



## Full length article

# Personality and video gaming: Comparing regular gamers, non-gamers, and gaming addicts and differentiating between game genres



Beate Braun <sup>a, \*</sup>, Juliane M. Stopfer <sup>b</sup>, Kai W. Müller <sup>a</sup>, Manfred E. Beutel <sup>a</sup>, Boris Egloff <sup>c</sup>

<sup>a</sup> University Medical Centre Mainz, Untere Zahlbacher Straße 8, 55131 Mainz, Germany

<sup>b</sup> Department of Psychology, University Göttingen, Gosslerstraße 14, 37073 Göttingen, Germany

<sup>c</sup> Department of Psychology, University Mainz, Bingener Straße 14-16, 55122 Mainz, Germany

## ARTICLE INFO

## Article history:

Received 1 April 2015

Received in revised form

14 August 2015

Accepted 24 September 2015

Available online 5 November 2015

## Keywords:

Video game behavior

Big Five

Game genres

Non-gamers

Personality

## ABSTRACT

This study deals with personality characteristics of gaming addicts, regular gamers, and non-gamers while differentiating between the gamers' favorite game genres. In order to point out personality differences, we conducted an online survey assessing the Big Five in a total of 2891 participants. Additionally, the gamers were screened with a diagnostic inventory for video game addiction and categorized according to their favorite game genre. We replicated findings in which gaming addicts were described as embodying challenging personality traits such as high neuroticism, and we observed similar results for non-gamers. For regular gamers, we primarily found low neuroticism, which underlines the innocuous nature of video game playing in itself. With respect to the players' favorite game genres, we found a wide variety of personality traits. For example, participants who preferred action games had high extraversion and low neuroticism. With respect to the differences pointed out above, future personality-based studies on gamers should include non-gamers and differentiate between the players' favorite game genres.

© 2015 Published by Elsevier Ltd.

## 1. Introduction

### 1.1. Video games and their users

Video games go back to the 1960s (Juul, 1998) and have continuously expanded in popular appeal. In the beginning, only scientists developed and tested rudimentary video games on the large-capacity computers in their laboratories. Nowadays, video games often contain photo-realistic graphics, sophisticated systems, and communicative characteristics. They have become an integral part of modern entertainment and the time spent gaming has risen up to 6.3 h a week (Nielson Company, 2014). Even though male adolescents might be seen as the target audience of video games, adults of different educational backgrounds and both genders enjoy playing them (Entertainment Software Association, 2015). Video gaming thus receives widespread positive attention and one might assume that every character might be attracted to video games. On the other hand, playing video games is said to be connected with addiction (Kuss, 2013) and aggression (Lin, 2013), and it might thus be assumed that gamers have challenging

personality traits connected to disorders and criminality. There are indeed studies that focused on personality in gaming addicts (Müller, Beutel, Egloff, & Wölfling, 2014; Walther, Morgenstern, & Hanewinkel, 2012; Wang, Ho, Chan, & Tse, 2015); others that examined personality traits in relation to internet usage in general (Landers & Lounsbury, 2006); and those that investigated personality differences between online game players and non-players (Teng, 2008). However, there still is a lack of an overall comparison between gaming addicts, regular gamers, and non-gamers, as well as a differentiation between various games genres which we want to fill with this study.

### 1.2. Video game genres

When discussing video games, one is confronted with a huge amount of different game genres. Apperley (2006) differentiated between the four game genres action, role-playing, simulation, and strategy. This classification is widely accepted in the field (e.g., Arsenault, 2009; Krzywinska & Brown, 2015; Qin, Rau, & Salvendy, 2009). Simulation games imitate realistic scenarios in life, sports, and economics. Strategy games require a global view, for instance when managing an economy while fighting rivals. Action games need game-play virtuosity as the gamer controls every move of the

\* Corresponding author.

E-mail address: [beate.braun@unimedizin-mainz.de](mailto:beate.braun@unimedizin-mainz.de) (B. Braun).

counter that usually can kill and can be killed. Role-playing games are rooted in pen-and-paper role-playing games and therefore have many creative and social aspects as the gamer creates and develops a character while interacting with real or digital others.

There are a few studies focusing on personality in gamers that favor role-playing games (Graham & Gosling, 2013; Simon, 1987). The personality of gamers that prefer other game genres is, however, not yet explored. There is the idea that some game genres have a greater potential for addiction as compared to others (Floros & Siomos, 2012; Lee et al., 2007). But it has not been investigated to what extent users of different game genres differ with regard to their personality. We now examined this important question in order to overcome generalizations of gamers across game genres and to provide deeper insights into the personality profiles of video gamers of various game genres.

### 1.3. Internet gaming disorder

In 1954, Gebattel postulated that any human interest can become addictive. But only in the last decade have behavioral addictions such as Internet Gaming Disorder (IGD) attracted the interest of researchers and clinicians (King & Delfabbro, 2014; Kuss, Griffith, Karila, & Billieux, 2014; Weinstein & Lejoyeux, 2015). The criteria of IGD, which was recently included in the appendix of the DSM-5 (American Psychiatric Association, 2013), are based on the criteria of substance-related addiction: (a) loss of control indicates that the beginning, duration, and end of gaming sessions have slipped out of one's hands, resulting in long playing times, (b) withdrawal symptoms such as nervousness can appear when gaming is prohibited, (c) tolerance means that a subtle increase in the duration and frequency of use is needed to obtain the desired effects, (d) reduced involvement indicates that involvement in non-gaming activities is neglected, potentially causing social isolation, (e) craving means that one longs for the game and constantly thinks about it, and (f) attempts to cut back are not met with success. Since IGD appears to be a worldwide health-related issue with prevalence rates ranging from 1 to 9% (Müller et al., 2015), a better understanding of this emerging mental disorder is crucial.

