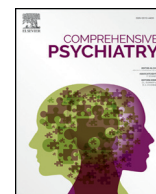


Contents lists available at [ScienceDirect](http://ScienceDirect.com)

Comprehensive Psychiatry

journal homepage: www.elsevier.com/locate/comppsy

The mediating effect of motivations between psychiatric distress and gaming disorder among esports gamers and recreational gamers

Fanni Bányai^{a,b}, Mark D. Griffiths^c, Zsolt Demetrovics^{a,*}, Orsolya Király^a^a Institute of Psychology, ELTE Eötvös Loránd University, Budapest, Hungary^b Doctoral School of Psychology, ELTE Eötvös Loránd University, Budapest, Hungary^c International Gaming Research Unit, Psychology Department, Nottingham Trent University, Nottingham, UK

ARTICLE INFO

Available online xxx

ABSTRACT

Research examining the relationship between gaming disorder, gaming motivations, and mental health is increasing, but the types of gaming use, such as recreational gaming and esports are not commonly distinguished. The present study compared recreational gamers and esports gamers ($N = 4284$) on a number of variables including game time, gaming motivations, severity of gaming disorder, and psychiatric symptoms. Additionally, the mediating effect of gaming motivations among esports and recreational gamers between psychiatric distress and problematic gaming was examined. Results showed that esports gamers spent significantly more time playing video games both on weekdays and weekend days than recreational gamers. Moreover, esports gamers had higher scores on social, competition, and skill development gaming motivations than recreational gamers. The mediation model demonstrated a significant positive direct and significant mediated effect via escapism (i.e., gaming excessively to avoid real life problems) between the higher levels of psychiatric distress and gaming disorder. However, esports and recreational gamers showed no significant differences in the model. The escapism motive appeared to be the common predictor of problematic gaming among both esports and recreational gamers. Future studies should focus on exploring escapism's mechanism in different subgroups of gamers in relation to problematic gaming to help the development of prevention, intervention, and treatment programs.

© 2019 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Over the past two decades, video game playing has become an increasingly popular leisure activity worldwide [1]. However, the activity of playing video games cannot be just labeled as a recreational pursuit. A small proportion of gamers now plays professionally and spends hours every day mastering their skills, and is now generally referred to as esports (electronic sport). Esports as professional (competitive) gaming started to gain prominence in the early 2000s [1]. Esport has been defined as a type of sporting activity in which gamers develop and train their mental skills and hand-eye co-ordination skills while using game-based information-communication technology [2], and where gamers are virtually represented in a digital "sporting world" [3]. At present, esports is most popular among adolescents and young adults (below 24 years) as a career option, and competitors of the esports scene are mostly males (92% of esports players) according to a recent online survey conducted on a convenience sample of 1814 esports gamers in Hungary [4,5].

As with other sports [6], esports now have organized and sanctioned competitions, such as esports tournaments [7]. Esports can be played via Local Area Network (LAN) connection between gaming devices (e.g., PC, consoles) and the events are hosted by sponsors, have live sport-commentary, have a large following audience (particularly via streaming platforms, like *Twitch.tv*, *YouTube*), and big money prizes for the winners [7–14]. Due to the widespread popularity of competitive video gaming, esports is under consideration to become a legitimate sporting activity. For example, the Olympic Council of Asia has already included esports as a medal event in the official program of 2022 Asian Games in China, which generally follows the Olympic Games' sports event [15].

Increasing numbers of gamers now see video game playing as an opportunity to make a financial living that could potentially change players' gaming motivations [1,16]. Moreover, esports and recreational gamers may differ in their gaming motivational pattern [17]. According to esports gamers' self-reports, esports can be (i) serious leisure [an intermediate activity between leisure and work [18]], (ii) enjoyable, (iii) driven by intrinsic, personal and social motivations, and (iv) comprise competitive and hedonic need gratifications [19–21]. Esports could be a job, but mostly for the top tier esports gamers who earn enough to make financial living. Their salary comes from different sources: tournament prizes, sponsorship (hardware, peripherals, influencer contracts),

* Corresponding author at: Institute of Psychology, ELTE Eötvös Loránd University, Izabella utca 46, Budapest 1064, Hungary.

E-mail address: demetrovics.zsolt@ppk.elte.hu (Z. Demetrovics).

becoming contracted player of an esports team/association or sport federation (i.e., Legia Warszawa, FC Schalke), and/or becoming a part-time streamer. Among semi-professional or entry-level esports gamers, working (in the traditional sense and unrelated to esports) or studying alongside an esports career is more common [12,18,19,22].

In light of the growing attention among scholars on gaming disorder, intensive and excessive videogame use among esports gamers raise interesting questions about the nature of addiction [1,16,23,24]. Griffiths [16] theoretically paralleled playing esports to professional gambling (i.e., poker players), highlighting the similarities in the excessive game time (while practicing or competing). Previous studies have focused on the comparison of professional, hobby, and problem gamblers [25,26], finding that the frequency and intensity of gambling can be similar in these groups. Compared to professional gamblers, problem gamblers show poorer psychosocial functioning [25], as well as less discipline, skill, and knowledge in their playing style [27]. Furthermore, problematic behavior and psychiatric distress can appear among all types of intensive gambling including professionals [26,28,29].

Following this concept, gaming studies should focus on the fact that esports gamers can develop problem gaming behavior the same as (or even more than) recreational gamers. Examining the differences between recreational game use and esports in relation to gaming disorder is much needed given the differences in motivation. Currently, two similar conceptualizations of gaming disorder exist in the psychiatric literature: 'Internet Gaming Disorder' (IGD) in the latest (fifth) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; [30]), and 'Gaming Disorder' (GD) in the latest (eleventh) edition of the International Classification of Diseases (ICD-11) by the World Health Organization (WHO [31]). The IGD diagnosis in the DSM-5 included nine criteria (i.e., preoccupation; withdrawal; tolerance; unsuccessful attempt to control the participation in internet games; loss of interest in previous hobbies; continued excessive use of internet games despite knowledge of psychosocial problems; deceiving family, the therapist or others regarding the amount of internet gaming; playing games to escape or relieve a negative mood; jeopardizing or losing significant relationship(s), jobs, educational or career opportunities because of playing). The ICD-11 characterized GD as comprising a pattern of persistent or recurrent online or offline gaming behavior including the following criteria: loss of control over gaming, increased priority of gaming over other activities, continuation or escalation of gaming despite its experienced negative consequences. The behavior pattern is of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning [32]. Both conceptualizations highlight that gaming disorder should be diagnosed if the gaming activity leads to the deterioration in the quality of life in a clinical sense.

