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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 fulfil 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, & Ledabyl, 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

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psychological and physical health, relationships, and work or study (King, Delfabbro, et al., 2018; Saunders et al., 2017; Walther, Morgenstern, & Hanewinkel, 2012). We employ the term 'problematic gaming' to encompass the DSM-5 and ICD-11 classifications, and to refer the broader spectrum of problematic gaming behaviors that fall below the clinical threshold.

Research suggests that players form an attachment to, or identify with aspects of, their avatar (Li, Liau, & Khoo, 2013; Liew, Stavropoulos, Adams, Burleigh, & Griffiths, 2018; Przybylski, Weinstein, Murayama, Lynch, & Ryan, 2012). This has been described in the literature as a "strong emotional bond" (Mancini et al., 2019), "powerful psychological component of the gaming world" (Stavropoulos, Pinches, Morcos, & Pontes, 2019), and important to an "individual's personal narrative, psychological wellbeing, and self-conception" (Wolfendale, 2007). Further, avatars have been proposed to fulfil important needs of the user (Wolfendale, 2007), allowing gamers to express "suppressed versions of their psyche" (Stavropoulos et al., 2020a). 'Avatar identification', a common term in this literature, refers to "the temporary alteration in self-perception of the player induced by the mental association with their game character" (van Looy et al., 2012; p.206). Avatar identification is described as a positive or desired experience, as avatars enable identity expression, creativity, and immersion in the virtual world (Klimmt, Hefner, & Vorderer, 2009; van Looy, 2015; Whang & Chang, 2004).

Avatar identification has also been linked to excessive gaming (Sioni, Burleson, & Bekerian, 2017; Mancini et al., 2017, 2019; Smahel, Blinka, & Ledabyl, 2008; You, Kim, & Lee, 2017) and depressive mood (Bessière et al., 2007; You et al., 2017; