



What matters is when you play: Investigating the relationship between online video games addiction and time spent playing over specific day phases



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ABSTRACT

Online video gaming is now widely considered an activity possibly related to addictive behaviors, so that the diagnosis of Internet Gaming Disorder (IGD) is now included both in DSM-5 and ICD-11; however, there is still debate about some specific features of such disorder. One debated aspect is time spent playing: IGD gamers certainly play a high amount of time, but, on the other hand, also highly-engaged individuals or people working with video games (e.g.: eSports professional players) may play a lot without developing IGD. The literature agrees on the importance of deepening the role of time spent playing video games in IGD, to understand if it can be considered a symptom useful for the diagnosis, or not: one possibility is that time spent playing is not important in an absolute sense, but relatively to specific day phases. The present research involved 133 participants to test the relationship between average time spent playing over day phases (morning, afternoon, night; week, weekend days), age, game preferences and IGD. IGD score positively predicted time spent playing during weekend mornings, which are a day phase usually dedicated to other activities. Instead, time spent playing during afternoon was negatively predicted by age, according to this day phase being more related to youngsters' spare time, while night playing was related to preference for game genres which need dedicated time to organize multi-playing. Discussion deals with the utility of these preliminary results for future, more systematic research on IGD and its distinctive symptoms.

1. Introduction

Video gaming is now widely considered an activity that could be related to addictive behaviors. Although the diagnosis of Internet Gaming Disorder (IGD) is now included both in DSM 5 and ICD11, there is still debate on some specific features of such a disorder (Griffiths et al., 2016; Király et al., 2014; Milani et al., 2017; Petry et al., 2014a, 2014b; van Rooij et al., 2014; Zastrow, 2017). Among the numerous factors related to problematic online video game playing, *time spent playing* (TSP) is maybe the most debated (Brunborg, Mentzoni, & Frøyland, 2014; Festl, Scharkow, & Quandt, 2013; Lemmens, Valkenburg, & Peter, 2009; Wood, 2008; Wood, Griffiths, & Parke, 2007). It is not clear whether increasing TSP online video games should

be actually considered a symptom of online gaming addiction, and therefore it should be included in the lists of criteria useful to perform a diagnosis, or not.

Indeed, TSP was considered a fundamental index of problematic use and possibly of addiction by the first studies in the field (Fisher, 1994; Ng & Wiemer-Hastings, 2005; Phillips, Rolls, Rouse, & Griffiths, 1995). However, the subsequent debate highlighted reasons why TSP may be a confounding variable and not a reliable indicator of addiction. Firstly, intensive use is not the same as addiction: players may develop profound passion and engagement towards video games, playing online or not (Charlton & Danforth, 2010; Griffiths et al., 2016), without experiencing the negative consequences on everyday life that are typical of addiction scenarios (Griffiths, 2010; Milani et al., 2017). Moreover,

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people may play for long periods of time because of contextual habits/practices that are not related to addiction (e.g.: video games-centered jobs, eSports professional players in training) (Griffiths, 2017; Triberti & Argenton, 2013). Furthermore, when unhealthy lifestyles or social disadvantages are present, problematic online video game playing could establish as a form of escapism from everyday life issues, but it tends to reduce or disappear when the other life issues are properly treated, which is not consistent with addiction scenarios (Griffiths, 2010; Wood, 2008).

Despite the debate on this topic is still ongoing, the majority of studies in the field continue to register TSP as an important information to assess problematic online video gaming, usually by self-report measures that vary in their structure. For example, some authors assess TSP by combining different measures based on Likert scales, one investigating days of playing over the week and the other focusing on gaming hours during a typical day (van Rooij et al., 2014; Van Rooij, Schoenmakers, Vermulst, Van Den Eijnden, & Van De Mheen, 2011), while others employ more generic scales (Coyne, Padilla-Walker, Stockdale, & Day, 2011). However, there is agreement on the fact that more information is needed on the role of TSP in problematic online game use and addiction, and that more detail should be considered while registering such a variable, for example in terms of quantity and frequency (Petry et al., 2014a, 2014b); indeed, also negative results have been registered about a meaningful relationship between TSP and problematic online video gaming (Király, Tóth, Urbán, Demetrovics, & Maraz, 2017).

One possibility is that TSP is not important in an absolute sense, but relatively to gaming's tendency to interfere with other activities. A healthy individual may play a lot because particularly engaged in a specific video game experience, but he/she will be able to control TSP according to the time necessary to perform other duties and commitments. Differently, it is possible that people suffering from addiction would not be able to control the urge to play, and to *continue* playing beyond the periods initially programmed; indeed, addicted persons are characterized by self-control issues, and by cognitive biases when considering aspects such as time and consumption (Masiero, Lucchiari, & Pravettoni, 2015). This is in accordance with studies from the field of video game engagement, which started analyzing TSP distribution over different periods of the day, and not only its absolute frequency or quantity (Greenberg, Sherry, Lachlan, Lucas, & Holmstrom, 2010). Accordingly, the main hypothesis of the present contribution concerns the possible predictive power of Internet Gaming Disorder (IGD) on the tendency to play during specific times over the day (i.e., morning, afternoon, night; week and weekend days).

Moreover, other variables could be analyzed as factors with a possible relationship with online video game addiction; one is age, in that it is related to different activities and commitments people should abide to and therefore differences in time available to play; moreover, according to literature, youngsters are more likely to develop IGD (Mentzoni et al., 2011; Milani et al., 2017; Van Rooij et al., 2011). Another variable is the preference for specific video game genres. Indeed, research highlights that some video game genres may be more related to nighttime playing (Kolo & Baur, 2004; Lemola et al., 2011; Mahmassani, Chen, Huang, Williams, & Contractor, 2010): for example, online games (e.g.: MMORPGs or Massive Multiplayer Online Role Playing games; MOBAs or Massive Online Battle Arenas) require players to organize with friends and find the time to participate in long game instances together.

2. Methods

Ethical approval for the present study was provided by the Università degli Studi dell'Aquila Internal Review Board (n.16/2016, on date June 21, 2016).

An online survey was conducted by posting a hyperlink on some popular Italian gaming websites and forums, in order to involve a

sample of active video gamers. The *online survey took approximately 20 min* to complete. Surveys that were not filled out completely or appropriately were excluded from the analyses. Participating to the survey was entirely voluntary without any form of compensation. For this reason, numerous compilations were initiated but not finished. In the end, the full database included 181 responses, but only the 73% was eligible for analyses ($N = 133$).

2.1. Participants

The final number of participants who signed the informed consent and completed the online survey ($N = 133$) included 110 males (82.7%) and 23 females (17.3%), ranging in age from 12 to 47 years ($M = 24.93$, $SD = 5.31$).

2.2. Measures

The online survey consisted of three parts aimed to investigate:

- 1) Participants demographic data and their actual use of specific video game genres (MMORPG and MOBA); the last two were single questions phrased as: "how much do you like to play MMORPG games/MOBA", on Likert scales ranging from 1 (I don't like it very much) to 5 (I like it very much);
- 2) Time spent playing, by asking to participants how many hours on average they use to spend in three time phases over the day (morning, afternoon and night) with a specific focus on week or weekend days; these variables ranged from 0 to 8 h and were phrased as such: "Think about a week (weekend) day: write down how many hours you usually spend playing video games; 1) Between waking up and lunch; 2) Between lunch and dinner; 3) Between dinner and going to bed";
- 3) Internet Gaming Disorder: we used the Problem Videogame Playing (PVP) scale (Tejero Salguero & Morán, 2002), that measures problematic video gaming use and VG addiction consistently with DSM-5 diagnostic criteria; according to a recent review (King et al., 2013), PVP results one of the most reliable measures of IGD. It consists of 9 items with dichotomic response (yes/no) measuring the presence of each of the 9 Internet Game Disorder symptoms. In the present study, we used the DSM-5 recommended cutoff of 5 symptoms to define IGD. Cronbach's alpha was 0.62, similar to that reported by the authors (0.69), and considered adequate for a measure of 9 items.

2.3. Data analysis

Two analytic steps were performed. First, in order to better describe the sample and participant's gaming preferences, we compared potential IGD (score higher than 5) and not-IGD participants in terms of demographics and gaming habits via Student's *t*-tests and Chi square tests. Secondly, we performed six stepwise regressions inserting as dependent measures the amount of hours of playing during the specific day phases (Week Day Morning, Afternoon, Night; Weekend Day Morning, Afternoon, Night; also descriptive analyses are reported) and the following as predictors: age, preference for MMORPGs and MOBAs video games, and IGD as measured by PVP. Predictors were inserted in the regression equations simultaneously.

