Gaming under the influence: An exploratory study

KATEŘINA ŠKAŘUPOVÁ*, LUKAS BLINKA and ADAM ŤÁPAL

Faculty of Social Studies, Masaryk University, Brno, Czech Republic

Background and aims: Association between substance use and excessive play of online games exists both in theory and research. However, no study to date examined playing online games under the influence of licit and illicit drugs. *Methods:* We questioned a convenient online sample of 3,952 Czech online gamers on their experiences and motives of using caffeine, alcohol, tobacco, psychoactive pharmaceuticals, and illicit drugs while playing massive multiplayer online games (MMOGs). *Results:* The results showed low prevalence of illicit drug use while playing online games. Substance use was positively associated with intensity of gaming and both addiction and engagement; psychoactive substances with stimulating effect were linked to higher engagement and gaming intensity, whereas use of sedatives was associated with higher addiction score. Substance use varied slightly with the preference of game genre. *Discussion:* Drug use while playing appears as behavior, which is mostly not related to gaming – it concerns mostly caffeine, tobacco, alcohol, or cannabis. For some users, however, drug use was fueled by motivations toward improving their cognitive enhancement and gaming performance.

Keywords: online gaming, addiction, engagement, substance use

INTRODUCTION

In general, the concepts of behavioral addiction, particularly online gaming addiction, and substance use are closely related on many levels. Although the discussion did not yet reach complete consensus (see Kuss, Griffiths, & Pontes, 2017 and other papers in the issue for the summary of the debate), addictive behaviors appear to share similar sets of correlates and risk factors (Fisoun, Floros, Siomos, Geroukalis, & Navridis, 2012; Yen, Yen, Chen, Chen, & Ko, 2007), similar neurobiological manifestations (Grant, Brewer, & Potenza, 2014; Ko, Yen, Yen, Chen, & Chen, 2012), and similar symptomatology (Petry et al., 2014). Studies found positive relationship between addiction to some online applications including games and both licit and illicit drugs use (Walther, Morgenstern, & Hanewinkel, 2012), even in the longitudinal perspective (Zhang, Brook, Leukefeld, & Brook, 2016). Some researchers approach substance use and excessive use of online applications in terms of psychiatric comorbidity (Starcevic & Khazaal, 2017), while others try to explain the co-occurrence of both conditions within the framework of problem behavior theory (Ko et al., 2008). High risk of Internet addiction was found associated with negative academic outcomes, truancy, lifetime use of tobacco, alcohol, and/or drugs, suicidal thoughts, self-harming, and delinquent behaviors (Evren, Dalbudak, Evren, & Ciftci Demirci, 2014). Substance use is also associated with increased duration of Internet use (Secades-Villa et al., 2014); excessive gamers are often excessive caffeine users (Porter, Starcevic, Berle, & Fenech, 2010). These studies typically measure any use of the substance within certain period of time or during the lifetime; no data exist on actual gaming under the influence of psychoactive substances.

Gaming under the influence of psychoactive substances is, however, described for pathological gambling, where acute intoxication leads to worsened gambling outcomes. For instance, effects of concurrent alcohol use include disinhibition and risk-taking behaviors leading to increased losses (Ellery, Stewart, & Loba, 2005; Lyvers, Mathieson, & Edwards, 2015; Wiebe, Single, & Falkowski-Ham, 2001), while use of stimulant-type drugs, especially amphetamines, allows players to gamble for longer periods of time, to operate more slot-machines at once, and to stay focused longer (Hart et al., 2008). Tobacco, alcohol, caffeine, cannabis, and methamphetamine are the most commonly used substances among the patients in treatment for gambling disorder in the Czech Republic, with nearly one fifth using the latter two (Mravčík, Černý, Roznerová, Licehammerová, & Tion Leštinová, 2015). Griffiths and Barnes (2008) note that addictive behaviors online may elevate these risks given the 24/7 availability and a lack of social control.

