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Avatar identification and problematic gaming: The role of self-concept clarity

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ABSTRACT

Some video-gaming activities feature customizable avatars that enable users to fulfill self-identity needs. Research evidence (e.g., fMRI and survey studies) has suggested that poorer self-concept and stronger avatar identification are associated with problematic gaming. Player-avatar relationships have thus been proposed to require attention in gaming disorder assessment and interventions. To examine the interplay of player-avatar interactions in problematic gaming, this study investigated whether avatar identification differed according to avatar characteristics and game types, and whether the association between avatar identification and problem gaming was mediated by self-concept clarity. A total of 993 adult respondents completed an online survey that assessed problematic gaming, avatar identification, and self-concept clarity. The results indicated that avatar identification scores were generally unrelated to avatar characteristics (e.g., human resemblance, degree of customizability, and in-game perspective). Avatar identification was significantly positively related to problematic gaming and significantly negatively related to self-concept clarity. There was a significant indirect relationship between avatar identification on problem gaming mediated through self-concept clarity. These findings suggest that poorer self-concept clarity may be one mechanism by which avatar identification affects problem gaming. Future research with clinical samples may help to gain a better understanding of avatar-related processes and psychological vulnerabilities related to problematic gaming.

1. Introduction

Online gaming activities have become increasingly sophisticated in terms of the interactive experiences offered to players (Billieux et al., 2015; King, Herd, & Delfabbro, 2018; King, Koster, & Billieux, 2019; Lemenager, Neissner, Sabo, Mann & Kiefer, 2020). An important element of gaming that enhances this interactivity is the playable avatar projected into an immersive digital environment (Bailey, West, & Kuffel, 2013; Bessière, Seay, & Kiesler, 2007; Burleigh, Stavropoulos, Liew, Adams, & Griffiths, 2018; King & Delfabbro, 2014; Trepte & Reinecke, 2010). Avatars are the representations of the player or the self that are projected to other players (Bailey et al., 2013; Bessière et al., 2007; Burleigh et al., 2018; Trepke & Reinecke, 2010). Such playable avatars can be realistic or stylized and come with customization options that allow players to alter their attributes, abilities, and their appearance. Certain games that emphasize avatar creation are generally referred to as ‘role-playing’ games, such as massively multiplayer online role-playing games (MMORPGs) (Smahel, Blinka, & Ledaby, 2008), but avatar elements can be found in many types of games. Avatar features have attracted increasing attention to explain the popularity of gaming as well as the development and maintenance of problematic gaming (Wan & Chiou, 2006).

Problematic gaming, in its most serious form, has been recognized as gaming disorder (GD) in the International Classification of Diseases-11 (ICD-11; World Health Organization, 2019) and as a condition for further study in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). The prevalence of gaming disorder is estimated to fall between 1 and 3% (Stevens et al., 2020). The conceptualization of gaming disorder shares features and symptoms (e.g., loss of control and continuation despite awareness of harm) with other addictive behaviors (e.g., gambling disorder), substance use disorders (SUDs), impulse control disorders (e.g., compulsive buying disorder (CBD)) and obsessive–compulsive disorder (OCD) (King & Delfabbro, 2019). This condition is characterized by persistent involvement in gaming activities, impaired control over gaming, and continued use despite harm to multiple areas of functioning, including...
Yee and Bailenson, 2007). Pinches, Morcos, (1987) self-discrepancy theory, van Looy argues that wishful identification provides useful points of reference to distinguish these important aspects of avatar identification. His model proposes three basic dimensions, including similarity identification, wishful identification, and embodied presence. Of particular relevance to understanding gamers’ personal vulnerabilities is the concept of wishful identification, which refers to a process whereby a person desires to emulate or live vicariously through the avatar. Drawing on Higgins (1987) self-discrepancy theory, van Looy argues that wishful identification relates to a desire to compensate for perceived discrepancies between their real-world and virtual selves. According to van Looy (2015), avatar identification involves a process of temporarily experiencing an altered sense of self due to the mental association with an avatar, which can lead to a tendency to use the avatar to escape from reality and one’s problems. This tendency, in turn, may lead to gaming that generates negative consequences (Kwon, Chung, & Lee, 2011).