### 1.4. Characterizing video game players according to the Big Five

The Big Five personality traits neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness have been used to describe human personality for many years (Costa & McCrae, 1985). Research on video game players' personality has previously focused on gaming addicts, regular gamers without further distinctions between game genres, and role-playing gamers in particular.

According to research, high neuroticism is associated with IGD (Lehenbauer-Baum et al., 2015; Mehroof & Griffith, 2010; Müller et al., 2014; Yan, Li, & Sui, 2014; Yang, Choe, Baity, Lee, & Cho, 2005), probably abetting and maintaining it (Wölfling & Müller, 2009). This finding did not hold true in the context of regular internet use in a former study (Landers & Lounsbury, 2006). However, a recent large-scale representative study of young adults showed that global internet use was also positively related to neuroticism (Mark & Ganzach, 2014), perhaps because people who are neurotic use the internet to lower their feelings of loneliness. Our knowledge on the neuroticism level of regular gamers is limited so far; however, Teng (2008) suggested that it did not differ from non-gamers in a student sample. Regarding game genre, exposure to a role-playing game was not correlated with emotional instability, and the role-playing gamers obtained a healthy psychological profile in an early study (Simon, 1987), but role-playing gamers tended to be high on neuroticism in a recent investigation

(Graham & Gosling, 2013). The latter might indicate that the role-playing gamers deny their negative emotions through games set in fantastical scenarios but there are no further investigations up to now. No association emerged between neuroticism and video game violence exposure (Bartholow, Sestir, & Edward, 2005), thus violent contents that are primarily found in action games might be too stimulating for people high in neuroticism. On the other hand, in a recent study neurotic individuals preferred to play video games that were more violent (Chory & Goodboy, 2011). The connection between neuroticism and other game genres has not been explored yet.

There is some evidence that the frequent and addictive use of the internet and video games is related to low extraversion (Landers & Lounsbury, 2006; Müller et al., 2014; Öztürk et al., 2015). The reduced face-to-face communication and anonymity of the internet can probably provide an alternative to the eschewed offline social activities of introverts and bind them. Contrarily, some studies have found no connection between extraversion and internet addiction (Senormanci et al., 2014) or even a positive relation between extraversion and global internet use (Mark & Ganzach, 2014), use of leisure services (Amichai-Hamburger & Ben-Artzi, 2000; Tel & Sargent, 2004), online game playing (Teng, 2008), and violent video game use (Chory & Goodboy, 2011). The latter is consistent with previous media research (Bruggemann & Barry, 2002) and is explained by sensation seeking, which requires activity and a "rush". Role-playing gamers were found to be low on extraversion (Douse & McManus, 1993). Maybe role-playing allows them to expand their self by playing roles that would otherwise be inaccessible to them in real life. But there is also evidence of extraverted role-playing gamers who focus on the interactive and socializing elements of those games (Graham & Gosling, 2013; Worth & Book, 2014; Yee, 1999). Links between extraversion and other game genres have not been explored so far.

A connection between internet use and openness was confirmed (Witt, Massman, & Jackson, 2010) but as well disconfirmed (Landers & Lounsbury, 2006). These contrary findings might be due to different options to move through the internet: It is possible to search for but also to avoid new things. Regarding IGD, the user is constricted to a certain field, so it is not surprising that IGD was associated with low openness (Wang et al., 2015). However, participants performed better in creativity tests after having played action video games (Yeh, 2015). In addition, openness was high in regular gamers (Teng, 2008; Tuten & Bosnjak, 2001; Witt et al., 2010), frequent players of violent video games (Chory & Goodboy, 2011), and in role-playing gamers (Graham & Gosling, 2013; Simon, 1987; Yee, 1999), probably because games often require fantasy activities and imagination, and there are many things to explore in these kinds of games. The other game genres have not yet been investigated with regard to the players' level of openness.

Low agreeableness was associated with IGD (Lehenbauer-Baum et al., 2015) and internet usage in general (Landers & Lounsbury, 2006). These findings seem reasonable because spending time in front of a computer may contradict social harmony. Playing violent video games was related to low agreeableness (Chory & Goodboy, 2011). Especially in violent games one does not tend to be kind; these games' appeal may also stem from the lack of social rules in violent virtual worlds. Role-playing gamers who focused on achievement were found to have low agreeableness (Graham & Gosling, 2013). So far there are no studies that explored the relationship between the other game genres and agreeableness.

Internet use was negatively correlated with conscientiousness (Landers & Lounsbury, 2006). On the other hand, conscientiousness was also positively related to internet use (Mark & Ganzach, 2014) and regular gamers (Teng, 2008). This finding shows that using the

internet can also demand and foster self-discipline and planned behavior. Importantly, low conscientiousness appeared as the most powerful predictor of IGD in a clinical sample of gaming addicts and also allowed to discriminate this group from pathological gamblers and from internet addiction in general (Müller et al., 2014; Wang et al., 2015). Role-playing gamers who play to gain a sense of achievement showed low conscientiousness (Graham & Gosling, 2013), but there were no correlations between conscientiousness and the use of violent video games (Chory & Goodboy, 2011). So far, the relation between conscientiousness and other game genres has not been investigated.

In summary, many findings on personality in gaming addicts and, to a lesser extent, regular gamers have been reported, even though these results do not show a consistent pattern. Furthermore, there is a lack of research on personality in non-gamers and gamers who prefer different game genres. Therefore, the present study was designed to fill some of these gaps in addition to replicating prior findings.