Our study aims to explore levels and patterns of online gaming under the influence and to describe what substances are used by the gamers while playing, what are the subjective reasons for use, whether there is any relationship

---

* Corresponding author: Kateřina Škařupová; Faculty of Social Studies, Masaryk University, Joštova 218/10, Brno 602 00, Czech Republic; Phone: +420 549 493 180; E-mail: skarupovakat@gmail.com

between intoxicated play, time spent gaming, and gaming addiction severity. We also acknowledge the variability of acute effects of individual substances (Miller, 2013) and of the gaming genres (Lemmens & Hendriks, 2016) and assume different drug preferences among players of different genres as some games may involve more competitive and achievement-oriented gaming, whereas others may be more suitable for relaxation and escape from daily routines.

METHODS

Data collection and sampling

The data come from the second wave of the three-wave longitudinal online survey among the Czech and Slovak players of massive multiplayer online games and were collected in winter 2013. The questionnaire was published online in the Czech language using the Lime Survey platform. Gamers were recruited through advertisement at online forums, Facebook pages, and guild sites and in specialized magazines that targeted the core of the Czech and Slovak gaming community, with heavy players expected to be of the highest proportion in the sample. Respondents were asked to provide an e-mail address to participate in follow-up data collection. The questionnaire contained a set of sociodemographic questions, several items on gaming intensity, patterns, and preferences, the Addiction–Engagement Questionnaire (AEQ), and a voluntary module on drug use. At least one prevalence question in the drug module was answered by 4,004 respondents aged 11–59 years (10.2% were 15 years old or younger, 25.5% were 17 years old or younger, and 55.0% stated age of 21 years or less), who represented 83.1% of the total sample of 4,821 gamers. Compared with non-respondents, those who responded to drug module were by 0.9 years older [$M = 22.16$, $SD = 6.41$, $t(4,819) = -3,500$, $p < .001$] were less often male [92.4%, compared with 95.2%; χ^2 (1, $N = 4,821$) = 8.159, $p = .004$], and did not differ in hours spent gaming per week [$M = 29.67$, $SD = 16.35$, $t(4,354) = -0.897$, $p = .370$].

Measures and analyses

Online gaming addiction was measured by AEQ, a 24-item tool with response options on a 4-point scale (ranging from 1 – strongly agree to 4 – strongly disagree). The scale was designed to distinguish between online gaming addiction (12 items) and high engagement in online games (12 items) (Charlton & Danforth, 2007, 2010). Addiction scale covers the components, such as tolerance, conflict, and withdrawal, whereas engagement refers more to salience and mood changes. Since it was not validated for discriminatory purposes, we do not use cutoff points to distinguish addicted and non-addicted gamers, but rather work with the scale as a continuum. Both subscales had sufficient internal consistency (Cronbach's $\alpha = .83$ for addiction and .74 for high engagement). We created two new combined variables for addiction and engagement as mean scores of the respective subscales ranging from 1 to 4 ($M_{ADD} = 1.84$, $SD_{ADD} = 0.54$; $M_{ENG} = 2.82$, $SD_{ENG} = 0.42$). The frequency of online gaming, expressed in weekly playing hours, was constructed as a combined measure using two open-ended questions asking

the number of hours spent playing during average weekday and on a day off. Respondents who did not play in the last 3 months (i.e., obtained zero in the combined frequency variable) were excluded from the analysis. Gaming genre was identified on the basis of the favorite game title – three most popular genres were compared [role-playing games (RPG), multiplayer online battle arena (MOBA), and first/third-person shooter games (FPS)].

Drug use while gaming was measured using two items. Question on prevalence asked whether respondents have played games under the influence of following substances once, repeatedly, or never in the last 12 months: caffeine, tobacco, alcohol, cannabis or cannabis resin, amphetamine or methamphetamine, Ecstasy/MDMA, cocaine, stimulant pharmaceuticals (e.g., Ritalin), hallucinogens (LSD or psilocybin), sedatives and tranquilizers, mephedrone, and other legal highs. Legal highs were defined as "legal drugs and other enhancers from smart shop." Since the numbers of users were generally low, the responses were coded as 0 (not used) and 1 (used). Mephedrone use was reported by only two individuals and was not, therefore, regarded in further analyses. A dummy drug Relevin was also included to identify false-positive answers – three respondents were excluded from the analysis on the basis of this item. Motivations to use the substance were measured using multiple response set asking why the respondents used the substance: to concentrate better, to stay up, for courage, to enjoy more, to calm down, to suppress hunger, to fall asleep, not related to gaming, and no reason.

Descriptive statistics were calculated for all variables; t-test was used to compare addiction, engagement, and frequency levels between users and non-users; χ^2 test (or Fisher's exact test for drugs with small number of users) was employed to assess the distribution of users and non-users by gaming genre. Given the exploratory nature of the study, we report statistics and effect sizes for all relationships (Cohen, 1988).

Ethics

The study did not require approval of the ethics committee. In line with the university ethical guidelines (CTT, 2015), details about the study aims, procedures, and the data collected were provided on the first page of the questionnaire. Participation was voluntary and all information provided was confidential. The participation was solicited by online advertisement and parents of underage children could not be addressed directly; therefore, minors were requested to confirm that they would participate in the survey with parental approval.

RESULTS

Caffeine was, with 74.2% of positive responses, the most common stimulant-type substance used during gaming. Tobacco products were used by 25.3% and alcohol by 50.4% of the sample; 2.8% played online games under the influence of psychoactive pharmaceuticals; 1.8% mentioned legal highs; and 14.5% stated that they used at least one of the list of illicit substances while gaming (14.2% reported cannabis use and 1.9% used other drugs; see Table 1).

Table 1. Proportion of gamers using the substances while gaming, overall and by genre (%)

	Genres (% of users)					χ^2	(df)	Effect size	
	RPG	MOBA	FPS/TPS	Others	Total			Cramer's V	N
Caffeine	73.5	75.3	76.4	72.1	74.2	4.35	(3)	0.03	3,941
Tobacco	28.3	24.3	24.5	23.2	25.3	8.50	(3)	0.05	3,933
Alcohol	48.6	54.4	45.5	48.3	50.4	16.67	(3)	0.07	3,935
Cannabis/resin	12.9	16.7	15.1	11	14.2	16.41	(3)	0.07	3,930
Amphetamines	0.4	0.5	1.1	0.7	0.6	3.03*	(3)	0.03	3,938
Ecstasy/MDMA	0.9	0.5	0.7	0.2	0.6	3.50*	(3)	0.06	3,933
Cocaine	0.5	0.1	1.3	0.4	0.4	10.16*	(3)	0.02	3,928
Stimulant-type pharmaceuticals	0.4	0.2	0.2	0.2	0.3	1.31*	(3)	0.02	3,943
Hallucinogens (LSD/psilocybin)	1.4	1.2	0.7	0.9	1.1	2.02	(3)	0.04	3,939
Sedatives and tranquilizers	3.5	2.2	1.6	2.6	2.6	6.66	(3)	0.02	3,938
Legal highs	1.8	1.9	1.1	1.8	1.8	1.21	(3)	0.02	3,936

Note. RPG: role-playing games; MOBA: multiplayer online battle arena; FPS/TPS: first/third-person shooter game.
*For tables having the cells with expected values less than 5, the Fisher's exact test is reported.

Those who played under the influence of almost any substance spent more hours per week gaming than the non-users – the difference was highest for stimulant-type pharmaceuticals (+9.8 hr/week), Ecstasy/MDMA (+9.6), sedatives (+6.9), and amphetamines (+6.2) and lowest for cannabis, alcohol, and hallucinogens. Caffeine users played on average 3.8 more hours per week. Addiction scores were higher mainly for users of legal highs, sedatives and tranquilizers, ecstasy, and caffeine; engagement grew for users of caffeine and ecstasy; cocaine users were less engaged than non-users. The effect sizes ranged from very small to medium (Table 1). In terms of game genres, rather small differences in substance use while gaming were observed with overall trivial effects sizes. Nevertheless, players of FPS and MOBA games showed slight tendency toward stimulant-type drugs, whereas RPG players used more tobacco products, hallucinogens, and ecstasy (Table 2).

Most often, the use of the substance was not related to gaming (71.4% of those who stated at least one reason for substance use) or there was no particular reason for use (30.1%). More than half of the sample (59.6%) stated only reasons that were not related to gaming; game-related motives were mentioned by 40.4% respondents and involved avoiding sleep (25.8%), increased concentration (15.6%), enhanced enjoyment (13.8%), tension management (7.3%), increased courage (4.1%), avoiding hunger (2.7%), and insomnia management (2.0%). The differences by game genre were negligible.

DISCUSSION

Drug use while playing appears to be a very specific behavior, likely less prevalent than any drug use in the same population. Although not representative of the gaming community, our results suggest that the use of mildly stimulating caffeine while gaming is a rather common behavior, whereas any type of cognitive enhancement by misused pharmaceuticals and/or illicit substances appears to be rare.

Every third gamer who plays intoxicated has used the substance for reasons related to playing. This outcome may suggest that, at least for some gamers, the association between substance use and gaming severity cannot be fully explained using traditional approaches of psychiatric co-morbidity (Starcevic & Khazaal, 2017) or problem behavior theory (Ko et al., 2008), as it seems a pragmatic choice instead of an uncontrolled behavior. This may be especially true for high achievers and competitive gamers, as the use of "smart drugs" is increasingly observed in gaming sports (Dance, 2016). This hypothesis would also be supported by the fact that players of the more competitive genres (such as FPS and MOBA games) showed higher tendency to use substances with stimulating effects, and that cocaine and caffeine users scored higher on the engagement subscale of the AEQ. The observation that the users of legal highs, a category that may also include smart drugs, averaged higher in weekly frequency of play and on the addiction subscale may be explained by the acute effects involving, among others, tunnel vision and increased immersion (Petersen, Nørgaard, & Traulsen, 2015).

On the other hand, majority of the sample stated reasons unrelated to the game itself, suggesting that they would use the substance anyway or they just got to play already intoxicated. This may be self-evident for the high proportion of caffeine, tobacco, and alcohol users in the sample, but it may be linked to deeper underlying problems for users of illicit and addictive drugs as parallels with pathological gamblers would suggest (Cunningham-Williams, Cottler, Compton, Spitznagel, & Ben-Abdallah, 2000; Goudriaan, Oosterlaan, de Beurs, & van den Brink, 2006). Gaming addiction was associated with symptoms of depression and worse mood, and addicted gamers might, therefore, tend to self-medicate for mood management (Charlton & Danforth, 2010). Due to the exploratory nature of this study and limited contextual data, we cannot test this hypothesis.

Our results may also be viewed as an indication of association between intoxicated gaming and gaming frequency and severity of online gaming addiction symptoms. Such association has already been described for any use of

Table 2. Gaming addiction, engagement, and frequency of play among gamers using the substances while gaming and among non-users

	Not used			Used				t-test		
	M	SD	N	M	SD	N	Diff	t	df	Cohen's d
Addiction score										
Caffeine	1.73	0.50	1,011	1.88	0.55	2,910	−0.15	−8.14	1,898.5	0.29
Tobacco	1.84	0.54	2,921	1.86	0.54	992	−0.02	−1.03	3,911.0	0.04
Alcohol	1.82	0.55	1,941	1.87	0.53	1,974	−0.04	−2.59	3,896.2	0.08
Cannabis/resin	1.84	0.54	3,356	1.89	0.51	554	−0.05	−2.10	3,908.0	0.10
Amphetamines	1.84	0.54	3,894	1.86	0.59	24	−0.01	−0.12	3,916.0	0.02
Ecstasy/MDMA	1.84	0.54	3,892	1.98	0.68	21	−0.14	−1.21	3,911.0	0.26
Cocaine	1.84	0.54	3,892	1.76	0.48	17	0.08	0.60	3,907.0	0.15
Stimulant-type pharmaceuticals	1.84	0.54	3,912	1.88	0.49	11	−0.04	−0.22	3,921.0	0.07
Hallucinogens (LSD/psilocybin)	1.84	0.54	3,876	1.91	0.48	43	−0.07	−0.83	3,917.0	0.13
Sedatives and tranquilizers	1.84	0.54	3,817	2.11	0.54	102	−0.27	−5.04	3,917.0	0.51
Legal highs	1.84	0.54	3,847	2.13	0.61	69	−0.29	−4.43	3,914.0	0.54
Engagement score										
Caffeine	2.74	0.42	1,006	2.85	0.41	2,910	−0.11	−7.48	3,914.0	0.27
Tobacco	2.81	0.42	2,918	2.86	0.41	990	−0.04	−2.84	3,906.0	0.10
Alcohol	2.81	0.43	1,938	2.84	0.40	1,972	−0.03	−2.52	3,879.8	0.08
Cannabis/resin	2.82	0.42	3,353	2.84	0.39	552	−0.02	−1.31	773.0	0.06
Amphetamines	2.82	0.42	3,894	2.77	0.49	24	0.05	0.62	3,911.0	0.13
Ecstasy/MDMA	2.82	0.42	3,887	2.90	0.52	21	−0.08	−0.87	3,906.0	0.19
Cocaine	2.82	0.42	3,887	2.71	0.39	17	0.12	1.18	3,902.0	0.29
Stimulant-type pharmaceuticals	2.82	0.42	3,907	2.80	0.35	11	0.02	0.19	3,916.0	0.06
Hallucinogens (LSD/psilocybin)	2.82	0.42	3,872	2.89	0.48	42	−0.07	−1.09	3,912.0	0.17
Sedatives and tranquilizers	2.82	0.42	3,812	2.90	0.41	102	−0.08	−1.89	3,912.0	0.19
Legal highs	2.82	0.42	3,842	2.89	0.49	69	−0.07	−1.12	69.8	0.16
Weekly hours of play										
Caffeine	26.87	15.58	952	30.62	16.53	2,754	−3.75	−6.31	1,743.7	0.23
Tobacco	29.11	16.12	2,765	31.21	16.98	933	−2.09	−3.39	3,696.0	0.13
Alcohol	30.12	16.63	1,815	29.22	16.12	1,886	0.90	1.68	3,699.0	0.06
Cannabis/resin	29.60	16.37	3,175	30.15	16.42	522	−0.55	−0.71	3,694.0	0.03
Amphetamines	29.62	16.34	3,680	35.78	22.44	23	−6.16	−1.32	22.1	0.38
Ecstasy/MDMA	29.60	16.28	3,678	39.19	24.45	21	−9.59	−1.80	20.1	0.59
Cocaine	29.61	16.34	3,678	34.47	19.04	17	−4.86	−1.22	3,693.0	0.30
Stimulant-type pharmaceuticals	29.64	16.37	3,699	39.44	17.20	9	−9.80	−1.79	3,706.0	0.60
Hallucinogens (LSD/psilocybin)	29.65	16.34	3,664	30.48	18.37	40	−0.83	−0.32	3,702.0	0.05
Sedatives and tranquilizers	29.48	16.25	3,606	36.38	18.91	97	−6.91	−3.56	99.9	0.42
Legal highs	29.58	16.32	3,637	35.53	18.83	64	−5.95	−2.88	3,699.0	0.36

Note. Diff: mean difference.

psychoactive substances and addiction to online applications (Fisoun et al., 2012; Yen et al., 2007) as well as comorbidity of pathological gambling and substance (typically alcohol) addiction (Geisner et al., 2016). Nevertheless, it should be stressed that our data do not provide insight in severity of substance use; we only refer to any intoxication while gaming within the last 12 months.

Any conclusions beyond our sample should be, however, made with caution due to a number of limitations. The self-nominated sample of online gamers is not representative and the results should not be generalized. The actual drug use while gaming may be underreported, since it is a sensitive issue, the data collection was part of a longitudinal project and we collected e-mail addresses to distribute the follow-up questionnaires; the sense of anonymity/confidentiality might have been affected. Also, the available information on interfering variables and covariates is limited, as we only aimed for exploratory screening within broader online gaming addiction project. This is also why we do not report

p values, as we did not aim to test any hypotheses within the exploratory design.

CONCLUSIONS

Use of legal stimulants and mood/cognitive enhancements, specifically of alcohol, tobacco, and caffeine products, appears to be rather normalized and widespread. Drug use while playing, a specific behavior often not related to gaming, concerns mostly caffeine, tobacco, alcohol, or cannabis. For some users, however, drug use was fueled by motivations toward improving their cognitive enhancement and gaming performance. Nevertheless, intoxicated gaming may increase the risks of development of gaming problem for some players and excessive use of legal stimulants, such as caffeine products, and medicines in the parenting context may serve as an indicator of growing engagement into the gaming.