Many of the IGD criteria (e.g., preoccupation, withdrawal, tolerance) have undergone much scholarly debate, and one of the most important criticisms is the argument that these criteria are not appropriate in distinguishing highly engaged gamers and truly problematic cases because they can often be endorsed by highly engaged or esports gamers without leading to clinical impairment [23,33–36,38]. Furthermore, an increasing number of studies have highlighted differences between esports gamers and recreational gamers not only in gaming motivations and the intensity of playing, but also in terms of the IGD criteria [17,37].

For a better understanding of the psychological profile of gaming disorder, numerous studies have explored the possible correlates and negative outcomes of gaming disorder which are related to gamers' mental health [e.g. 38,39], especially the correlates between psychiatric distress and gaming disorder [40–42]. Although gaming disorder affects only a minority of gamers, among this group, gaming disorder was found to be associated with depression [43–50], anxiety [44,45,50], and social anxiety [46,48,51].

Gaming motivations have also been found to predict gaming disorder [52–55], especially the high level of escapism [52,56–60] when gamers play videogames excessively to avoid real life problems and

difficulties [61]. Gaming disorder has also been associated with fantasy and immersion into video game worlds where gamers take on other identities and personas [62–64], as well as in-game achievement, advancement, and skill enhancement [52,57,59]. However, these previous results have only been found among the general gaming population rather than esports gamers. Very few studies have investigated the gaming motivations of esports gamers even though esports gamers have both intrinsic motivations (i.e., self-development) and extrinsic motivations (i.e., money, fame) in becoming esports gamers [1]. Motivations such as competition, seeking a challenge, escapism, and social relationships may drive esports gamers to seek career opportunities in playing video games professionally [19,20,65,66]. In fact, research has shown that recreational and esports gamers have different life goals and motivations [21]. Compared to recreational gamers, esports gamers have higher levels of affiliation (i.e., need to support others, interact intensively with others) and diversion (i.e., need of tension, experiencing new, exciting) [1]. Moreover, esports gamers who hold leader positions within the team reported higher satisfaction of their need of power compared to esports gamers who are not the leader of an esports team [21].

The difference between recreational gamers and an esports gamer raises more interesting questions concerning motivations based on the results of two previous studies [64,67]. These studies demonstrated that gaming motivations mediate the relationship between psychiatric symptoms (e.g., depression, anxiety) and gaming disorder, similarly to the findings reported in the alcohol and problem gambling literature [68–72]. Escapism was the strongest mediator in both aforementioned studies, but competition [67] and fantasy [64] also showed a weaker mediating effect. Furthermore, the study by Király et al. [67] also examined gender and game genre differences (i.e., massively multiplayer online role-playing games [MMORPGs] vs. first-person shooter [FPS] game players) and found that the association between escapism and gaming disorder was significantly stronger for female gamers than for male gamers.

Previous studies have only compared different groups of gamers based on their gender or favorite game genre [59,61,67,73,74], but did not differentiate between players using videogames for recreation or esports. However, such a distinction may be important as one of the most important criticisms of IGD that the present criteria and definitions are not appropriate to distinguish the highly engaged gamers from the truly problematic cases. Consequently, the present study aimed to compare recreational and esports gamers via demographics, gaming-related characteristics, severity of gaming problems, gaming motives, and psychiatric symptoms. Furthermore, the present study tested a previously established model (examining the mediation effect of gaming motives between psychiatric distress and gaming disorder) in both recreational and esports gamers to examine whether there are any differences in the mechanics between these groups.

2. Methods

2.1. Participants and recruitment

An online survey was created and administered to Hungarian-speaking gamers. The online survey was promoted for three weeks between November and December 2016 on the homepage and the Facebook website of a popular Hungarian video game-related magazine (*GameStar*). Incentives were used for recruitment purposes among gamers (a raffle for two shopping vouchers in a videogame shop with a value of approximately €200 each). The participation in the present study was voluntary and anonymous. However, a contact e-mail address was asked from the participants who wanted to participate in the raffle. These contact emails were only used to inform the winners of the vouchers and were deleted after the raffle draw had taken place. Before starting the online survey, all participants were informed about the general goals of the survey, and the time needed to complete the questionnaire. They were assured of confidentiality and anonymity.

Gamers under the age of 18 years (14- to 17-year olds) were allowed to participate if parental consent was provided. In total, 7815 gamers began the survey, and 5632 (72.1%) answered at least half of the questions. In the present study, only those who completed all the scales needed for the present analysis (i.e., psychiatric symptoms, online gaming motives, and problematic online gaming use) were used resulting in a final sample size of 4284 gamers (54.8%).

2.2. Measures

2.2.1. Sociodemographic variables

Questions related to major socio-demographics were collected, including age, gender, marital status, and education.

2.2.2. Gaming-related variables

Information regarding general video game play was also collected. For game time played on an average weekday and weekend day, the response options were given in time periods ('I don't play at all', 'Less than 1 hour a day', '1–2 hours a day', '2–4 hours a day', '4–6 hours a day' or 'More than 6 hours a day'). Data regarding the gaming platform(s) and videogames genres played were also collected. In addition, to identify esports gamers, several questions were asked concerning esports activity, such as the medium of the competitions (online and/or offline [LAN]) and the frequency of participating in esports competitions for both online and offline types separately (response options were: 'I did not compete in the last year'; '1–2 times in the last year'; '3–5 times in the last year'; '6–11 times in the last year'; 'several times a month'; and 'weekly or more frequently'). These characteristics helped to differentiate esports gamers from hardcore gamers, some of who also played competitively, but less frequently, mostly online, and had no intention to become professional esports gamers. Furthermore, the majority of esports tournaments comprise online qualifiers followed by offline finals. The frequency of online tournaments is fairly high (e.g., tournaments organized by the Electronic Sports League [ESL] take place several times a month), while offline esports tournaments available for Hungarian esports gamers are relatively rare (e.g., every two months or half a year). To determine the cut-off point of esports gamers, both theoretical conceptualizations [2,3,9] and esports event organization information were considered. Taking these into account, gamers who attended online and/or LAN esports competitions at least 6–11 times or more in the past year were classed as 'esports gamers', which means that they joined competitions at least in every two months on average.

2.2.3. Online gaming motives

To assess the gamers' general gaming motivations, the Motives for Online Gaming Questionnaire (MOGQ; [61]) was used. The MOGQ is a 27-item self-report measure that assesses gaming motivations across seven motivational factors described below. The MOGQ uses a 5-point Likert scale (from 'never' = 1 to 'almost always/always' = 5), with higher scores indicating stronger motivations. The seven motivations assessed were: *social, escapism, competition, skill development, coping, fantasy and recreation*. Cronbach's alphas were between 0.78 (recreation) and 0.91 (skill development), and demonstrating good internal consistency of the scale in the present study.