Extending this, Sporić and Glavak-Tkalcić (2018) proposed that a poorly defined sense of self was a risk factor for overuse of avatar-based games. They argued that players with poorer self-concept engaged in gaming to become immersed into different roles offered within a game, or to create an avatar as a representation of one’s ideal self to develop a clearer concept of themselves. These avatar-related experiences could provide a “temporary detachment from reality and their actual self, and therefore may lead to excessive and problematic video game playing” (p.8). Sporić and Glavak-Tkalcić surveyed 509 adult gamers and reported that poorer self-concept clarity was related to problematic gaming. The results of their mediation model showed that self-concept clarity was both directly and indirectly (via escape motive) associated with problematic online gaming. These findings were consistent with other studies that reported that some players created an avatar with idealized attributes to compensate for perceived inadequacies (Bessière et al., 2007; Lemenager et al., 2014, 2020), and studies reporting significant positive correlations between avatar identification and excessive gaming (Lemenager et al. 2013; Mancini et al., 2019; Smahel et al., 2008; You et al., 2017; Ting & Pau, 2020).

Another research gap has been the study of different avatar characteristics and how these may relate to psychological processes, including avatar identification. The communications literature suggests that users tend to prefer avatars that are more similar, either visually or psychologically, to the user, and tend to find such avatars more persuasive (Ducheneaut, Wen, Yee, & Wadley, 2009; Nowak & Fox, 2018). Research by Yee and colleagues (e.g., Yee & Bailenson, 2007; Yee, Bailenson, & Ducheneaut, 2009; Yee & Bailenson, 2006) in relation to the ‘Proteus Effect’ suggests that digital self-representation can affect player’s gaming behaviors. Yee et al.’s studies reported that characteristics of the avatar – including, for example, its physical attributes (height, attractiveness) – can influence the user’s in-game choices and behaviors (e.g., a taller avatar increases the user’s aggressiveness; Yee et al., 2009). Other researchers have reported that certain Proteus Effect ‘profiles’, such as users who reported that their emotions and behaviors were more strongly affected by their avatar, were more at risk of problem gaming (Stavropoulos et al., 2020c).

There has been limited work on how aspects of the avatar (e.g., avatar race) may affect avatar identification and problem gaming (Christou & Michael, 2014; Lim & Reeves, 2009; Morcos, Stavropoulos, Rennie, Clark, & Pontes, 2019; Stavropoulos, Pinches, et al., 2020). Research has focused on massively multiplayer online role-playing game (MMORPG) players (Collins, Freeman, & Chamorro-Premuzic, 2012; Hyun et al., 2015), despite the prominence of avatars across many types of games, including first-person shooter (FPS) and multiplayer online battle arenas (MOBAs). Most MMORPGs are long-played games (usually with one avatar), featuring options for character development, customization, emphasis on group play and social functionality, and have been identified as a ‘high-risk’ game for problematic use (Eichenbaum et al., 2015; Stavropoulos et al., 2020). Mancini et al. (2019) reported that MMORPG players’ intention to play was higher among those who customized and identified with an idealized avatar. While studies have examined gaming motivations (Hussain, Williams, & Griffiths, 2015; King, Herd, et al., 2018; Zhong & Yao, 2013), little research has examined avatar features in relation to avatar identification and problem gaming (Stavropoulos et al., 2020c).

1.1. The present study

The present study was guided by van Looy’s (2015) multidimensional model of avatar identification, which proposes that players can develop an attachment to their avatar which affects their in-game choices, emotions, and behaviors, which may increase their desire to play to escape from problems and reality. As outlined by the concept of wishful identification in van Looy’s (2015) model, and based on recent research (Sporić & Glavak-Tkalcić, 2018), we predicted that poorer self-concept clarity may be a mechanism by which avatar identification is related to problematic gaming. We also sought to examine potential differences in avatar identification according to the avatar’s characteristics. Specifically, we explored whether customization of avatar characteristics to match preferences for attributes such as their gender, race,
attitude, background, and current situation would be positively associated with avatar identification.

The following hypotheses were proposed: (1) humanoid, personalized, and customizable avatars would be associated with stronger avatar identification than non-human, non-customizable ‘default’ avatars; (2) stronger avatar identification and poorer self-concept clarity would be significantly related to problem gaming; (3) wishful identification would have a stronger relationship to problem gaming than similarity identification; (4) the expected positive association between avatar identification and problem gaming would be mediated by poorer self-concept clarity.

2. Method

2.1. Participants

A total of 993 adult participants (73% male; n = 725) with a mean age of 26.4 years (SD = 8.1), completed an online survey advertised on online gaming-related forums (Reddit, GameSpot, Games Planet, and PC Gamer Forum). Most respondents reported being Caucasian (75.4%), single (59.5%), engaged in employment (61.3%) and/or further study (45.3%). Based on GD checklist scores, there were 162 (16.3%) problem gamers. The sample comprised of players of MMORPG (n = 419, 42.2%), single-player RPG (n = 253, 25.5%), FPS (n = 125, 12.6%), MOBA (n = 80, 8.1%), and other games (n = 116, 11.7%). Missing/incomplete data (n = 646) and ineligible participants were excluded (e.g., aged under 18 years old (n = 41)).

2.2. Measures

2.2.1. Demographic and gaming-related information

Each participant provided socio-demographic information (e.g., gender, age, other details). Participants reported the typical number of hours spent gaming each day in the last 3 months. Participants reported their preferred gaming genre, including MMORPG, MOBA, FPS, RPG (single-player), or Other. Questions about avatar characteristics referred to the main game currently played. Participants reported the number of avatars they controlled (1 avatar; 2 or more avatars; no identifiable avatar), avatar type (human; non-human creature; non-human non-creature), avatar perspective (first-person only; third-person only; both first-person and third-person perspective), pre-game avatar customization (default avatar; choice from multiple defaults; fully customizable avatar), and in-game avatar customization (none; some vs. many options).

2.2.2. Problematic gaming

Petry et al.’s (2014) checklist is a 9-item self-report measure to assess the DSM-5 gaming disorder. Response options are dichotomous (Yes/No). A score of 5 + indicated problematic status. The checklist has been used in clinical and neurobiological studies of GD, and shown solid psychometric qualities (King et al., 2020a, 2020b). Internal consistency of the scale in this study was 0.68, which was relatively low but consistent with other studies (Evans et al., 2018; Jeromin, Rief, & Barke, 2016; King, Adair, Saunders, & Delfabbro, 2018), and which may be attributed to the variable sensitivity of the 9 DSM-5 criteria (Ko et al., 2014).

2.2.3. Avatar identification

The Player Identification Scale (Van Looy, Courtois, De Vocht, & De Marec, 2012) is a 28-item measure that includes 17 items that measure avatar identification (e.g., “my character is an extension of myself”). There are three subscales for avatar identification: similarity identification (e.g., “my character resembles me”), embodied presence (e.g., “I feel like I am inside my character when playing”), and wishful identification (e.g., “my character is a better me”). Each statement is rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Avatar identification scores range from 17 to 85, with higher scores indicating stronger identification. Game and group identification variables were not included in this study. The measure has demonstrated adequate to excellent psychometric properties (van Looy et al., 2012). Cronbach’s alpha for the total Avatar identification scale was 0.93, and for the subscales: similarity identification (0.90), embodied presence (0.92), and wishful identification (0.90).

2.2.4. Self-concept clarity

Self-concept clarity refers to the extent to which an individual holds self-beliefs or schema that are stable, clearly, and confidently defined (Osborne & Taylor, 2010). The Self-Concept Clarity Scale (Campbell et al., 1996), presents 12 statements (e.g., “in general, I have a clear sense of who I am and what I am”) and asks participants to indicate their level of agreement. Responses range from 1 (strongly disagree) to 5 (strongly agree). Higher scores (i.e., sum of all items) indicate higher self-concept clarity. Campbell et al. (1996) reported that the scale had excellent reliability and validity. This sample yielded a Cronbach’s alpha of 0.89.

2.3. Procedure

Ethics approval was granted by the School of Psychology Human Research Ethics Subcommittee (approval number: 20/18). Participants who were aged 18 or older and played games weekly were eligible to participate. Upon completion of the survey, participants entered a prize draw for a $50 AUD voucher.

2.4. Statistical analysis

Analyses were conducted using IBM SPSS Version 26 software. Pearson product-moment correlations were used to assess bivariate associations. One-way ANOVAs and Bonferroni tests compared avatar identification across gender, game genres, and avatar-related characteristics and features. An exploratory multiple regression examined the predictive value of each variable on GD scores. Version 3.5 of the PROCESS macro for SPSS (Hayes, 2013) was used to conduct mediation analyses.

3. Results

3.1. Descriptive statistics and mean comparisons

Table 1 presents a summary of group differences in avatar identification according to participants’ gender and avatar characteristics. Avatar identification was significantly higher among: (1) female gamers as compared to male gamers; (2) participants who used fully customizable avatars as compared to a default avatar or one of multiple default avatar options; (3) participants who had many in-game avatar customization options as compared to some or no customization options; (4) participants who used one main avatar as compared to multiple or no discernible avatars; and (5) participants whose avatar had both first- and third-person perspective compared to only one of either perspective. However, avatar identification did not differ according to whether the avatar was human, a non-human creature, or non-human non-creature. All significant comparisons yielded only small effect sizes. Thus, there was limited support for the hypothesis that humanoid, personalized, and customizable avatars would be associated with stronger avatar identification than non-human, non-customizable avatars.

3.2. Correlations

Table 2 summarizes the Pearson product-moment correlations between the main variables. In support of Hypothesis 2, avatar identification was significantly positively related to problem gaming (r = 0.26) and significantly negatively related to self-concept clarity (r = -0.39).
Self-concept clarity was significantly negatively correlated with problem gaming. Avatar identification was not related to gaming time, suggesting that the player-avatar bond may not change greatly as a function of time spent playing.

3.3. Multiple regression

Table 3 presents a simultaneous multiple regression examining the three subscales of avatar identification (similarity identification, embodied presence, wishful identification), self-concept clarity, and gaming time as predictors of GD. The model explained 20.6% of the variance in GD. Of the three avatar identification subscales, wishful identification ($\beta = 0.19$) was the only significant predictor of problem gaming. Therefore, Hypothesis 3 was supported.

3.4. Mediation analysis

Fig. 1 presents a summary of the mediation analysis, including the regression weights for paths a, b, c, and $c'$. The model assessed whether self-concept clarity mediated the relationship between avatar identification and problem gaming. Time spent gaming was included as a covariate in the model ($b = 0.03$, $p < 0.05$). The model explained 11% of the variance in IGD scores. The 95th percentile confidence intervals (CI) for the indirect effects were estimated with bias-corrected bootstrap analyses (5000 samples). There was a significant indirect effect of avatar identification on problem gaming through self-concept clarity, $b = 0.1$, 95% CI [0.008, 0.016]. Therefore, Hypothesis 3 was supported.

An additional mediation analysis, which included wishful identification instead of avatar identification, was performed by request. Fig. 2 presents a summary of the results, which were largely comparable to those presented in Fig. 1. The model explained 12% of the variance in IGD scores.

4. Discussion

This study examined avatar identification and self-concept clarity in relation to problematic gaming, as well as differences in avatar identification according to avatar characteristics. Avatar identification was modestly associated with problematic gaming in bivariate and multivariate analyses. This finding was consistent with past studies (Mancini et al., 2019; Smahe et al., 2008; Sioni et al., 2017; You et al., 2017). Further, the wishful identification subscale of avatar identification was the only significant avatar-related predictor of problem gaming. Wishful identification refers to the process whereby a person desires to emulate or live vicariously through the avatar (van Looy, 2015). For example, wishful identification items refer to experiencing the avatar as a “better me”, and as having “characteristics that I would like to have”. Thus, while the avatar identification construct was a significant predictor of problem gaming, it appears that the most important aspect of avatar identification in relation to problematic gaming involves the avatar providing the means of compensating for the player’s perceived self-deficiencies in the real world. This result was consistent with the two mediation analyses, which found a significant indirect effect of avatar identification (Fig. 1) and wishful identification (Fig. 2) on problem gaming through self-concept clarity. Poorer self-concept clarity may be a psychological mechanism or vulnerability by which avatar identification, and particularly wishful identification, affects problem gaming. It is important to note, however, that these two models reported only modest coefficients and explained a total of 11% and 12% of the variance in IGD scores, respectively.

This study found only limited support for the notion that personalized and customizable avatars are more strongly associated with stronger avatar identification than non-customizable avatars. Differences in avatar identification scores across avatar types were statistically significant (due to large sample size) but constituted small effects only. Avatar identification was also slightly higher among those who controlled a single avatar (versus multiple avatars) and those who viewed their avatar from both first and third-person perspectives. MOBA users reported slightly lower avatar identification than MMORPG and RPG users. However, avatar identification did not differ greatly according to whether the participant’s avatar was a human, a non-human creature, or non-human non-creature. Avatar identification was not associated with time spent playing the game, suggesting that stronger avatar identification may not be the product of mere exposure (i.e., repeatedly viewing the avatar) (Zajonc, 1968) or the target of cognitive dissonance (i.e., a need to rationalize one’s investment in the gaming