### 1.5. Research hypotheses

We hypothesized:

- (1) There will be a positive association between neuroticism and IGD (Lehenbauer-Baum et al., 2015; Mehroof & Griffith, 2010; Müller et al., 2014; Yan et al., 2014; Yang et al., 2005). Regular gamers will not show this association (Teng, 2008). Neuroticism will be higher for action gamers (Chory & Goodboy, 2011) and role-playing gamers (Graham & Gosling, 2013) than for players of other game genres.
- (2) There will be a negative association between extraversion and IGD (Amichai-Hamburger & Ben-Artzi, 2000; Landers & Lounsbury, 2006; Müller et al., 2014; Öztürk et al., 2015). Role-playing gamers will score lower on extraversion than those playing other game genres (Douse & McManus, 1993), especially in contrast to action gamers (Chory & Goodboy, 2011).
- (3) There will be a negative association between openness and IGD (Wang et al., 2015) which will not be present in regular gamers (Teng, 2008; Tuten & Bosnjak, 2001). Role-playing gamers and action gamers will have a high level of openness (Chory & Goodboy, 2011; Graham & Gosling, 2013; Simon, 1987; Yee, 1999; Yeh, 2015).
- (4) Conscientiousness and agreeableness will be negatively associated with IGD (Lehenbauer-Baum et al., 2015; Müller et al., 2014; Wang et al., 2015).

## 2. Material and methods

### 2.1. Measures<sup>1</sup>

#### 2.1.1. Big Five Inventory-SOEP (BFI-S)

The BFI-Schupp and Gerlitz (2008) is a 15-item, validated, short version of the self-reported Big Five Inventory (Lang, John, Lüdtke, Schupp, & Wagner, 2011). Each of the five personality dimensions (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) is measured with three items. Participants are asked to rate their answers on a seven-point Likert scale ranging from 1 (disagree strongly) to 7 (agree strongly). In the present study, Cronbach's alpha ranged from  $\alpha = .45$  (agreeableness) to  $\alpha = .81$  (extraversion). These coefficients are largely

consistent with those reported previously (Hahn, Gottschling, & Spinath, 2012; Schupp & Gerlitz, 2008).

#### 2.1.2. Assessing video game behavior

We used the Scale for the Assessment of Internet and Computer game Addiction (AICA-S gaming; Wölfling, Beutel, & Müller, 2012) to classify participants' gaming behavior with regard to potential addictive use. Based on the criteria of substance-related addiction such as craving, tolerance, withdrawal, loss of control, and unsuccessful attempts to cut back, this standardized self-report scale consists of 15 items usually with a five-point scale ranging from 1 (never) to 5 (very often). Higher scores indicate an unhealthy use of video games. Weighted scoring is used to differentiate gamers from gaming addicts (sensitivity = 80.5%, specificity = 82.4%) with a cut-off of 13.5 points indicating addictive use. The instrument has been validated in the general population and in clinical samples (Müller et al., 2014; Müller, Glaesmer, Brähler, Wölfling, & Beutel, 2013). Cronbach's alpha was  $\alpha = .79$ .

The participants reported whether they played video games (yes/no). Using Apperley (2006) four game genres, we categorized the participants' self-reported favorite video games as action, role-playing, simulation, or strategy. For demographic purposes, participants also rated how often they played various video game subgenres such as first-person shooter (action), role-playing games (role-playing), life simulation (simulation), and round-based strategy (strategy). Ratings were made on a four-point Likert scale ranging from 1 (never) to 4 (very often).

### 2.2. Participants<sup>2</sup>

A total of 2891 subjects (2421 male, 470 female) between 13 and 65 years of age ( $M = 23.2$ ,  $SD = 5.99$ ) completed an online survey. Links to the survey were placed on various online forums and popular online game sites. To achieve heterogeneity of the sample, no exclusion criteria other than having internet access and understanding German were specified. With regard to participants' professions, 33% were workers, 30% college students, 19% high-school students, 11% apprentices, and 7% non-workers. Most were single (63%). The sample consisted primarily of gamers (78%), then gaming addicts (16%) and non-gamers (6%). The most often played genres were action (43%) and role-playing (29%), whereas strategy (15%), simulation (8%), and others (5%) were preferred less. The preferred subgenres were (a) first-person shooter (62%) and third-person shooter (21%) for the action genre, (b) role-playing games (41%) and massively multiplayer online role-playing games (31%) for the role-playing genre, (c) round-based strategy (86%) for the strategy genre, and (d) life simulation (37%), sport simulation (36%), and business simulation (23%) for the simulation genre.

### 2.3. Statistical analysis

Basic descriptive statistics were calculated to determine sample characteristics. The question of whether personality is associated with video game behavior was tested with correlations. Analysis of variance was used (a) to compare the personality traits of non-gamers, gamers, and gaming addicts and (b) to show whether preferring a certain game genre was associated with certain personality traits. We used Scheffé's method for our post-hoc testing.

<sup>1</sup> Further measures were applied, but they were not relevant to the present research question and were thus not mentioned in this paper.

<sup>2</sup> The data were gathered as part of a larger project. However, the analyses in the present article do not overlap with those of the previous work.

### 3. Results

#### 3.1. Personality traits and video game behavior

In order to obtain a first overview, we explored the links between personality traits and video game behavior using correlations (see Table 1). Video game use was positively correlated with neuroticism and negatively correlated with extraversion and conscientiousness. The relations between video game use and openness and agreeableness both disappeared after controlling for gender.