2.2.4. Psychiatric symptoms

Psychiatric symptoms were assessed with the Brief Symptom Inventory (BSI; [75]) comprising 53 items on a 5-point Likert scale (from 'not at all' = 0 to 'extremely' = 4), assessing nine symptoms (i.e., somatization, obsession-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobia, paranoia, and psychoticism). In the present study, three subscales of the Hungarian version of the BSI were used with their respective items. These were depression (six items), anxiety (six items), and psychoticism (five items). A summarized index (i.e., 'Psychiatric distress') was calculated to assess the intensity of general distress via the three subscales that were highly

related to gaming disorder according to previous studies. The 17 items used to calculate the summarized index showed excellent internal consistency in the present study (Cronbach's alpha = 0.93).

2.2.5. Gaming disorder

Gaming disorder (GD) was assessed using the Ten-Item Internet Gaming Disorder Test (IGDT-10; [76]). The IGDT-10 was developed theoretically to operationalize the nine DSM-5 criteria for internet gaming disorder (IGD) by adopting clear unambiguous wording for each item. Each DSM-5 criterion is operationalized using one item, except for the final criterion (e.g., "jeopardy or losing a significant relationship, job, or educational or career opportunity because of participation in Internet games"). This criterion was operationalized via two items because of its complexity and for clearer understanding. The IGDT-10 uses three response options for the ten items ('never' = 0, 'sometimes' = 1 and 'often' = 2) for easier understanding. However, those scoring items as 'never' and 'sometimes' were recoded into 'no' (0) and those scoring items as 'often' were coded as 'yes' (1) to follow the dichotomous structure of the DSM-5. Furthermore, criteria 9 and 10 were recoded into a single criterion response following the original structure of the IGD. Instead of categories (i.e., being at risk for GD vs. not being at risk for GD), the composite score of the IGDT-10 ranging from 0 to 9 was used in the present study, with higher scores indicating more symptoms/criteria of gaming disorder. The authors propose that the IGDT-10 can be used to assess both online games and video games depending on the instruction. In the present study symptoms related to video games (both online and offline) were assessed, an approach that is in line with the recent inclusion of GD in the ICD-11. The original 10-item structured questionnaire's Cronbach alpha was 0.76, while the 9-item version's Cronbach alpha was 0.64.

2.3. Statistical analyses

Structural regression analyses within structural equation modeling (SEM) were used to test the mediation model between psychiatric symptoms and GD on the esports gamer sample and the recreational gamer sample. The scales used in the present study were not normally distributed, therefore analyses used the maximum likelihood estimation robust to non-normality (MLR). Multigroup analyses were used to test the difference between esports and recreational gamers. To evaluate both models' fit, a *p*-value of chi-square ($p > .05$) was used for testing the models' fit. However, given the sensitivity of the chi-square test to large samples, additional fit indices were also evaluated: the comparative fit index (CFI) and the Tukey-Lewis Fit Index (TLI) both have to be higher than 0.90 for an acceptable fit and higher than 0.95 for a good fit. Furthermore, the root mean square error of approximation (RMSEA) and its 95% confidence interval (90% CI), and standardized root mean square residual (SRMR) were calculated. The values of RMSEA and SRMR should be <0.05 and 0.10, respectively for a good fit [77–79]. Descriptive analyses were run with SPSS 22.0 statistical software package [80] and SEM analyses were performed with MPLUS 6.0 [81].

2.4. Ethics

The study was approved by the Institutional Review Board of the Faculty of Education and Psychology, ELTE Eötvös Loránd University (Budapest, Hungary).

3. Results

3.1. Descriptive statistics

The mean age of the sample ($N = 4284$) was 23.08 years ($SD = 6.57$ years; range 14–58 years). The majority of the sample were male ($N_{\text{male}} = 3851$; 89.89%) which is in line with the gender distribution of other self-selected gamer samples in previous studies. As previously

mentioned, further analyses were focused on two different subtypes of gamers in the final sample: recreational gamers ($N_{\text{recreational}} = 4079$; 95.21% of the total sample) and esports gamers ($N_{\text{esport}} = 205$; 4.79% of the total sample). Among the recreational gamers 3656 gamers were male (89.63%), whereas among the esports gamers 195 were male (95.12%). More details on the total sample and the two subgroups, such as sociodemographic and video game use-related data are presented in Table 1. It was assumed that the proposed mediation model might be different regarding the players' video game usage (i.e., recreational or esports use). Therefore, the psychopathology-related variables and gaming-related variables in the two groups are presented in Table 2. The results show that esports gamers had significantly higher average game time on a weekday ($M_{\text{esport}} = 2.98$, $SD = 1.41$; $M_{\text{recreational}} = 2.32$, $SD = 1.40$) and on a weekend day ($M_{\text{esport}} = 4.72$, $SD = 1.40$; $M_{\text{recreational}} = 3.95$, $SD = 1.60$) than recreational gamers. Moreover, the two examined groups showed differences in gaming motivations. Esports gamers scored higher on social, competition, and skill development motivations compared to recreational gamers (see Table 2).

3.2. Mediation analysis

It was assumed that psychiatric distress has both direct and indirect effect on gaming disorder via the mediating effect of gaming motives. The proposed mediation models were tested with SEM. Psychiatric distress with its summarized score of the Brief Symptom Inventory's three subscales (i.e., depression, anxiety and psychoticism) was used in the model as a continuous observed variable. Gaming disorder was assessed by the summarized score of the IGDT-10 (i.e., nine dichotomized items) as a continuous variable. The seven factors of the MOGQ were introduced in the model as continuous latent variables. As mentioned earlier, the model was estimated separately for recreational and esports gamers using multigroup analysis via SEM. The model comparing recreational gamers and esports gamers had an acceptable fit to the data ($\chi^2_{4284} = 4978.5$; esports gamers: $\chi^2 = 586.3$; recreational gamers: $\chi^2 = 4392.2$, $p < .001$; CFI = 0.938; TLI = 0.930; RMSEA = 0.053, 95% CI 0.051–0.055; Cfit > 0.90; SRMR = 0.046). The overall result (see Fig. 1) showed that psychiatric symptoms had a significant direct effect on GD in both groups, and escape motivation significantly mediated between psychiatric symptoms and GD in both groups.

In the esports gamers' group, the standardized effect size of the direct pathway was 0.293 ($p < .001$), whereas the standardized effect size of the mediation pathway via escape was 0.224 ($p < .001$), and accounted for 45.8% of the total effect size. Other indirect pathways via online gaming motivations were not significant in the esports gamers' group. The full model explained 41% of the total variance of GD. In the case of recreational gamers, the standardized effect size of the direct pathway

from psychiatric distress to GD was 0.172 ($p < .001$), while the standardized effect size of the mediation pathway was 0.23 ($p < .001$), that accounted for 57.1% of the total effect size. The mediation pathways showed significant indirect effect sizes via escape, coping, fantasy and competition motives. The specific indirect effect size of escape was 0.261 ($p < .001$). Other indirect pathways, via coping (-0.023 ; $p < .01$), fantasy (-0.016 ; $p < .05$) and competition (0.01; $p < .001$) were also significant. However, they had negligible effect sizes and some of them were even negative. The full model explained 33% of the total variance of GD. The comparison of the two models (for esports gamers and for recreational gamers) showed no significant differences according to the Wald test, meaning that gamer type did not differentiate the mediation model.