| Table 1 | Avatar identification scores according to gender and avatar characteristics. |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| Andrews et al.  | Gender          | n               | M (SD)          | F (2,992)       | Partial η²      | Post-hoc p    |
|                 | 1. Male         | 725             | 40.77           | (15.39)         | 0.03            | 2 > 1        |
|                 | 2. Female       | 243             | 46.61           | (13.76)         |                |              |
|                 | 3. Other        | 25              | 44.16           | (14.62)         |                |              |
| Avatar type     | 1. Human        | 897             | 42.45           | (15.15)         | 1.06            |              |
|                 | 2. Non-human    | 82              | 41.48           | (15.49)         |                |              |
|                 | 3. Non-human    | 14              | 36.86           | (15.19)         |                |              |
| Number of avatars controlled | 1. 1 main avatar | 435             | 44.36           | (14.88)         | 7.81            | 1 > 2-3      |
|                 | 2. 2+ avatars   | 511             | 40.87           | (15.19)         |                |              |
|                 | 3. No main avatar | 47            | 38.53           | (15.68)         |                |              |
| Avatar perspective | 1. First-person only | 128           | 40.07           | (16.06)         | 8.57            | 2 > 1        |
|                 | 2. Third-person only | 675           | 41.60           | (15.09)         |                |              |
|                 | 3. Both perspectives | 190           | 46.22           | (14.30)         |                |              |
| Initial avatar customizability | 1. Single default | 212            | 39.54           | (15.55)         | 8.11            | 3 > 1-2      |
|                 | 2. Multiple defaults | 196           | 40.52           | (15.86)         |                |              |
|                 | 3. Fully customizable | 585           | 43.87           | (14.63)         |                |              |
| In-game avatar customization | 1. No option | 133             | 38.99           | (17.15)         | 11.24           | 3 > 1-2      |
|                 | 2. Some options | 383             | 40.51           | (14.50)         |                |              |
|                 | 3. Many options | 477             | 44.63           | (14.80)         |                |              |
| Game genre      | 1. MMO          | 419             | 43.60           | (15.22)         | 3.95            | 3 > 1-2      |
|                 | 2. RPG          | 253             | 43.38           | (14.67)         |                |              |
|                 | 3. MOBA         | 80              | 37.64           | (16.37)         |                |              |
|                 | 4. FPS          | 125             | 40.34           | (15.08)         |                |              |
|                 | 5. Other        | 116             | 40.48           | (14.64)         |                |              |

*p < .01. *Higher scores indicated stronger avatar identification (Range: 17–85). Total score on the main subscale. *Bonferroni post-hoc analyses, except for gender and avatar customizability options when there were unequal variances assumed (Games-Howell). MMO: Massively Multiplayer Online; RPG: Role-Playing Game; MOBA: Multiplayer Online Battle Arena; FPS: First Person Shooter.
that focuses on achieving emotional detachment from the avatar, where gaming interventions that refer to the need to address avatar-related identification. Avatar features may not greatly affect or inhibit potential avatar identification. As they can transfer some of them into their own ‘avatar life’ (p.9). The extent to which guided exploration of the avatar may aid therapy objectives warrants further examination. As noted in our review (Green et al., 2020), treatment engagement is often low among individuals with GD, particularly among adolescents (Humphreys, 2019), and therefore clinicians should apply evidence-based guidelines to optimize what can be delivered within a typically limited period of engagement. Brief cognitive-behavioral therapy (see Stevens et al., 2019; Wölfing, Jo, Bengesser, Beutel, & Müller, 2012; Wölfing et al., 2019) designed to establish new non-gaming routines, including identifying personal barriers and employing harm minimization strategies, may be the most feasible and effective option.

The present study was not without limitations. First, although the study recruited a very large and diverse sample of regular gamers, the recruitment approach was purposive (i.e., to select more individuals with relevant gaming and avatar-related experiences) and therefore these findings may not generalize to the wider gaming population nor to individuals with more severe gaming problems, such as those described in case reports (Allison et al., 2006). Another limitation is the potential transience of gaming for many participants, which may have affected the specificity of measurement. It is possible, for example, that some individuals may play numerous games and sometimes take extended ‘breaks’ from their main game. The study’s questions provided only a ‘snapshot’ and thus did not systematically gather data on the player’s history with specific games and avatars. Acquiring such information may be a worthwhile follow-up project, which could also examine the predictive value of avatar identification to habit formation or predicting future gaming behaviors.

This study employed measures with abstract concepts requiring insight and English language competency that may preclude the comprehension of some populations (e.g., individuals with low verbal comprehension). This study also did not examine identity issues (e.g., gender dysphoria) or personality traits (e.g., conscientiousness, perfectionism) that may influence avatar and in-game goal motivations. This work should be considered preliminary and in need of replication, particularly in clinical samples, and using alternative methods of data collection, such as interviews, to confirm experiences. Finally, this study was conducted during the COVID-19 pandemic and, while most variables would be relatively stable constructs, it is possible that participants may have responded differently due to pandemic-related stress and uncertainties (King, Delfabbro, Billieux, & Potenza, 2020).