Next we compared non-gamers, regular gamers, and gaming addicts on personality traits (see Table 2). Non-gamers showed the highest scores on neuroticism, but their scores did not differ significantly from gaming addicts. Gamers showed significantly lower scores on neuroticism as compared with non-gamers and gaming addicts. Non-gamers and gamers did not differ significantly in their extraversion scores, whereas gaming addicts showed significantly lower scores on extraversion. Openness interacted with gender. For males, non-gamers scored significantly higher on openness ( $M = 5.5$ ,  $SD = .96$ ) than regular gamers ( $M = 5.1$ ,  $SD = 1.11$ ) and gaming addicts ( $M = 5.0$ ,  $SD = 1.21$ ). Female regular gamers showed significantly higher scores on openness ( $M = 5.6$ ,  $SD = 1.02$ ) than female non-gamers ( $M = 5.3$ ,  $SD = 1.12$ ). There were no significant differences between non-gamers, regular gamers, and gaming addicts on agreeableness. All groups differed significantly from one another on conscientiousness with the highest scores for non-gamers, followed by regular gamers and gaming addicts.

#### 3.2. Personality traits and favorite video game genres

We categorized the participants according to their favorite game genres and then compared their personality traits (see Table 3). Participants who preferred action games had the lowest neuroticism scores and differed significantly from those preferring role-playing and simulation games. Participants who preferred action games also had the highest extraversion scores and differed significantly from participants who preferred any other genre. The highest openness was found for participants who preferred role-playing games, but the difference between the genres was not significant. Only females who preferred role-playing games had significantly higher openness scores ( $M = 5.67$ ,  $SD = 1.07$ ) than females who preferred strategy games ( $M = 5.11$ ,  $SD = 1.05$ ). Participants who preferred different video games did not differ significantly in agreeableness. Participants who preferred simulation games had the highest conscientiousness and differed significantly from participants who preferred strategy games.

**Table 1**  
Correlations between personality traits and video game behavior.

Personality traits	Gaming behavior	
	<i>R</i>	<i>r<sub>part</sub></i>
Neuroticism	.12**	.08**
Extraversion	-.14**	-.11**
Openness	-.06**	-.02
Agreeableness	-.05**	-.02
Conscientiousness	-.25**	-.18**

Note. *r* is the Pearson correlation between personality traits and the AICA-S. *r<sub>part</sub>* is the partial correlation between personality traits and the AICA-S, controlled for participant sex. Personality traits measured with the BFI-S ranged from 1 (disagree strongly) to 7 (agree strongly). Gaming behavior was measured with the AICA-S.

\*\* $p < .01$ .

**Table 2**

Analysis of variance with gamer type as derived from the AICA-S as the independent variable and personality as the dependent variable.

	<i>F</i>	<i>P</i>	$\eta^2$	Non-gamers		Regular gamers		Gaming addicts	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Neuroticism	27.64	<.001	.019	4.2 <sub>a</sub>	1.27	3.6 <sub>b</sub>	1.24	4.0 <sub>a</sub>	1.34
Extraversion	23.58	<.001	.016	4.9 <sub>a</sub>	1.38	4.7 <sub>a</sub>	1.38	4.2 <sub>b</sub>	1.45
Openness	6.85	.001	.005	5.4 <sub>a</sub>	1.01	5.2 <sub>a</sub>	1.11	5.0 <sub>b</sub>	1.21
Agreeableness	4.78	.009	.003	5.5 <sub>a</sub>	.74	5.7 <sub>a</sub>	.79	5.6 <sub>a</sub>	.86
Conscientiousness	63.82	≤.001	.042	5.2 <sub>a</sub>	.98	5.0 <sub>b</sub>	.98	4.4 <sub>c</sub>	1.02

Note. The response format of the Big Five traits (BFI-S) ranged from 1 (disagree strongly) to 7 (agree strongly). For openness, there was an interaction with gender that is mentioned in the text. Different letters a, b, c indicate significant group differences.

### 4. Discussion

#### 4.1. Summary of findings

Our study was realized to examine personality in gaming addicts, regular gamers, and non-gamers while differentiating between the gamers' favorite game genres. In the following we will discuss the findings in detail.

- (1) In line with former research (Lehenbauer-Baum et al., 2015; Mehroof & Griffith, 2010; Müller et al., 2014; Yan et al., 2014; Yang et al., 2005), there was a positive association between neuroticism and IGD in our study. This result is in accordance with the well-explored finding that IGD comes along with anxiety and depression (Ho et al., 2014). High neuroticism was, as expected on the basis of previous studies (Landers & Lounsbury, 2006; Teng, 2008), not transferable to regular gamers in the present study. Mark and Ganzach (2014) finding of global internet use being positively related to neuroticism could be explained by the included academic and economic matters, whereas regular video gaming as a leisure activity facilitates recovery and contributes to health and enjoyment (Adams, Christian, & Tarshis, 2015; Rieger, Wulf, Kneer, Frischlich, & Bente, 2014). A finding that contradicts Teng (2008) results obtained in a small student sample was that the non-gamers in our study had a higher level of neuroticism than the regular gamers and, in this respect, could not be distinguished from gaming addicts. It might be the case that worrying and nervousness complicate the ability to immerse oneself in a game world so that people high in neuroticism are not interested in playing video games in the first place. Non-gamers are also missing the chance to relax and come in contact with social partners through gaming, which is a regular leisure activity. With regard to game genres, neuroticism was previously found to be higher for violent video game users than for users of non-violent video games (Chory & Goodboy, 2011). Our finding that participants preferring action games had the lowest neuroticism scores and differed significantly from those preferring role-playing and simulation games contradicts this prior result. We must not forget that the stimulating social structure of action games is hardly compatible with high neuroticism. We, however, confirmed our hypothesis that those preferring role-playing games are relatively high in neuroticism, and we extended this observation with a relatively high neuroticism score for those preferring simulation games. Imitating realistic or fantastical scenarios and characters might be especially suitable to deny unpleasant emotions beyond those related to the gaming experience,



**Table 3**

Analysis of variance with players' favorite game genre as the independent variable and the dimensions of the BFI–S as dependent variables.

	F	P	$\eta^2$	Simulation		Strategy		Action		Role-play	
				M	SD	M	SD	M	SD	M	SD
Neuroticism	10.30	$\leq .001$	.021	4.0 <sub>a</sub>	1.26	3.6 <sub>ab</sub>	1.24	3.6 <sub>b</sub>	1.26	3.8 <sub>a</sub>	1.28
Extraversion	11.08	$\leq .001$	.023	4.4 <sub>a</sub>	1.41	4.4 <sub>a</sub>	1.37	4.8 <sub>b</sub>	1.37	4.4 <sub>a</sub>	1.43
Openness	5.39	$\leq .001$	.011	5.2 <sub>ab</sub>	1.21	4.9 <sub>a</sub>	1.12	5.1 <sub>ab</sub>	1.15	5.3 <sub>b</sub>	1.10
Agreeableness	1.94	.071	.004	5.7 <sub>a</sub>	.86	5.6 <sub>a</sub>	.83	5.7 <sub>a</sub>	.77	5.7 <sub>a</sub>	.81
Conscientiousness	7.20	$\leq .001$	.015	5.1 <sub>a</sub>	1.02	4.7 <sub>b</sub>	1.91	4.9 <sub>ab</sub>	.98	4.9 <sub>ab</sub>	.98

Note. The response format of the Big Five traits (BFI–S) ranged from 1 (disagree strongly) to 7 (agree strongly). For openness, there was an interaction with gender that is mentioned in the text. Different letters a, b indicate significant group differences.

which nevertheless persist. To subsume, the first research hypothesis was confirmed with regard to a positive association between neuroticism and IGD, low neuroticism in regular gamers, and a relatively high neuroticism for the participants preferring role-playing games. The hypothesis was contradicted, however, with regard to a relatively low neuroticism for the participants who preferred action games and extended by our findings of high neuroticism in non-gamers and those preferring simulation games.

- (2) We confirmed that there was a negative association between extraversion and IGD (Amichai-Hamburger & Ben-Artzi, 2000; Landers & Lounsbury, 2006; Müller et al., 2014; Öztürk et al., 2015), so introversion might foster and result from the development of addictive gaming. The avoidance of offline social contact generates time that can be spent playing video games. Addictive gaming can decrease a person's pleasure in and increase alienation from outside companionship since gaming addicts replace this with the game world. There was no difference in extraversion between regular gamers and non-gamers; thus, extraversion does not seem to predict regular video gaming. Previous studies have found that video gaming can also go along with high extraversion (Amichai-Hamburger & Ben-Artzi, 2000; Tel & Saragat, 2004; Teng, 2008). Our study illustrates that this is influenced by the players' favorite game genre. Users who prefer action games had, as expected from findings by Chory and Goodboy (2011), the highest extraversion. This finding might be explained by a high level of excitement-seeking that promotes enjoyment with thrilling violent video games. The use of action games in multiplayer settings further requires communicative aspects and the enjoyment of spontaneous interactions with others so that success in this regard might require and increase extraversion. On the contrary, especially those preferring role-playing games were expected to score low on extraversion (Douse & McManus, 1993). This hypothesis, however, was not confirmed in our study. There was no difference in extraversion between users who preferred role-playing, strategy, and simulation games. Presumably, single-player games with low action might attract introverts independent of game genre because such games allow them to do spectacular things quietly and by themselves. To conclude, the second research hypothesis was supported by the negative association between extraversion and IGD and the positive association between extraversion and the preferred use of action games. The hypothesis was contradicted by the unremarkable level of introversion of the participants preferring role-playing games and supplemented by the findings on comparable introversion of those preferring simulation and strategy games.
- (3) We could not affirm a negative association between openness and IGD (Wang et al., 2015), instead we found no

association between the two variables. One explanation might be that addicted gamers need to be open to get involved in a changing virtual world, and the experience of abstract gaming might stimulate fantasy and imagination. Yet they might tend to avoid the unknown and be unwilling to try new things outside of the gaming world. For females, we found that regular gamers had higher openness than non-gamers. But, by contrast, for males, regular gamers had lower openness than non-gamers. This pattern might stem from *non-gaming men* and *gaming women* curiously outgoing their gender roles in which they are expected to play or not to play, respectively (Williams, Consalvo, Caplan, & Yee, 2009). In terms of game genres, we did not confirm that role-playing and action gamers had the highest openness (Chory & Goodboy, 2011; Graham & Gosling, 2013; Simon, 1987; Yee, 1999) because users of other game genres showed similar levels. An explanation for this may be that creative fantasy activities and story elements are standard components of most video games. In summary, we confirmed the negative association between openness and IGD, challenging the claim that role-playing and action gamers had an especially high openness. We complemented the third research hypothesis by uncovering gender differences.

- (4) In accordance with previous research (Müller et al., 2014; Wang et al., 2015), a negative association was found between conscientiousness and IGD. In addition, conscientiousness in non-gamers was higher than conscientiousness in regular gamers, which contradicts findings reported by Teng (2008). Using video games might interfere with dedication in other life areas, and the influence of video games may increase with the amount of time spent gaming. With regard to game genres that were not investigated so far, participants preferring simulation games had the highest conscientiousness. This can be explained by the notion that simulation games represent reality, and in their strong connection between action and consequence they require challenges to be addressed adequately. In contrast to our prediction, these findings were not the same for agreeableness. Agreeableness was not related to video game behavior, even though we expected that gaming addicts would avoid interpersonal settings because of the potential for conflict and thereby prefer video games that require less agreeable behavior. But we must not forget that gaming often involves contact with others and teamwork, so that agreeableness can be important. In summary, we confirmed the fourth research hypothesis with regard to the negative association between conscientiousness and IGD while at the same time building upon it by assessing non-gamers and game genres. Unexpectedly, agreeableness was not related to video game behavior.