3. Results

Table 1 includes descriptives of the investigated variables, Table 2 features significant correlations.

Results show that users with a likely IGD do not differ for age and gender, but seem to prefer MMORPGs and MOBA games (see Table 3).

TSP was coherently distributed in the whole sample: gamers use to play in the afternoon and in the evening, both in week (week afternoon

Table 1
Descriptives of the investigated variables.

Variable	Mean	SD	Range
Preference for MMORPG videogames	2.84	1.51	1–5
Preference for MOBA videogames	2.47	1.54	1–5
Time spent playing (TSP) - morning, week days	0.33	0.72	0–5
TSP - morning, weekend days	0.98	1.15	0–5
TSP - afternoon, week days	1.33	1.37	0–7
TSP - afternoon, weekend days	2.34	1.6	0–8
TSP - night, week days	2.17	1.52	0–8
TSP - night, weekend days	2.23	1.8	0–8
PVP (internet gaming disorder)	2.84	1.96	0–9

M = 1.33, SD = 1.3; week night M = 2.17, SD = 1.5) and weekend days (weekend afternoon M = 2.34, SD = 1.6; weekend night M = 2.23, SD = 1.8); mornings were the day phase less associated to video game playing (week morning M = 0.33, SD = 0.7; weekend morning M = 0.98, SD = 1.1).

Regression analyses (see Table 4) show some specific patterns. PVP score (IGD) positively predicted TSP video games during morning hours, both in week and weekend days. Age negatively predicted TSP video games during afternoon hours, both in week and weekend days; TSP playing video games during week afternoon hours was positively predicted by the preference for MOBA games too. Finally, the preference for MMORPGs positively predicted TSP playing video games during night hours in week days, while preference for MOBA games positively predicted TSP playing video games during night hours in weekend days. However, applying Bonferroni correction to control for multiple testing (*p* threshold set to 0.008), regressions IGD over TSP during morning hours in week days and Age over TSP during afternoon hours in weekend days should not be considered significant.

4. Discussion

The present study analyzed the relationship between time spent playing video games over day phases, Internet Gaming Disorder (IGD), age and the preference for specific game genres. Regression analyses identified interesting predictive relationships between the variables.

As expected, age had an influence on the time of the day that participants usually spent video gaming. In particular, younger participants tend to play more during the afternoon compared to older gamers. This result is in line with the typical daily routine of students, who are more likely to have available time to play during that period of time compared to workers. However, comparable data are not available, because most of the previous studies investigated only the amount of time spent video gaming and did not measure in which phase of the day it was mainly situated.

About video game genres, the preference for online games predicted the time spent playing during the afternoon (of a typical working day in particular) together with age, and during the night (both during working and weekend days). This relationship is presumably connected

Table 2
Correlations between the investigated variables (* = *p* < 0.05, ** = *p* < 0.01, / = n.s.).

Correlations	1	2	3	4	5	6	7	8	9
1. MMORPG		0.460**	/	/	/	/	0.243**	/	0.224**
2. MOBA			/	/	0.174*	/	0.221*	0.245**	0.248**
3. TSP - morning, week days				0.419**	/	/	/	/	0.173*
4. TSP - morning, weekend days					0.322**		0.235**	0.272**	0.281**
5. TSP - afternoon, week days						0.472**	0.296**	0.366**	/
6. TSP - afternoon, weekend days							0.188*	/	/
7. TSP - night, week days								0.620**	0.176*
8. TSP - night, weekend days									
9. PVP (internet gaming disorder)									0.221*

Table 3
Comparisons between participants with a likely IGD and participants without IGD in terms of age, gender and MMORPGs/MOBA games preferences (*t*-tests and χ^2).

Variable	IGD	No IGD	<i>t</i> (131)	<i>p</i>
Age	24.07 (5.3)	25.78 (7.8)	-1.087	ns
Preference for MMORPG videogames	3.39 (1.5)	2.69 (1.4)	2.201	0.02
Preference for MOBA videogames	3.14 (1.7)	2.29 (1.4)	2.637	0.00
Gender			χ^2	<i>p</i>
Male	22	88	0.42	ns
Female	6	17		

Table 4
Stepwise regression models on time spent playing videogames during specific day phases; independent variables: age, preference for MMORPGs and MOBA video game genres, and IGD. Variables resulting significant when applying Bonferroni correction are highlighted by asterisks.

