Internet Addiction Disorder: Electrophysiological Evidence from a Go/NoGo Study. *Neuroscience Letters, 485:*2, 138-142.

Gentile, D. A. (2011) The Multiple Dimensions of Video Game Effects. *Child Development Perspectives, 5:*2, 75-81.

Gentile, D. A., H. Choo, A. Liau, T. Sim, D. Li, D. Fung, and A. Khoo. (2011) Pathological Video Game Use among Youths: A Two-year Longitudinal Study. *Pediatrics*, 2010-1353.

Griffiths, D. J. (2005) *Introduction to Quantum Mechanics*: Pearson Education India.

Griffiths, M. (2009) Online Computer Gaming: Advice for Parents and Teachers. *Education and Health, 27*:1, 3-6.

Griffiths, M. D., M. N. Davies, and D. Chappell (2003) Breaking the Stereotype: The Case of Online Gaming. *Cyber Psychology & Behavior, 6*:1, 81-91.

Griffiths, M. D., M. N. Davies, and D. Chappell (2004) Demographic Factors and Playing Variables in Online Computer Gaming. *Cyber Psychology & Behavior, 7:4*, 479-487.

Grüsser, S. M., R. Thalemann, and M. D. Griffiths. (2006) Excessive Computer Game Playing: Evidence for Addiction and Aggression? *Cyber Psychology & Behavior, 10*:2, 290-292.

Hamissi, J., M. Babaie, M. Hosseini, and F. Babaie. (2013) The Relationship between Emotional Intelligence and Technology Addiction among University Students. *International Journal of Collaborative Research on Internal Medicine & Public Health, 5*:5, 310-319.

Han, D. H., I. K. Lyoo,and P. F. Renshaw. (2012) Differential Regional Gray Matter Volumes in Patients with On-line Game Addiction and Professional Gamers. *Journal of Psychiatric Research, 46:4*, 507-515.

Hollander, E. (2006) Behavioral and Substance Addictions: A New Proposed DSM-V Category Characterized by Impulsive Choice, Reward Sensitivity, and Fronto-striatal Circuit Impairment. *CNS Spectrums, 11:11*, 814-815.

King, D., P. Delfabbro, and M. Griffiths. (2010) The Convergence of Gambling and Digital Media: Implications for Gambling in Young People. *Journal of Gambling Studies, 26:2*, 175-187.

King, D. L., M. C. Haagsma, P. H. Delfabbro, M. Gradisar, and M. D. Griffiths. (2013) Toward a Consensus Definition of Pathological Video-gaming: A Systematic Review of Psychometric Assessment Tools. *Clinical Psychology Review, 33:3*, 331-342.

Kirmayer, L. J., S.-L. Fraser, V. Fauras, and R. Whitley. (2009) Current Approaches to Aboriginal Youth Suicide Prevention. *Cultural and Mental Health Research Unit Working Paper, 14*.

Ko, C.-H., G.-C. Liu, S. Hsiao, J.-Y. Yen, M.-J. Yang, W.-C. Lin, and C.-S. Chen. (2009) Brain Activities Associated with Gaming Urge of Online Gaming Addiction. *Journal of Psychiatric Research, 43:7*, 739-747.

Ko, C.-H., J.-Y. Yen, C.-C. Chen, S.-H. Chen, K. Wu, and C.-F. Yen. (2006) Tridimensional Personality of Adolescents with Internet Addiction and Substance Use Experience. *The Canadian Journal of Psychiatry, 51:14*, 887-894.

Ko, C.-H., J.-Y. Yen, C.-F. Yen, C.-S. Chen, and C.-C. Chen (2012) The Association between Internet Addiction and Psychiatric Disorder: A review of the Literature. *European Psychiatry, 27:1*, 1-8.

Kuss, D. J. (2013). Internet Gaming Addiction: Current Perspectives. *Psychol Res Behav Manag, 6*, 125-137.

Lee, S. J., S. Bartolic,, and E. A. Vandewater. (2009) Predicting Children's Media Use in the USA: Differences in Cross-Sectional and Longitudinal Analysis. *British Journal of Developmental Psychology, 27:1*, 123-143.

Lemmens, J. S., P. M. Valkenburg, and J. Peter. (2009) Development and Validation of a Game Addiction Scale for Adolescents. *Media Psychology, 12:1*, 77-95.

Liu, M., and W. Peng. (2009) Cognitive and Psychological Predictors of the Negative Outcomes Associated with Playing MMOGs (massively multiplayer online games). *Computers in Human Behavior, 25:6*, 1306-1311.

Montag, C., and M. Reuter. (2015) *Internet Addiction: Neuroscientific Approaches and Therapeutical Interventions*: Springer.

Morahan-Martin, J. (1998) Males, Females, and the Internet.

Nakaya, J. (2015) Thinking Social Media from Ethical Viewpoint. *Asian Journal of Business Ethics, 4:1*, 1-13.

Newswire, P., and G. Press. (2016) Playing the Field: Another Look at Internet Gaming Disorder. *Age*.

Petry, N. M., and C. P. O'brien. (2013) Internet Gaming Disorder and the DSM-5. *Addiction, 108*:7, 1186-1187.

Pontes, H. M., O. Kiraly, Z. Demetrovics, and M. D. Griffiths. (2014) The Conceptualisation and Measurement of DSM-5 Internet

Gaming Disorder: the Development of the IGD-20 Test. *PLoS One, 9:10,* e110137.

Ramadhani, R. F. (2018) University of Muhammadiyah Malang.

Shahbaz, K., and K. Shahbaz. (2015) Relationship between Spiritual Well-being and Quality of Life among Chronically Ill Individuals. *The International Journal of Indian Psychology, 2*:4.

Soper, W. B., and M. J. Miller. (1983). Junk-time Junkies: An Emerging Addiction among Students. *The School Counselor, 31:1*, 40-43.

Van Rooij, A. (2011) Online Video Game Addiction: Exploring A New Phenomenon.

Vlček, M. (2016) *Ovisnost o Računalu Kao Suvremena Bihevioralna ovisnost.* University of Zagreb. Faculty of Education and Rehabilitation Sciences.

Volkow, N. D., G. J. Wang, J. S. Fowler, D. Tomasi, F. Telang, and R. Baler (2010) Addiction: Decreased Reward Sensitivity and Increased Expectation Sensitivity Conspire to Overwhelm the Brain's Control Circuit. *Bioessays, 32:*9, 748-755.

Young, K. S., and C. N. De Abreu. (2010) *Internet Addiction: A Handbook and Guide to Evaluation and Treatment*. John Wiley & Sons.