4. Discussion

The findings highlight that esports gamers play videogames more intensely than recreational gamers. The results of the present study suggest that esports and recreational gamers play video games in a different way in terms of game time (i.e., esports gamers have longer game times on weekdays and weekend) and gaming motivations (i.e., esports gamers scored significantly and considerably higher on specific motives such as competition, social, and skill-development). This is in line with previous esports studies, which report that competition, social factors, and the attitude towards self-development are core motives among esports gamers [19–21,65,66].

The higher level of competition motivation can be beneficial for those who start their esports career or try to maintain it even when they struggle with losing [19]. Higher social motivation could help esports gamers to become an effective team-member, and being sociable appears to be a requirement in being successful in the esports community (e.g., peer pressure, social comparison opportunities, earning beneficial and supportive team membership, developing friendly relationships) [20,21]. The high level of skill development motivation is also required to succeed in esports, such as obtaining deep knowledge about the game, thinking strategically, making quick decisions, being motivated to keep playing, and maintaining a knowledgeable mindset [65]. These motives can help in overcoming losses by being intrinsically motivated to persevere in gaming [19].

The present study also explored the relationship between gaming motives, psychiatric distress and gaming disorder comparing esports and recreational gamers. Overall, psychiatric symptoms were both directly and indirectly associated with gaming disorder via gaming motivations. In both groups, the escapism motive appeared to be the common predictor of gaming disorder. In the esports group, the escapism was the only motivation that had mediating effect, while in the recreational group, competition, fantasy, and coping also showed weak or

Table 1
Demographic characteristics of the gamers.

	Total sample ($N = 4284$)	Recreational gamers ($n = 4079$)	Esports gamers ($n = 205$)	χ^2/t	Effect size
Gender (male) [n (%)]	3851 (89.89%)	3656 (89.63%)	195 (95.12%)	7.23**	0.04
Average age Mean (SD)	23.08 (6.57)	23.1 (6.58)	22.0 (6.27)	-2.37*	0.33
Marital status n (%)				0.24	0.02
Single	2485 (58.01%)	2374 (58.20%)	111 (54.15%)		
In relationship but living separately	753 (17.58%)	706 (17.31%)	47 (22.63%)		
In relationship but living together	743 (17.34%)	713 (17.48%)	30 (14.63%)		
Married	241 (5.63%)	227 (5.57%)	14 (6.83%)		
Divorced or widowed	24 (0.56%)	24 (0.59%)	n/a		
Years of completed education Mean (SD)	13.2 (3.06)	13.2 (3.07)	12.8 (2.91)	-1.63	0.01
Currently studying n (%)	2439 (56.93%)	2307 (56.56%)	132 (64.39%)	4.85*	0.03
Currently working n (%)	2443 (57.03%)	2318 (56.83%)	125 (60.98%)	20.54***	0.07

Chi-square test was conducted on gender (1 = male, 2 = female), currently studying and currently working (1 = no, 2 = yes), whereas independent sample t-tests were conducted on the following variables: average age, marital status, years of education. The reported effect sizes are Cohen's *d* and *Phi*.

*** $p < .001$.

** $p < .01$.

* $p < .05$.

Table 2
Psychopathology- and gaming-related variables.

	Total sample (N = 4284)	Recreational gamers (n = 4079)	Esport gamers (n = 205)	t	Effect size
Psychiatric symptoms Mean (SD)	0.96 (0.79)	0.96 (0.79)	0.87 (0.80)	-1.60*	0.11
Gaming Disorder Mean (SD)	0.72 (1.19)	0.71 (0.97)	0.84 (1.32)	1.42**	0.11
Gaming time					
Average weekday Mean (SD)	2.35 (1.40)	2.32 (1.40)	2.98 (1.41)	6.55***	0.47
Average weekend day Mean (SD)	3.99 (1.60)	3.95 (1.60)	4.72 (1.40)	7.66***	0.51
Social	2.28 (0.98)	2.26 (0.97)	2.80 (1.03)	7.74***	0.54
Escape	2.31 (1.12)	2.31 (1.12)	2.31 (1.16)	0.06	0
Competition	2.63 (1.10)	2.59 (1.10)	3.41 (1.10)	10.44***	0.50
Motivations of Online Gaming Mean (SD)					
Coping	2.88 (1.06)	2.88 (1.06)	3.03 (1.13)	1.97†	0.14
Skill development	2.98 (1.18)	2.95 (1.18)	3.57 (1.08)	8.01***	0.55
Fantasy	2.89 (1.23)	2.89 (1.23)	2.88 (1.23)	-0.03	0.01
Recreation	4.45 (0.67)	4.45 (0.67)	4.37 (0.69)	-1.69	0.12

Independent sample t-tests were conducted on the following variables: psychiatric symptoms [range: 0–4], Internet Gaming Disorder [range: 0–9], gaming time [range: 0–5] and motivations of online gaming [range: 1–5]. The reported effect sizes are *Cohen's d*.

*** $p < .001$.

** $p < .01$.

* $p < .05$.

† $p = .05$.

even negative association with gaming disorder, which might be due to a negative suppressor effect in the regression, given the relatively strong association between these motives (i.e., escape, fantasy, coping). However, the esport gamers and recreational gamers did not differentiate in the way motivations mediated between psychiatric distress and gaming disorder.

Via escapism, gamers can avoid real life problems while playing video games, and not have to think about real life difficulties [61]. Escapism is considered the most important motivation in problematic video game use and has been repeatedly found in previous studies as the strongest mediator between psychiatric distress and gaming disorder [39,52,56,57,59,60,64,67,82–85]. Even if the recreational gamers and the esport gamers did not differ significantly in the mediation effect of escapism, the motivation itself may have different effects among different populations. Escapism can be a maladaptive coping strategy among recreational gamers [56–59,64,67]. However, escapism among highly competitive gamers may have a different meaning and/or consequences. Weiss and Schiele [66] also found that escapism is one of the main motivations among esport gamers. From this point of view, escapism may relate to building highly skilled characters or earning highly ranked gamer profiles while the gamers immerse into the virtual world to gain competitive advantage. Moreover, the gamer may act more competitively, feel powerful, and feel more capable in the virtual world compared to real life [66]. According to the results of the present study, escapism may also threaten esport gamers' video game use and may lead to more gaming disorder-related behavior. Furthermore, Kardefelt-Winther [60] highlighted that the predictive value of high escapism in gaming disorder is a more complex mechanism in relation to level of real life stress, low psychological wellbeing, and low self-esteem.