## 4.2. Limitations

The data for the present study were collected via an online survey that was appropriate for investigating video gamers (Griffiths, 2010). The high percentage of young, male, and educated participants must be highlighted to avoid generalizations. Also, in the present study, we observed an overabundance of gaming addicts and gamers who favored action games, groups that are not representative of the gaming population as a whole. These groups were oversampled because our online survey was promoted through a gaming website that focuses on action games. Nevertheless, we do not suspect that our results are biased because we differentiated between game genres and had no epidemiological focus. Since most previous investigations of video gamers have excluded non-gamers, we do not know anything about their demographic backgrounds. Hence, we do not know whether our non-gamers were representative. Also a cross-sectional design cannot determine causal relationships, and the clinical classification of IGD through self-report measures must not be considered a true clinical diagnosis. In general, it is possible to generalize the results only to a limited extent because the findings were balanced across gamer populations rather than the general population.

## 4.3. Conclusions and future prospects

The present study provides a detailed summary of the relation between personality and video game use and also respected effects of the preferred game genre. Referring to the Big Five allowed to identify important personality differences between gaming addicts, regular gamers, and non-gamers. Even more precisely, the users' personality was examined with regard to the preferred game genre. Relating to gaming addiction, subjects were characterized by high neuroticism and decreased extraversion and conscientiousness. Understanding the causes behind the development of addictive video gaming is of immense importance for developing effective prevention strategies and adapting therapeutic approaches. In order to consolidate the findings and to shed light into their causality, a need for longitudinal analyses becomes evident. Of particular importance, the rather unexplored discrimination between genres and the examination of non-gamers were found to be very informative in our study. Both aspects should be considered in further studies. Studies that do not include non-gamers run the risk of not describing regular and addicted gamers adequately, since the lack of distinction between gaming addicts, regular gamers, and non-gamers lets regular gamers appear to be functional game addicts and one might oversee some healthy behavior or characteristics compared to non-gamers. Also, without considering the different game genres, the results would be biased toward an assumed but non-existent general gaming population. There is, however, no such thing as *the gamer*. If we can avoid assuming the existence of a "general gamer," we can better understand some of the conflicting findings of prior studies.

## Disclosure statement

No competing financial interests exist.