4.1. Conclusions

This study found a significant relationship between avatar identification and problem gaming that was mediated by self-concept clarity. Gamers with poor self-concept clarity may be more vulnerable to relying on avatar features in games to meet their identity-related needs (i.e., to compensate for lack of real-world identity), which may, in turn, increase the risk of problem gaming. Players who have a stronger need to be like activity as being worthwhile (Festinger, 1957). Similarly, wishful identification was only weakly positively correlated with gaming time. These results suggest that player-avatar bonds, including positive perceptions or desires to be like the avatar, may occur or form relatively quickly and endure over time, and that different implementations of avatar features may not greatly affect or inhibit potential avatar identification.

The present study’s findings add to continuing discussion of problem gaming interventions that refer to the need to address avatar-related phenomena. For example, Lemenager et al. (2016) describes a therapy that focuses on achieving emotional detachment from the avatar, where “addicted gamers discuss in a group setting all positive characteristics of their avatar and how they can transfer some of them into their own personality” (p.496). Similarly, Burleigh et al. (2018) argued that “prevention and treatment initiatives should target the gamer-avatar relationship...to guide cognitive and self-reflective interventions” (p.116). Stavropoulos et al. (2020) refers to inviting gamers “to talk about their virtual personas, and their game-related achievements and investigating ways that such avatar aspects of their ‘in-game’ avatar life can be transferred to real life” (p.9).

Fig. 2. The direct and indirect effects of self-concept clarity on the relationship between wishful identification and problem gaming, with gaming time as a covariate.
their avatar, or who view their avatar as the ideal version of themselves, appear to be slightly more at risk of problematic gaming. Avatar identification was not generally related to features of the avatar itself, including whether it was humanoid or customizable. These data will hopefully contribute to continuing efforts to identify potential mechanisms of problematic gaming. At a time when the validity of GD is criticized for ‘pathologizing’ gaming (Bean et al., 2017), the notion that avatar identification underlies and maintains GD may attract similar scrutiny. In our view, despite these and other promising findings, it may be premature for avatar identification to be considered a symptom of gaming disorder. However, the concept may nevertheless be a useful psychological process (see Brand et al., 2020) for understanding the importance of in-game rewards that some players’ desire and seek out excessively. This study emphasizes the important role of player vulnerabilities in understanding the formation of problem gaming. Future research may gain a better understanding of avatar-related processes, including how avatar-stimuli preferences develop and operate in connection to established addictive processes such as approach bias and inhibitory control (Brand et al., 2019).

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Contributors

RG and DLK designed the study and cowrote the first draft of the manuscript. RG recruited participants and analyzed the data. All authors contributed to and approved the final manuscript.

CRediT authorship contribution statement

Raquel Green: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing. Paul H. Delfabbro: Formal analysis, Writing - review & editing. Daniel L. King: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Allison, S. E., Von Wahlde, L., Shockley, T., & Gabbard, G. O. (2006). The development of the self in the era of the internet and role-playing fantasy games. American Journal of Psychiatry, 163, 381–385.
Bailey, K., West, R., & Kuffel, J. (2013). What would my avatar do? Gaming, pathology, and risky decision making. Frontiers in Psychology, 4, 609.
Bean, A. M., Nielsen, R. K., van Roon, A. J., & Ferguson, C. J. (2017). Video game addiction: The push to pathologize video games. Professional Psychology: Research and Practice, 48(5), 378.
Bessière, K., Seay, A. F., & Kiessler, S. (2007). The ideal elf: Identity exploration in World of Warcraft. Cyberpsychology & Behavior, 10, 530–535.
Billieux, J., Thoreen, G., Khazaal, Y., Zullino, D., Achab, S., & Van der Linden, M. (2015). Problematic involvement in online games: A cluster analytic approach. Computers in Human Behavior, 43, 242–250.
Brand, M., Rumpf, H.-J., King, D. L., Potenza, M. N., & Wegmann, F. (2020). Clarifying Bessi administration, Funding acquisition. Writing - original draft, Writing - review & editing. Paul H. Delfabbro: Formal analysis, Writing - review & editing. Daniel L. King: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Supervision, Project administration, Funding acquisition.