According to Kardefelt-Winther [60], gamers who experienced high levels of stress but had stable wellbeing and self-esteem did not use video games problematically even though they had high level of escapism. These factors also appear to modify the relationship between escapism and negative outcomes depending on the gamer's psychological status. The many facets of escapism also draw attention to the esport gamers' mental health, highlighting the importance of supporting esport gamers to maintain a stable self-esteem and good subjective wellbeing that could prevent problematic video game use. However, in the way gaming motivations mediate between psychiatric distress and gaming disorder, esport gamers and recreational gamers appeared to be similar, suggesting escapism as the most powerful predictor of gaming disorder among both gamer types.

4.1. Limitations

Despite the large sample size, there are some limitations regarding the data collection. First, the participation in the present study was voluntary, meaning the participants were self-selected and came from Hungarian-speaking regions (i.e., Hungary, Romania, Slovakia). The self-selection of Hungarian gamers affects the generalizability and representativeness of the result. Furthermore, well-known biases due to the self-reported nature of the questionnaire (e.g., memory recall, social desirability) should also be noted. The gender distribution in the present study was also highly imbalanced. Regarding the followers of *GameStar*, it appears that male users in this gaming community were overrepresented. The categorization of esport and recreational gamers was based on the number of gaming competitions engaged in (i.e., types and frequency of esport activities) but it was not supported by rigorous empirical methods. Therefore, future studies should use more standardized ways for such a categorization. Finally, the cross-sectional design of the study meant that causal explanations of the relationships between examined constructs could not be made. Future studies should collect data from a more diverse gaming community, and data collection should be carried out longitudinally and also include clinically diagnosed gamers having gaming disorder in the sample.

4.2. Implications and conclusions

In line with the previous studies focusing on gamers' mental health, gaming motivations, and the possible negative detriments of playing video games, the present study drew attention to the diversity of video game use. Esports as the professional, skill-mastering form of gaming may be considered not just a different type of video game use, but also an alternate sporting activity. Despite scholars' interest in researching problematic video game use, very few studies have focused on esport gamers' psychological status. The present study highlighted the differences of video game use (game time, motivational pattern) of esport gamers and recreational gamers. In the way gaming motivations mediate between psychiatric distress and gaming disorder, esport gamers and recreational gamers appeared to be similar, suggesting escapism as the most powerful predictor of gaming disorder among both gamer types.

However, the way esport gamers and recreational gamers escaped from reality to virtual worlds may result from different mechanisms and psychological backgrounds. Nonetheless, this assumption needs further testing. Moreover, escapism is a complex mechanism that

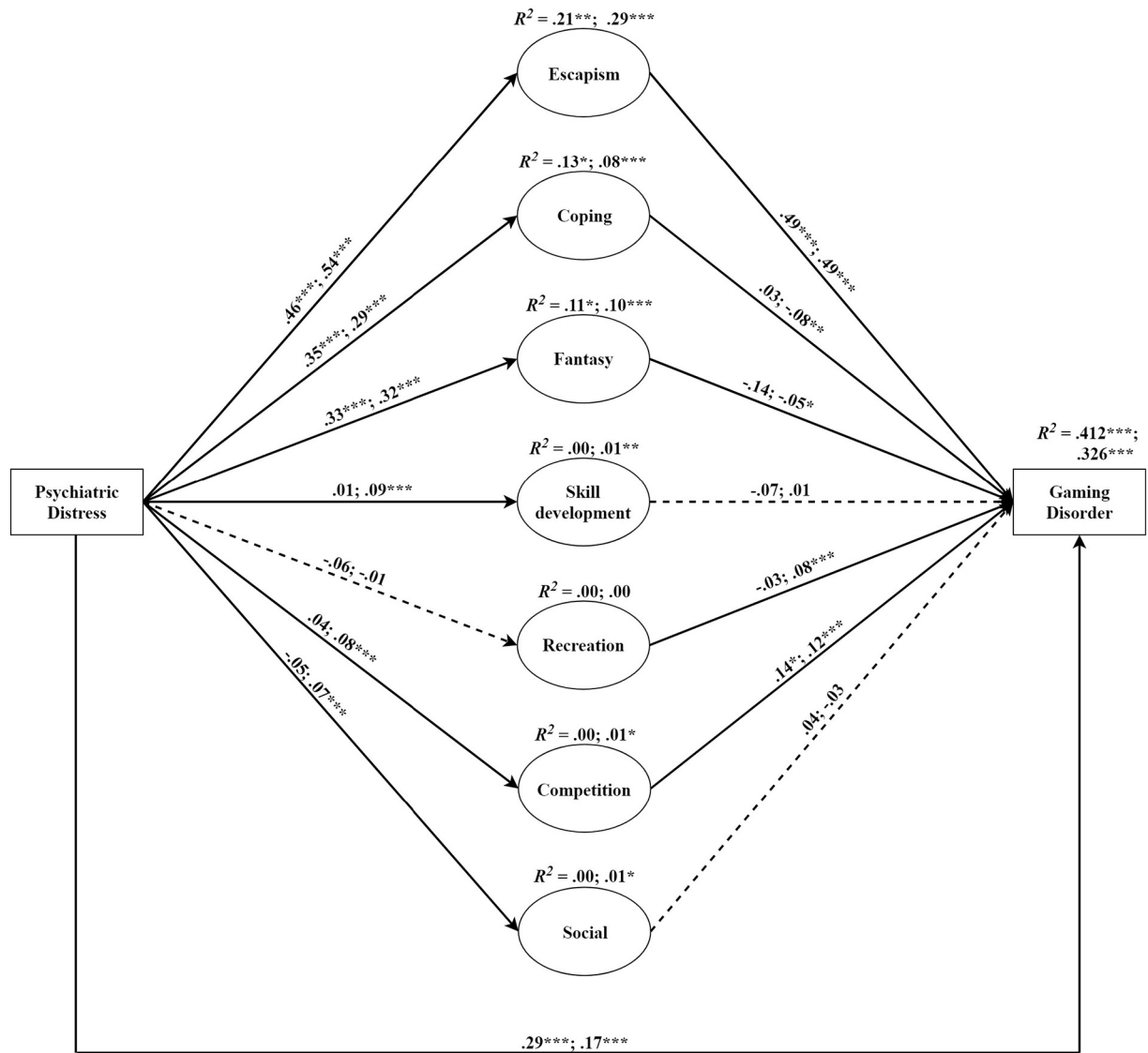


Fig. 1. Results of the multigroup analysis and path coefficients of two gamer types: esports gamers ($n = 205$) and recreational gamers ($n = 4079$). The first (left) values describe esports gamers, whereas the second (right) values describe recreational gamers. For clarity, simple arrows show the significant path coefficients; dotted arrows show non-significant path coefficients. * $p < .05$; ** $p < .01$; *** $p < .001$. Also, for clarity, indicator variables associated with the latent mediator variables, and the covariances between the errors of all mediator variables have not been depicted in the figure.

interacts with an individual's mental health (such as high stress, psychosocial wellbeing, low self-esteem). These factors appear to modify the effect of escapism on gaming disorder [60]. This raises interesting research questions to investigate. How and why do esports gamers play to escape into competitive video game playing? How does escapism influence an individual's esports career and occasionally lead to negative outcomes such as gaming disorder? Escapism may cause negative outcomes and could end an esports gamer's career just like any sportsman's career could end with a severe injury or trauma. Conceptualizing esports gamers as sport athletes may also lead to increased support methods used by traditional sportsmen (i.e., mental training, optimal self-esteem, adaptive coping strategies in competitive situations).