## References

- Adams, J., Christian, G., & Tarshis, T. (2015). Managing media: reflections on media and video game use from a therapeutic perspective. *Journal of the American Child and Adolescence Psychiatry*, 54(5), 341–342. <http://dx.doi.org/10.1016/j.jaac.2015.02.013>.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Amichai-Hamburger, Y. E., & Ben-Artzi, E. (2000). The relationship between extraversion and neuroticism and the different uses of the Internet. *Computers in Human Behavior*, 16, 441–449. [http://dx.doi.org/10.1016/S0747-5632\(00\)00017-0](http://dx.doi.org/10.1016/S0747-5632(00)00017-0).
- Apperley, T. H. (2006). Genre and game studies: toward a critical approach to video game. *Simulation & Gaming*, 7, 6–23. <http://dx.doi.org/10.1177/1046878105282278>.
- Arsenalut, D. (2009). Video game genre, evolution and innovation. *Journal for Computer Game Culture*, 3(2), 149–176.
- Bartholow, B. D., Sestir, M. A., & Davis, E. B. (2005). Correlates and consequences of exposure to violent video game violence: hostile personality, empathy, and aggressive behavior. *Personality and Social Bulletin*, 31, 1573–1586. <http://dx.doi.org/10.1177/0146167205277205>.
- Bruggemann, J. M., & Barry, R. J. (2002). Eysenck's P as a modulator of affective and electrodermal responses to violent and comic film. *Personality and Individual Difference*, 32, 1029–1048. [http://dx.doi.org/10.1016/S0191-8869\(01\)00108-8](http://dx.doi.org/10.1016/S0191-8869(01)00108-8).
- Chory, R., & Goodboy, A. K. (2011). Is basic personality related to violent and non-violent video game play and preferences? *Cyberpsychology, Behavior and Social Networking*, 14(4), 191–198. <http://dx.doi.org/10.1089/cyber.2010.0076>.
- Costa, P. T., & McCrae, R. R. (1985). *The NEO personality inventory. Manual form S and form R*. Odessa, FL: Psychological Assessment Resources.
- Douse, N. A., & McManus, I. C. (1993). The personality of fantasy game players. *British Journal of Psychology*, 84, 505–509. <http://dx.doi.org/10.1111/j.2044-8295.1993.tb02498.x>.
- Entertainment Software Association. (2014). *Essential facts about the computer and video game industry* Accessed 19.07.15 <http://www.theesa.com/wp-content/uploads/2015/04/ESA-Essential-Facts-2015.pdf>.
- Floros, G., & Siomos, K. (2012). Patterns of choice of video game genres and Internet addiction. *Cyberpsychology, Behavior, and Social Networking*, 15(8), 417–424. <http://dx.doi.org/10.1089/cyber.2012.0064>.
- Gebsattel, V. E. (1954). *Prolegomena einer medizinischen anthropologie [Prolegomena to a medical anthropology]*. Berlin: Springer.
- Graham, L. T., & Gosling, S. D. (2013). Personality profiles associated with different motivations for playing world of warcraft. *Cyberpsychology, Behavior, and Social Networking*, 16(3), 189–193. <http://dx.doi.org/10.1089/cyber.2012.0090>.
- Griffiths, M. D. (2010). The use of online methodologies in data collection for gambling and gaming addictions. *International Journal of Mental Health and Addiction*, 8, 8–20. <http://dx.doi.org/10.1007/s11469-009-9209-1>.
- Hahn, E., Gottschling, J., & Spinath, F. M. (2012). Short measurement of personality—validity and reliability of the GSOEP Big Five Inventory (BFI-S). *Journal of Research in Personality*, 46, 355–359. <http://dx.doi.org/10.1016/j.jrp.2012.03.008>.
- Ho, R. C., Zhang, M. W., Tsang, T. Y., Toh, A. H., Pan, F., Lu, Y., et al. (2014). The association between internet addiction and psychiatric co-morbidity: a meta-analysis. *BMC Psychiatry*, 14, 183–193. <http://dx.doi.org/10.1186/1471-244X-14-183>.
- Juul, J. (1998). *A history of the computer game*. <http://www.jesperjuul.net/thesis/2-historyofthecomputergame.html> Accessed 09.07.15.
- King, D. L., & Delfabbro, P. H. (2014). Internet gaming disorder treatment: a review of definitions of diagnosis and treatment outcome. *Journal of Clinical Psychology*, 70(10), 942–955. <http://dx.doi.org/10.1002/jclp.22097>.
- Krzywinka, T., & Brown, D. (2015). *Online games and genre* (pp. 1–4). The International Encyclopedia of Digital Communication and Society. <http://dx.doi.org/10.1002/9781118767771.wbiedcs043>.
- Kuss, D. J. (2013). Internet gaming addiction: current perspectives. *Psychology Research and Behavior Management*, 14(6), 125–137. <http://dx.doi.org/10.2147/PRBM.S39476>.
- Kuss, D. J., Griffith, M. D., Karila, L., & Billieux, J. (2014). Internet addiction: a systematic review of epidemiological research for the last decade. *Current Pharmaceutical Design*, 20(25), 4026–4052. <http://dx.doi.org/10.2174/13816128113199990617>.
- Landers, R. N., & Lounsbury, J. W. (2006). An investigation of Big Five and narrow personality traits in relation to Internet usage. *Computers in Human Behavior*, 20(6), 283–293. <http://dx.doi.org/10.1016/j.chb.2004.06.001>.
- Lang, F. R., John, D., Lüdtke, O., Schupp, J., & Wagner, G. G. (2011). Short assessment of the Big Five: robust across survey methods except telephone interviewing. *Behavioral Research Methods*, 43, 548–567. <http://dx.doi.org/10.3758/s13428-011-0066-z>.
- Lee, M. S., Ko, Y. H., Song, H. S., Kwon, K. H., Lee, H. S., Nam, M., et al. (2007). Characteristics of Internet use in relation to game genre in Korean adolescents. *CyberPsychology & Behavior*, 10(2), 278–285. <http://dx.doi.org/10.1089/cpb.2006.9958>.
- Lehenbauer-Baum, M., Klaps, A., Kovacovsky, Z., Witzmann, K., Zahlbruckner, R., & Stelina, B. U. (2015). Addiction and engagement: an exploratory study toward classification criteria for internet gaming disorder. *Cyberpsychology, Behavior, and Social Networking*, 18(6), 343–349. <http://dx.doi.org/10.1089/cyber.2015.0063>.
- Lin, J. H. (2013). Do video games exert stronger effects on aggression than film? The role of media interactivity and identification on the association of violent content and aggressive outcomes. *Computers in Human Behavior*, 3, 535–543. <http://dx.doi.org/10.1016/j.chb.2012.11.001>.
- Mark, G., & Ganzach, Y. (2014). Personality and Internet usage: a large-scale representative study of young adults. *Computers in Human Behavior*, 36, 274–281. <http://dx.doi.org/10.1016/j.chb.2014.03.060>.
- Mehroof, M., & Griffith, M. D. (2010). Online gaming addiction: the role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *Cyberpsychology, Behavior and Social Networking*, 13(3), 313–316. <http://dx.doi.org/10.1089/cyber.2010.0076>.