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Burleigh, T. L., Stavropoulos, V., Liew, L. W., Adams, B. L., & Griffiths, M. D. (2018). Depression, internet gaming disorder, and the moderating effect of the gamer-avatar relationship: An exploratory longitudinal study. International Journal of Mental Health and Addiction, 16(1), 102–124.
Campbell, J. D., Trappell, P. D., Heine, S. J., Katz, I. M., Lalavalle, L. F., & Lehman, D. R. (1996). Self-concept clarity: Measurement, personality correlates, and cultural boundaries. Journal of Personality and Social Psychology, 71(5), 1139–1152.
Christou, C., & Michael, D. (2014). September. Aliens versus humans: Do avatars make a difference in how we play the game?. In 2014 4th international conference on games and virtual worlds for serious applications (VS-GAMES) (pp. 1–7).
Choi, E. J., Taylor, M. J., Hong, S. B., Kim, C. J., Kim, M. W., McIntyre, R. S., & Yi, S. H. (2018). Gaming-addicted teens identify more with their cyber-self than their own self: Neural evidence. Psychiatry Research: Neuroimaging, 279, 51–59.
Collins, J. A., Greenman, T. (2013). Self-concept clarity and problematic and non-problematic massively multiplayer online role playing game use. Personality and Individual Differences, 52, 133–138.
Dieter, J., Hill, H., Sell, M., Reinhard, I., Vollstadt-Klein, S., Kiefer, F., … Lemenger, T. (2019). Avatar’s neurobiological traits in the self-concept of massively multiplayer online role-playing game (MMORPG) addicts. Behavioral Neuroscience, 129, 8–17.
Ducheneaut, N., Wen, M. H., Yee, N., & Wadley, G. (2009). Body and mind: A study of avatar personalization in three virtual worlds. In Proceedings of the SIGCHI conference on Human Factors in Computing Systems (pp. 1151–1160).
Eichenbaum, A., Kattner, F., Bradford, D., Gentile, D. A., & Green, C. S. (2015). Role-playing and real-time strategy games associated with greater probability of Internet gaming disorder. Cyberpsychology, Behavior, and Social Networking, 18, 485–485.
Evans, C., King, D. L., & Delfabbro, P. H. (2018). Effect of gaming abstinence on self-reported withdrawal in adolescent at-risk daily gamers: A randomized controlled study. Computers in Human Behavior, 88, 70–77.
Festinger, L. (1957). A theory of cognitive dissonance. Stanford, CA: Stanford University Press.
Green, R., Delfabbro, P. H., & King, D. L. (2020). Avatar- and self-related processes and gaming disorder: A systematic review. Addictive Behaviors, 108, Article 106461.
Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. New York: Guilford Press.
Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. Psychological Review, 94, 319–340.
Humphreys, G. (2019). Shaping the focus on gaming disorder. Bulletin of the World Health Organization, 97, 392–393.
Hussain, Z., Williams, G. A., & Griffiths, M. D. (2015). An exploratory study of the association between online gaming addiction and enjoyment motivations for playing massively multiplayer online role-playing games. Computers in Human Behavior, 50, 221–236.
Hyun, G. J., Han, D. H., Lee, Y. S., Kang, D. K., Yoo, S. K., Chung, U. S., & Rihm, P. F. (2015). Risk factors associated with online game addiction: A hierarchical model. Computers in Human Behavior, 48, 706–713.
Jeronim, F., Riet, W., & Barke, A. (2016). Validation of the Internet Gaming Disorder questionnaire in a sample of adult German-speaking Internet gamers. Cyberpsychology, Behavior, and Social Networking, 19, 453–459.
King, D. L., & Delfabbro, P. H. (2014). The cognitive psychology of Internet gaming disorder. Clinical Psychology Review, 34, 298–308.
King, D. L., & Delfabbro, P. H. (2019). Internet gaming disorder: Theory, assessment, treatment, and prevention. Cambridge, MA: Elsevier, Academic Press.
Klimmt, C., Hefner, D., & Vorderer, P. (2009). The video game experience as a theory of enjoyable alterations of players and risky decision making. Cyberpsychology, Behavior, and Social Networking, 12, 528–535.
Koster, E., & Delfabbro, P. H. (2010). Motivational components of tolerance in Internet gaming disorder. Computers in Human Behavior, 72, 133–141.
Koster, E., & Delfabbro, P. H. (2018). Internet gaming disorder should qualify as a mental disorder. Australian and New Zealand Journal of Psychiatry, 52, 615–617.
Kuon, J. H., Chung, C. S., & Lee, J. (2011). The effects of escape from self and interpersonal relationship on the pathological use of Internet games. Community Mental Health Journal, 47, 113–121.
Ku, C. H., Yen, Y. J., Chen, S. H., Wang, P. W., Chen, C. S., & Yen, C. F. (2014). Evaluation of the diagnostic criteria of Internet gaming disorder in the DSM-5 among young adults in Taiwan. Journal of Psychiatric Research, 53, 103–110.
Lemenger, T., Dieter, J., Hill, H., Koopmann, A., Reinhard, I., Sell, M., … Mann, K. (2014). Neurobiological correlates of physical self-concept and self-identification with avatars in addicted players of Massively Multiplayer Online Role-Playing Games (MMORPGs). Addictive Behaviors, 39, 1789–1797.
Lemenager, T., Dieter, J., Hill, H., Hoffmann, S., Reinhard, I., Beutel, M., ... Mann, K. (2016). Exploring the neural basis of avatar identification in pathological internet gamers and of self-reflection in pathological social network users. Journal of Behavioral Addictions, 5, 485–499.