The present study demonstrated a number of novel findings which help take the field forward and suggests a number of practical and policy implications. The number of studies examining the psychosocial impact of esports is very few and therefore the findings here add significantly to the extant literature. More specifically, this is the first ever study to compare esports players with recreational video game players. While there were some similarities between the two groups, the present study found that competitive esports gamers have different

gaming motivations to play compared to recreational gamers (e.g., competition and skill-based motivations which provide good face validity that the two groups are psychosocially different).

The present study also found that esports gamers played more intensely than recreational gamers. While research has shown that high gaming intensity does not necessarily indicate problematic gaming behavior [84,86,87], the results indicate that esports players can experience problematic gaming. This raises an interesting theoretical question if some esports players view their activity as their job rather than as a leisure activity. For esports players who experience severe problematic gaming (i.e., 'gaming addiction'), there is a question as to whether such individuals would be classed as addicted to gaming or addicted to work [88]. Previous research has suggested that professional poker players can be addicted to gambling [28,89] and that elite athletes can be addicted to exercise [90], and the results of the present study suggest that some esports players might be addicted to gaming (which like professional poker players being addicted to gambling or professional athletes being addicted to exercise) is their job. This has implications for esports governing bodies because esports players who see gaming as their job are self-employed. Therefore, there is arguably a duty of care

for professional esports bodies to ensure that the individuals who engage in the sport and develop problems get help, support, and treatment if they need it (irrespective of whether they are addicted to gaming or their job). While esports bodies such as the Electronic Sports League have developed rigorous guidelines around the use of performance enhancing drugs, based on the findings of the present study, they should also develop a code of conduct that includes guidance and diagnostic checklists concerning problematic gaming and gaming disorder.

Acknowledgements

This study was supported by the Hungarian National Research, Development and Innovation Office [Grant number: K111938; KKP126835]. Orsolya Király was supported by the ÚNKP New National Excellence Program of the Ministry of Human Capacities. This paper was supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences. The study was also supported by the Hungarian Ministry of Human Capacities (ELTE Institutional Excellence Program, 783-3/2018/FEKUTSRAT). The funding institutions had no role in the study design or the data collection, analysis and interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

Declaration of competing interest

The authors declare that they do not have any interests that could constitute a real, potential or apparent conflict of interest with respect to their involvement in the publication. The authors also declare that they do not have any financial or other relations (e.g. directorship, consultancy or speaker fee) with companies, trade associations, unions or groups (including civic associations and public interest groups) that may gain or lose financially from the results or conclusions in the study. Sources of funding are acknowledged.