- [dx.doi.org/10.1089/cpb.2009.0229](http://dx.doi.org/10.1089/cpb.2009.0229).
- Müller, K. W., Beutel, M. E., Egloff, B., & Wölfling, K. (2014). Investigating risk factors for Internet gaming disorder: a comparison of patients with addictive gaming, pathological gamblers and healthy controls regarding the Big Five personality traits. *European Addiction Research*, 20, 129–136. <http://dx.doi.org/10.1159/000355832>.
- Müller, K. W., Glaesmer, H., Brähler, E., Wölfling, K., & Beutel, M. E. (2013). Internet addiction in the general population. *Behaviour and Information Technology*, 33, 757–766. <http://dx.doi.org/10.1080/0144929X.2013.81077>.
- Müller, K. W., Janikian, M., Dreier, M., Wölfling, K., Beutel, M. E., Tzavara, C., et al. (2015). Regular gaming behavior and Internet gaming disorder in European adolescents: results from a cross-national representative survey of prevalence, predictors, and psychopathological correlates. *European Child & Adolescent Psychiatry*, 24(5), 565–574. <http://dx.doi.org/10.1007/s00787-014-0611-2>.
- Nielson Company. (2014). *Multi-platform gaming: for the win!* Accessed 19.07.15 <http://www.nielsen.com/us/en/insights/news/2014/multi-platform-gaming-for-the-win.html>.
- Öztürk, C., Bektas, M., Ayar, D., Özügüven, B., Öztornaci, B., & Yağci, D. (2015). Association of personality traits and risk of Internet addiction in adolescents. *Asian Nursing Research*, 9(2), 120–124. <http://dx.doi.org/10.1016/j.anr.2015.01.001>.
- Qin, H., Rau, P. L. P., & Salvendy, G. (2009). Effects of different scenarios of game difficulty on player immersion. *Interacting with Computers*, 22(3), 230–239. <http://dx.doi.org/10.1016/j.intcom.2009.12.004>.
- Rieger, D., Wulf, T., Kneer, J., Frischlich, L., & Bente, G. (2014). The winner takes it all: the effect of in-game success and need satisfaction on mood repair and enjoyment. *Computers in Human Behavior*, 39, 281–286. <http://dx.doi.org/10.1016/j.chb.2014.07.037>.
- Schupp, J., & Gerlitz, J. Y. (2008). BFI-S: Big Five Inventory-SOEP. In A. Glöckner-Rist (Ed.), *Zusammenstellung sozialwissenschaftlicher Items und Skalen [Compilation of social-scientific items and scales]*. Bonn: GESIS.
- Senormanci, O., Saracli, O., Atasoy, N., Senormanci, G., Koktürk, F., & Atik, L. (2014). Relationship of Internet addiction with cognitive style, personality, and depression in university students. *Comprehensive Psychiatry*, 55(6), 1385–1390. <http://dx.doi.org/10.1016/j.comppsy.2014.04.025>.
- Simon, A. (1987). Emotional stability pertaining to the game of dungeons & dragons. *Psychology in the Schools*, 24, 329–332. <http://dx.doi.org/10.1002/1520-6807>.
- Tel, A., & Sargent, S. L. (2004). Individual differences in Internet usage motives. *Computers in Human Behavior*, 6, 711–726. <http://dx.doi.org/10.1016/j.chb.2004.09.002>.
- Teng, C. T. (2008). Personality differences between online game players and non-players in a student sample. *CyberPsychology & Behavior*, 11, 232–234. <http://dx.doi.org/10.1089/cpb.2007.0064>.
- Tuten, T., & Bosniak, M. (2001). Understanding differences in web usage: the role of need for cognition and the five factor model of personality. *Social Behavior and Personality*, 29(4), 391–398. <http://dx.doi.org/10.2224/sbp.2001.29.4.391>.
- Walther, B., Morgenstern, M., & Hanewinkel, R. (2012). Co-occurrence of addictive behaviors: personality factors related to substance use, gambling and computer gaming. *European Addiction Research*, 18(4), 167–174. <http://dx.doi.org/10.1159/000335662>.
- Wang, C. W., Ho, R. T., Chan, C. L., & Tse, S. (2015). Exploring personality characteristics of Chinese adolescents with internet-related addictive behaviors: trait differences for gaming addiction and social network addiction. *Addictive Behaviors*, 42, 32–35. <http://dx.doi.org/10.1016/j.addbeh.2014.10.039>.
- Weinstein, A., & Lejoyeux, M. (2015). New developments on the neurobiological and pharmacogenetic mechanisms underlying Internet and videogame addiction. *American Journal on Addictions*, 24(2), 117–125. <http://dx.doi.org/10.1111/ajad.12110>.
- Williams, D., Consalvo, M., Caplan, S., & Yee, N. (2009). Looking for gender: gender roles and behaviors among online gamers. *Journal of Communication*, 59, 700–725. <http://dx.doi.org/10.1111/j.1460-2466.2009.01453.x>.
- Witt, E. A., Massman, A. J., & Jackson, L. A. (2010). Trends in youth's videogame playing, overall computer use, and communication technology use: the impact of self-esteem and personality factors. *Computers in Human Behavior*, 27, 763–769. <http://dx.doi.org/10.1016/j.chb.2010.10.025>.
- Wölfling, K., Beutel, M. E., & Müller, K. W. (2012). Construction of a standardized clinical interview to assess Internet addiction: first findings regarding the usefulness of AICA-S. *Addiction Research & Therapy*, 6, 1–7. <http://dx.doi.org/10.4172/2155-6105.S6-003>.
- Wölfling, K., & Müller, K. W. (2009). Internet gaming disorder. In D. Batthyány, & A. Pritz (Eds.), *Rausch ohne Drogen. Substanzungebundene Süchte [Highs without drugs. Substance-free addictions]*. Wien: Springer.
- Worth, N. C., & Book, A. S. (2014). Personality and behavior in a massively multi-player online role-playing game. *Computers in Human Behavior*, 38, 322–330. <http://dx.doi.org/10.1016/j.chb.2014.06.009>.
- Yang, C. K., Choe, B. M., Baity, M., Lee, J. H., & Cho, J. S. (2005). SCL-90-R and 16PF profiles of senior high school students with excessive Internet use. *Canadian Journal of Psychiatry*, 50, 404–414.
- Yan, W., Li, Y., & Sui, N. (2014). The relationship between recent stressful life events, personality traits, perceived family functioning and internet addiction among college students. *Stress and Health*, 30(1), 3–11. <http://dx.doi.org/10.1002/smi.2490>.
- Yee, N. (1999). *An exploration of the interplay between player and character selves in role-playing games* Accessed 28.07.15 <http://www.nickyyee.com/rpg/paper.doc>.
- Yeh, C. S. H. (2015). Exploring the effects of videogame play on creativity performance and emotional responses. *Computers in Human Behavior*, 53, 396–407. <http://dx.doi.org/10.1016/j.chb.2015.07.024>.