To examine these hypotheses would, though, require more focused research.

REFERENCES

Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior, 23*(3), 1531–1548. doi:10.1016/j.chb.2005.07.002

Charlton, J. P., & Danforth, I. D. W. (2010). Validating the distinction between computer addiction and engagement: Online game playing and personality. *Behaviour & Information Technology, 29*(6), 601–613. doi:10.1080/0144929090 3401978

Cohen, J. (1988). *Statistical power analyses for the social sciences.* Hillsdale, NJ: Lawrence Erlbaum Associates.

CTT. (2015). *Nakládání s výzkumnými daty na Masarykově univerzitě* [Use of research data at Masaryk University]. Brno, Czech Republic: Centrum pro transfer technologií, Masarykova univerzita.

Cunningham-Williams, R. M., Cottler, L. B., Compton, W. M., Spitznagel, E. L., & Ben-Abdallah, A. (2000). Problem gambling and comorbid psychiatric and substance use disorders among drug users recruited from drug treatment and community settings. *Journal of Gambling Studies, 16*(4), 347–376. doi:10.1023/A:1009428122460

Dance, A. (2016). Smart drugs: A dose of intelligence. *Nature, 531*(7592), S2–S3. doi:10.1038/531S2a

Ellery, M., Stewart, S. H., & Loba, P. (2005). Alcohol's effects on video lottery terminal (VLT) play among probable pathological and non-pathological gamblers. *Journal of Gambling Studies, 21*(3), 299–324. doi:10.1007/s10899-005-3101-0

Evren, C., Dalbudak, E., Evren, B., & Ciftci Demirci, A. (2014). High risk of Internet addiction and its relationship with lifetime substance use, psychological and behavioral problems among 10th grade adolescents. *Psychiatria Danubina, 26*(4), 330–339. Retrieved from https://hrcak.srce.hr/file/239140

Fisoun, V., Floros, G., Siomos, K., Geroukalis, D., & Navridis, K. (2012). Internet addiction as an important predictor in early detection of adolescent drug use experience – Implications for research and practice. *Journal of Addiction Medicine, 6*(1), 77–84. doi:10.1097/ADM.0b013e318233d637

Geisner, I. M., Huh, D., Cronce, J. M., Lostutter, T. W., Kilmer, J., & Larimer, M. E. (2016). Exploring the relationship between stimulant use and gambling in college students. *Journal of Gambling Studies, 32*(3), 1001–1016. doi:10.1007/s10899-015-9586-2

Goudriaan, A. E., Oosterlaan, J., de Beurs, E., & van den Brink, W. (2006). Psychophysiological determinants and concomitants of deficient decision making in pathological gamblers. *Drug and Alcohol Dependence, 84*(3), 231–239. doi:10.1016/j.drugalcdep.2006.02.007

Grant, J. E., Brewer, J. A., & Potenza, M. N. (2014). The neurobiology of substance and behavioral addictions. *CNS Spectrums, 11*(12), 924–930. doi:10.1017/S10928529000 1511X

Griffiths, M., & Barnes, A. (2008). Internet gambling: An online empirical study among student gamblers. *International Journal of Mental Health and Addiction, 6*(2), 194–204. doi:10.1007/s11469-007-9083-7

Hart, C. L., Gunderson, E. W., Perez, A., Kirkpatrick, M. G., Thurmond, A., Comer, S. D., & Foltin, R. W. (2008). Acute physiological and behavioral effects of intranasal methamphetamine in humans. *Neuropsychopharmacology, 33*(8), 1847–1855. doi:10.1038/sj.npp.1301578

Ko, C. H., Yen, J. Y., Yen, C. F., Chen, C. S., & Chen, C. C. (2012). The association between Internet addiction and psychiatric disorder: A review of the literature. *European Psychiatry, 27*(1), 1–8. doi:10.1016/j.eurpsy.2010.04.011

Ko, C. H., Yen, J.-Y., Yen, C. F., Chen, C. S., Weng, C. C., & Chen, C. C. (2008). The association between Internet addiction and problematic alcohol use in adolescents: The problem behavior model. *CyberPsychology & Behavior, 11*(5), 571–576. doi:10.1089/cpb.2007.0199