DV: morning hours, week	B	SE (B)	β	<i>t</i>	Sig.
Internet gaming disorder	0.064	0.032	0.173	2.006	0.047
<i>F</i> = 4.024; <i>p</i> < 0.05; <i>R</i> ² = 0.03; <i>N</i> = 133					
DV: morning hours, weekend					
Internet gaming disorder*	0.165	0.049	0.281	3.354	0.001
<i>F</i> = 11.247; <i>p</i> < 0.01; <i>R</i> ² = 0.07; <i>N</i> = 133					
DV: afternoon hours, week					
Age*	-0.067	0.015	-0.365	-4.454	0.000
Preference for MOBA videogames*	0.202	0.073	0.228	2.780	0.006
<i>F</i> = 12.225; <i>p</i> < 0.001; <i>R</i> ² = 0.16; <i>N</i> = 133					
DV: afternoon hours, weekend					
Age	-0.041	0.019	-0.191	-2.222	0.028
<i>F</i> = 4.937; <i>p</i> < 0.05; <i>R</i> ² = 0.03; <i>N</i> = 133					
DV: night hours, week					
Preference for MMORPG videogames*	0.245	0.086	0.243	2.864	0.005
<i>F</i> = 8.204; <i>p</i> < 0.01; <i>R</i> ² = 0.05; <i>N</i> = 133					
DV: night hours, weekend					
Preference for MOBA videogames*	0.287	0.099	0.245	2.890	0.005
<i>F</i> = 8.353; <i>p</i> < 0.01; <i>R</i> ² = 0.06; <i>N</i> = 133					

to the specific characteristics of these games, which offer a series of incentives for playing. In particular, MOBAs and MMORPGs allow to play together with numerous players in the same virtual world and offer the possibility to achieve game goals, to get in-game rank reputation, to compete and dominate other participants and to immerse in the game (Kuss, Louws, & Wiers, 2012; Yee, 2006): in other words, these games are better enjoyed when played cooperatively in small groups (“parties”), so that players need specific periods over the day to organize with friends and meet inside the digital worlds for a reasonable amount of time. This may be the reason why players who prefer these kinds of games are more used to play over the night. Moreover, MMORPGs and

MOBA games were preferred by gamers with more symptoms of IGD according to the Students' *t*-test; this is consistent with the literature identifying these specific game genres more related to addictive behaviors (Nuyens et al., 2016; Škařupová & Blinka, 2015).

Finally, morning hours constituted the day phase where IGD predicted time spent playing. People suffering from addiction typically show exaggerate motivation to procure the substance/activity of interest (Volkow, 2011), so they tend to postpone or eliminate other activities in order to pursue consumption. Highly engaged but not addicted gamers would probably continue using mornings for other activities (work, school, resting), while problematic gamers tend to play video games also at times usually reserved to other commitments. However it should be considered that, applying Bonferroni correction to control for multiple testing, IGD predictive power on TSP online video games over morning hours in week days is not significant.

Although preliminary, these results may suggest important information for the correct analysis of the TSP factor in internet gaming disorder. Future research should include TSP over day phases as a possibly useful clue about the actual role of time in problematic gaming.

Limitations of the present study regard the relatively small sample and the low explained variance values; these, along with the cross-sectional nature of the study, do not allow to draw conclusions about causality. It should be noticed that a relatively high percentage of responses to the online questionnaire were not complete (27%); specifically, most of these participants ceased to fill in the questionnaire when reaching the questions about excessive use/IGD. As a consequence, we should consider that self-selection bias may affect our database (i.e., some possibly-problematic gamers did not want to respond to sensitive questions). Moreover, the present study did not include control variables which may affect both the TSP over specific day phases and the subjective recall of it (e.g., affective states); also, basing on self-reported data, this study did not include objective measures of video game playing. Future studies should involve greater samples and more complex models, as well as more complete sets of variables, to capture the actual relationship between video game addiction and TSP during specific day phases, in order to provide important information for diagnosis and treatment.

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