References

- Bányai F, Griffiths MD, Király O, Demetrovics Z. The psychology of esports: A systematic literature review. *Journal of Gambling Studies*. 2018;Epub ahead of print.
- Wagner MG. On the scientific relevance of esports. *International Conference on Internet Computing & Conference on Computer Games Development, ICOMP. Las Vegas, Nevada, USA 2006*.
- Hemphill D. Cybersport. *Journal of the Philosophy of Sport* 2005;32:195–207.
- eNet. Almost 200,000 hardcore gamers in Hungary – E-sports in figures. 2017.
- Newzoo. *Global esports market report*; 2017; 2017.
- Whalen SJ. *Cyberathletes' lived experience of video game tournaments [doctoral dissertation]*: University of Tennessee, US; 2013.
- Adamus T. Playing computer games as electronic sport: In search of a theoretical framework for a new research field. In: Fromme J, Unger A, editors. *Computer games and new media cultures: a handbook of digital games studies*. Dordrecht: Springer; 2012. p. 477–90.
- Jonasson K, Thiborg J. Electronic sport and its impact on future sport. *Sport in Society* 2010;13:287–99.
- Taylor T. *Raising the stakes: E-sports and the professionalization of computer gaming*. Cambridge: MIT Press; 2012.
- Lee JY, An JW, Lee SW. Factors affecting eSports audience satisfaction—the case of league of legends. *Journal of Korea Game Society* 2014;14:35–46.
- Lee SW, An JW, Lee JY. The relationship between e-sports viewing motives and satisfaction: The case of League of Legends. *International Conference on Business, Management & Corporate Social Responsibility (ICBMCSR'14)*. Batam, Indonesia; 2014. p. 33–6.
- Jenny SE, Manning RD, Keiper MC, Olrich TW. Virtual(ly) athletes: where esports fit within the definition of "sport". *Quest* 2016;69:1–18.
- Lopez-Gonzalez H, Griffiths MD. Understanding the convergence of markets in online sports betting. *Int Rev Sociol Sport* 2016;53:807–23.
- Hamari J, Sjöblom M. What is esports and why do people watch it? *Internet Res* 2017;27:211–32.
- Hallmann K, Giel T. eSports—competitive sports or recreational activity? *Sport Management Review* 2018;21:14–20.
- Griffiths MD. The psychosocial impact of professional gambling, professional video gaming & eSports. *Casino & Gaming International* 2017;28:59–63.
- Ma H, Wu Y, Wu X. Research on essential difference of E-sport and online game. In: Du W, editor. *Informatics and management science V*. London: Springer London; 2013. p. 615–21.
- Seo Y. Professionalized consumption and identity transformations in the field of eSports. *J Bus Res* 2016;69:264–72.
- Kim SH, Thomas MK. A stage theory model of professional video game players in South Korea: the socio-cultural dimensions of the development of expertise. *Asian Journal of Information Technology* 2015;14:176–86.
- Lee D, Schoenstedt LJ. Comparison of eSports and traditional sports consumption motives. *The ICHPER-SD Journal of Research in Health, Physical Education, Recreation, Sport & Dance* 2011;6:39–44.
- Martončík M. E-sports: playing just for fun or playing to satisfy life goals? *Comput Hum Behav* 2015;48:208–11.
- Hewitt E. Will eSports ever become widely accepted as official sports and how will they affect the way we entertain ourselves if they do. In: Sharpe J, Self R, editors. *Computers for everyone*. 1 ed 2014. p. 81–3.
- Kuss DJ, Griffiths MD, Pontes HM. Chaos and confusion in DSM-5 diagnosis of internet gaming disorder: issues, concerns, and recommendations for clarity in the field. *J Behav Addict* 2017;6:103–9.
- Kuss DJ, Griffiths MD, Pontes HM. DSM-5 diagnosis of internet gaming disorder: some ways forward in overcoming issues and concerns in the gaming studies field: response to the commentaries. *J Behav Addict* 2017;6:133–41.
- Weinstock J, Massura CE, Petry NM. Professional and pathological gamblers: similarities and differences. *J Gamb Stud* 2013;29:205–16.
- Hing N, Russell AM, Gainsbury SM, Blaszczynski A. A case of mistaken identity? A comparison of professional and amateur problem gamblers. *J Gamb Stud* 2016;32:277–89.
- McCormack A, Griffiths MD. What differentiates professional poker players from recreational poker players? A qualitative interview study. *Int J Ment Health Addict* 2012;10:243–57.
- Recher J, Griffiths MD. An exploratory qualitative study of online poker professional players. *Social Psychological Review* 2012;14:13–25.
- King DL, Gainsbury SM, Delfabbro PH, Hing N, Abarbanel B. Distinguishing between gaming and gambling activities in addiction research. *J Behav Addict* 2015;4:215–20.
- American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
- World Health Organization. *International statistical classification of diseases and related health problems (11th Revision)*. 2018.
- Billieux J, King DL, Higuchi S, Achab S, Bowden-Jones H, Hao W, et al. Functional impairment matters in the screening and diagnosis of gaming disorder: Commentary on: Scholars' open debate paper on the World Health Organization ICD-11 Gaming Disorder proposal (Aarseth et al.). *J Behav Addict* 2017:285–9.
- King DL, Delfabbro PH. Video-gaming disorder and the DSM-5: some further thoughts. *Australian and New Zealand Journal of Psychiatry* 2013;47:875–6.
- Király O, Griffiths MD, Urbán R, Farkas J, Kökönyei G, Elekes Z, et al. Problematic internet use and problematic online gaming are not the same: findings from a large nationally representative adolescent sample. *Cyberpsychol Behav Soc Netw* 2014;17:749–54.
- Aarseth E, Bean AM, Boonen H, Colder Carras M, Coulson M, Das D, et al. Scholars' open debate paper on the World Health Organization ICD-11 gaming disorder proposal. *J Behav Addict* 2017;6:267–70.
- Griffiths MD, Kuss DJ, Lopez-Fernandez O, Pontes HM. Problematic gaming exists and is an example of disordered gaming: commentary on: Scholars' open debate paper on the World Health Organization ICD-11 Gaming Disorder proposal (Aarseth et al.). *Journal of behavioral addictions*. 2017;6:296–301.
- Nielsen RKL, Karhulahti V-M. The problematic coexistence of internet gaming disorder and esports. *Proceedings of the 12th International Conference on the Foundations of Digital Games*. New York: ACM 2017. p. 52.
- Saunders JB, Hao W, Long J, King DL, Mann K, Fauth-Bühler M, et al. Gaming disorder: its delineation as an important condition for diagnosis, management, and prevention. *J Behav Addict* 2017;6:271–9.
- Kuss DJ, Griffiths MD. Internet gaming addiction: a systematic review of empirical research. *Int J Ment Heal Addict* 2012;10:278–96.
- Son DT, Yasuoka J, Poudel KC, Otsuka K, Jimba M. Massively multiplayer online role-playing games (MMORPG): association between its addiction, self-control and mental disorders among young people in Vietnam. *International Journal of Social Psychiatry* 2013;59:570–7.
- Kim NR, Hwang SSH, Choi JS, Kim DJ, Demetrovics Z, Király O, et al. Characteristics and psychiatric symptoms of internet gaming disorder among adults using self-reported DSM-5 criteria. *Psychiatry Investig* 2016;13:58–66.
- King DL, Delfabbro PH. The cognitive psychopathology of internet gaming disorder in adolescence. *J Abnorm Child Psychol* 2016;44:1635–45.
- Peng W, Liu M. Online gaming dependency: a preliminary study in China. *Cyberpsychol Behav Soc Netw* 2010;13:329–33.
- Mentzoni RA, Brunborg GS, Molde H, Myrseth H, Skouervørø KJM, Hetland J, et al. Problematic video game use: estimated prevalence and associations with mental and physical health. *Cyberpsychol Behav Soc Netw* 2011;14:591–6.
- Männikkö N, Billieux J, Kärräinen M. Problematic digital gaming behavior and its relation to the psychological, social and physical health of Finnish adolescents and young adults. *J Behav Addict* 2015;4:281–8.
- Wei H-T, Chen M-H, Huang P-C, Bai Y-M. The association between online gaming, social phobia, and depression: an internet survey. *BMC Psychiatry* 2012;12:92.
- Brunborg GS, Mentzoni RA, Frøyland LR. Is video gaming, or video game addiction, associated with depression, academic achievement, heavy episodic drinking, or conduct problems? *J Behav Addict* 2014;3:27–32.
- Van Rooij AJ, Kuss DJ, Griffiths MD, Shorter GW, Schoenmakers TM, Van De Mheen D. The (co-) occurrence of problematic video gaming, substance use, and psychosocial problems in adolescents. *J Behav Addict* 2014;3:157–65.
- Liau AK, Choo H, Li D, Gentile DA, Sim T, Khoo A. Pathological video-gaming among youth: a prospective study examining dynamic protective factors. *Addict Res Theory* 2015;23:301–8.

- [50] Andreassen CS, Billieux J, Griffiths MD, Kuss DJ, Demetrovics Z, Mazzoni E, et al. The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: a large-scale cross-sectional study. *Psychol Addict Behav* 2016;30:252–62.
- [51] Walther B, Morgenstern M, Hanewinkel R. Co-occurrence of addictive behaviours: personality factors related to substance use, gambling and computer gaming. *Eur Addict Res* 2012;18:167–74.
- [52] Yee N. Motivations for play in online games. *Cyberpsychol Behav* 2006;9:772–5.
- [53] Fuster H, Oberst U, Griffiths M, Carbonell X, Chamarro A, Talarn A. Psychological motivation in online role-playing games: a study of Spanish World of Warcraft players. *Anales de Psicología/Annals of Psychology* 2012;28:274–80.
- [54] Lee J, Lee M, Choi IH. Social network games uncovered: motivations and their attitudinal and behavioral outcomes. *Cyberpsychol Behav Soc Netw* 2012;15:643–8.
- [55] Kahn AS, Shen C, Lu L, Ratan RA, Coary S, Hou J, et al. The Trojan player typology: a cross-genre, cross-cultural, behaviorally validated scale of video game play motivations. *Comput Hum Behav* 2015;49:354–61.
- [56] Kwon J-H, Chung C-S, Lee J. The effects of escape from self and interpersonal relationship on the pathological use of internet games. *Community Ment Health J* 2011;47:113–21.
- [57] Dauriat FZ, Zeremattin A, Billieux J, Thorens G, Bondolfi G, Zullino D, et al. Motivations to play specifically predict excessive involvement in massively multiplayer online role-playing games: evidence from an online survey. *Eur Addict Res* 2011;17:185–9.
- [58] Kuss DJ, Louws J, Wiers RW. Online gaming addiction? Motives predict addictive play behavior in massively multiplayer online role-playing games. *Cyberpsychol Behav Soc Netw* 2012;15:480–5.
- [59] Nagygyörgy K, Mihalik Á, Demetrovics Z. Az online játékok pszichológiai vonatkozásai [Psychological aspects of online games]. A média hatása a gyermekekre és fiatalokra. Budapest: Nemzetközi Gyermekmentő Szolgálat Magyar Egyesülete 2012. p. 242–8.
- [60] Kardefelt-Winther D. The moderating role of psychosocial well-being on the relationship between escapism and excessive online gaming. *Comput Hum Behav* 2014;38:68–74.
- [61] Demetrovics Z, Urbán R, Nagygyörgy K, Farkas J, Zilahy D, Mervó B, et al. Why do you play? The development of the motives for online gaming questionnaire (MOGQ). *Behav Res Methods* 2011;43:814–25.
- [62] Billieux J, Chanal J, Khazaal Y, Rochat L, Gay P, Zullino D, et al. Psychological predictors of problematic involvement in massively multiplayer online role-playing games: illustration in a sample of male cybercafe players. *Psychopathology* 2011;44:165–71.
- [63] Kneer J, Rieger D. Problematic game play: the diagnostic value of playing motives, passion, and playing time in men. *Behavioral Sciences* 2015;5:203–13.
- [64] Ballabio M, Griffiths MD, Urbán R, Quartiroli A, Demetrovics Z, Király O. Do gaming motives mediate between psychiatric symptoms and problematic gaming? An empirical survey study. *Addict Res Theory* 2017;25:397–408.
- [65] Himmelstein D, Liu Y, Shapiro JL. An exploration of mental skills among competitive league of legend players. *International Journal of Gaming and Computer-Mediated Simulations* 2017;9:1–21.
- [66] Weiss T, Schiele S. Virtual worlds in competitive contexts: analyzing eSports consumer needs. *Electronic Markets* 2013;23:307–16.
- [67] Király O, Urbán R, Griffiths MD, Ágoston C, Nagygyörgy K, Kökönyei G, et al. The mediating effect of gaming motivation between psychiatric symptoms and problematic online gaming: An online survey. *J Med Internet Res* 2015;17:e88.
- [68] Kuntsche E, Knibbe R, Engels R, Gmel G. Drinking motives as mediators of the link between alcohol expectancies and alcohol use among adolescents. *J Stud Alcohol Drugs* 2007;68:76–85.
- [69] Mason AE, Boden MT, Cucciare MA. Prospective associations among approach coping, alcohol misuse and psychiatric symptoms among veterans receiving a brief alcohol intervention. *J Subst Abuse Treat* 2014;46:553–60.
- [70] Wood RT, Griffiths MD. A qualitative investigation of problem gambling as an escape-based coping strategy. *Psychol Psychother Theory Res Pract* 2007;80:107–25.
- [71] Carruthers C, Platz L, Busser J. Gambling motivation of individuals who gamble pathologically. *Ther Recreation J* 2006;40:165–81.
- [72] Takamatsu SK, Martens MP, Arterberry BJ. Depressive symptoms and gambling behavior: mediating role of coping motivation and gambling refusal self-efficacy. *J Gambli Stud* 2016;32:535–46.
- [73] Rehbein F, Psych G, Kleimann M, Mediasci G, Mößle T. Prevalence and risk factors of video game dependency in adolescence: results of a German nationwide survey. *Cyberpsychol Behav Soc Netw* 2010;13:269–77.
- [74] Lemmens JS, Valkenburg PM, Peter J. Psychosocial causes and consequences of pathological gaming. *Comput Hum Behav* 2011;27:144–52.
- [75] Derogatis L, Spencer P. Clinical psychometric research. MD: Baltimore; 1975.
- [76] Király O, Slezcka P, Pontes HM, Urbán R, Griffiths MD, Demetrovics Z. Validation of the ten-item internet gaming disorder test (IGDT-10) and evaluation of the nine DSM-5 internet gaming disorder criteria. *Addict Behav* 2017;64:253–60.
- [77] Browne MW, Cudeck R. Alternative ways of assessing model fit. *Sage Focus Editions*. 1993;154:136.
- [78] Byrne BM. Structural equation modeling with AMOS: basic concepts, applications, and programming. . 2nd ed. New York: Routledge; 2016.
- [79] Kline RB. Principles and practice of structural equation modeling. . 2nd ed. New York: Guilford Press; 2005.
- [80] Released IC. IBM SPSS statistics for windows, version 22.0. IBM Corp: Armonk, NY; 2013.
- [81] Muthén LK, Muthén BO. Mplus User's guide (7th edn). Muthén and Muthén: Los Angeles, CA; 2012.
- [82] Király O, Nagygyörgy K, Koronczai B, Griffiths MD, Demetrovics Z. Assessment of problematic internet use and online video gaming. In: Aboujaoude E, Starcevic V, editors. Mental health in the digital age: Grave dangers, great promise. New York: Oxford University Press; 2015. p. 46–68.
- [83] Xu Z, Turel O, Yuan Y. Online game addiction among adolescents: motivation and prevention factors. *Eur J Inf Syst* 2012;21:321–40.
- [84] Billieux J, Van der Linden M, Achab S, Khazaal Y, Paraskevopoulos L, Zullino D, et al. Why do you play world of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviours in the virtual world of Azeroth. *Comput Hum Behav* 2013;29:103–9.
- [85] Hagström D, Kaldö V. Escapism among players of MMORPGs—conceptual clarification, its relation to mental health factors, and development of a new measure. *Cyberpsychol Behav Soc Netw* 2014;17:19–25.
- [86] Griffiths MD. The role of context in online gaming excess and addiction: some case study evidence. *Int J Ment Heal Addict* 2010;8:119–25.
- [87] Chung T, Sum S, Chan M, Lai E, Cheng N. Will esports result in a higher prevalence of problematic gaming? A review of the global situation. *Journal of Behavioral Addictions*. 2019;8:in press.
- [88] Faust K, Meyer J, Griffiths MD. Competitive and professional gaming: discussing potential benefits of scientific study. *International Journal of Cyber Behavior, Psychology and Learning* 2013;3:67–77.
- [89] Delfabbro P, King DL. Play dynamics on electronic gaming machines: a conceptual review. *J Behav Addict* 2019:1–10.
- [90] Szabo A, Griffiths MD, Marcos RdLV, Mervó B, Demetrovics Z. Focus: addiction: methodological and conceptual limitations in exercise addiction research *Yale J Biol Med* 2015;88:303.