Kuss, D. J., Griffiths, M. D., & Pontes, H. M. (2017). Chaos and confusion in DSM-5 diagnosis of Internet gaming disorder: Issues, concerns, and recommendations for clarity in the field. *Journal of Behavioral Addictions, 6*(2), 103–109. doi:10.1556/2006.5.2016.062

Lemmens, J. S., & Hendriks, S. J. F. (2016). Addictive online games: Examining the relationship between game genres and Internet gaming disorder. *Cyberpsychology, Behavior, and Social Networking, 19*(4), 270–276. doi:10.1089/cyber.2015.0415

Lyvers, M., Mathieson, N., & Edwards, M. S. (2015). Blood alcohol concentration is negatively associated with gambling money won on the Iowa gambling task in naturalistic settings after controlling for trait impulsivity and alcohol tolerance. *Addictive Behaviors, 41,* 129–135. doi:10.1016/j.addbeh.2014.10.008

Miller, P. M. (2013). *Principles of addiction: Comprehensive addictive behaviors and disorders* (Vol. 1). San Diego, CA: Academic Press.

Mravčík, V., Černý, J., Roznerová, T., Licehammerová, Š., & Tion Leštinová, Z. (2015). Charakteristiky léčených problémových hráčů v ČR: průřezová dotazníková studie [Characteristics of problem gamblers in Treatment in the Czech Republic: A Cross-Sectional Questionnaire Survey]. *Adiktologie, 15*(4), 322–333. Retrieved from http://casopis.adiktologie.cz/cs/casopis/4-15-2015

Petersen, M. A., Nørgaard, L. S., & Traulsen, J. M. (2015). Pursuing pleasures of productivity: University students' use of prescription stimulants for enhancement and the moral uncertainty of making work fun. *Culture, Medicine, and Psychiatry, 39*(4), 665–679. doi:10.1007/s11013-015-9457-4

Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H.-J., Mößle, T., Bischof, G., Tao, R., Fung, D. S., Borges, G., Auriacombe, M., González Ibáñez, A., Tam, P., & O'Brien, C. P. (2014). An international consensus for assessing Internet gaming disorder using the new DSM-5 approach. *Addiction, 109*(9), 1399–1406. doi:10.1111/add.12457

Porter, G., Starcevic, V., Berle, D., & Fenech, P. (2010). Recognizing problem video game use. *Australian and New Zealand Journal of Psychiatry, 44*(2), 120–128. doi:10.3109/00048670903279812

Secades-Villa, R., Calafat, A., Fernández-Hermida, J. R., Juan, M., Duch, M., Skärstrand, E., Becoña, E., & Talic, S. (2014). Duration of Internet use and adverse psychosocial effects among European adolescents. *Adicciones, 26*(3), 247–253. doi:10.20882/adicciones.6

Starcevic, V., & Khazaal, Y. (2017). Relationships between behavioural addictions and psychiatric disorders: What is known and what is yet to be learned? *Frontiers in Psychiatry, 8,* 53. doi:10.3389/fpsyt.2017.00053

Walther, B., Morgenstern, M., & Hanewinkel, R. (2012). Co-occurrence of addictive behaviours: Personality factors related to substance use, gambling and computer gaming. *European Addiction Research, 18*(4), 167–174. doi:10.1159/000335662

Wiebe, J., Single, E., & Falkowski-Ham, A. (2001). *Measuring gambling and problem gambling in Ontario.* Retrieved from http://www.responsiblegambling.org/rg-news-research/rgc-centre/research-and-analysis/docs/research-reports/measuring-gambling-and-problem-gambling-in-ontario

Yen, J.-Y., Yen, C.-F., Chen, C.-C., Chen, S.-H., & Ko, C.-H. (2007). Family factors of Internet addiction and substance use experience in Taiwanese adolescents. *CyberPsychology & Behavior, 10*(3), 323–329. doi:10.1089/cpb.2006.9948

Zhang, C., Brook, J. S., Leukefeld, C. G., & Brook, D. W. (2016). Longitudinal psychosocial factors related to symptoms of Internet addiction among adults in early midlife. *Addictive Behaviors, 62,* 65–72. doi:10.1016/j.addbeh.2016.06.019