Lemenager, T., Neissner, M., Sabo, T., Mann, K., & Kiefer, F. (2020). “Who am I?” and “How should I be”: A systematic review on self-concept and avatar identification in gaming disorder. Current Addiction Reports, 7, 166–193.

Liew, L. W., Stavropoulos, V., Adams, B. L., Burleigh, T. L., & Griffiths, M. D. (2018). Internet gaming disorder: The interplay between physical activity and user-avatar relationship. Behaviour & Information Technology, 37, 558–574.

Li, D., Liao, A., & Kho, A. (2011). Examining the influence of actual-ideal self-discrepancies, depression, and escapist, on pathological gaming among massively multiplayer online adolescent gamers. Cyberpsychology, Behavior, and Social Networking, 14, 535–539.

Li, D. D., Liao, A. K., & Khoo, A. (2013). Player-Avatar Identification in video gaming: Concept and measurement. Computers in Human Behavior, 29, 257–263.

Lim, S., & Reeves, B. (2009). Being in the game: Effects of avatar choice and point of view on psychophysiological responses during play. Media Psychology, 12, 348–370.

Mancini, T., Imperato, C., & Sibilla, F. (2019). Does avatar’s character and emotional bond expose to gaming addiction? Two studies on virtual self-discrepancy, avatar identification and gaming addiction in massively multiplayer online role-playing game players. Computers in Human Behavior, 92, 297–305.

Mancini, T., & Sibilla, F. (2017). Offline identity and avatar customization: Discrepancy profiles and avatar identification in a sample of MMORPG players. Computers in Human Behavior, 69, 275–283.

Morcos, M., Stavropoulos, V., Rennie, J. J., Clark, M., & Pontes, H. M. (2019). Internet gaming disorder: Compensating as a Draenei in World of Warcraft. International Journal of Mental Health and Addiction, 1–17.

Neustaedter, C., & Fedorovskaya, E. (2009, May). Presenting identity in a virtual world through avatar appearance. Proceedings of Graphics Interface. (Toronto, Canada).

Nowak, K. L., & Fox, J. (2018). Avatars and computer-mediated communication: A review of the definitions, uses, and effects of digital representations. Review of Communication Research, 6, 30–53.

Petty, N. M., Feilhein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H. J., Moise, T., ... Auremacome, M. (2014). An international consensus for assessing Internet Gaming Disorder using the new DSM-5 approach. Addiction, 109(9), 1399–1406.

Przybylski, A. K., Weinstein, N., Murrayana, K., Lynch, M. F., & Ryan, R. M. (2012). The ideal self at play: The appeal of video games that let you be all you can be. Psychological Science, 23, 69–76.

Saunders, J. B., Hao, W., Long, J., King, D. L., Mann, K., Faust-Bühler, M., ... Chan, E. (2017). Gaming disorder: its delineation as an important condition for diagnosis, management, and prevention. Journal of Behavioral Addictions, 6, 271–279.

Sioni, S. R., Burleson, M. H., & Bekerian, D. A. (2017). Internet gaming disorder: The interplay between physical activity and user-avatar relationship. Journal of Behavioral Addictions, 7, 1–13.

Smahel, D., Blinka, L., & Ledabyl, O. (2008a). Playing MMORPGs: Connections between addiction and identifying with a character. Cyberpsychology & Behavior, 11(6), 715–718.

Smahel, D., & Glavak-Tkalici, R. (2018). The relationship between online gaming motivation, self-concept clarity and tendency toward problematic gaming. Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 12(1), 1–13.

Stavropoulos, V., Pinches, J., Morcos, M., & Pontes, H. (2020). My avatar, my self. APS InPsych.

Stavropoulos, V., Gomez, R., Mueller, A., Yucel, M., & Griffiths, M. (2020). User-avatar bond profiles: How do they associate with disordered gaming? Addictive Behaviors, 103, Article e106245.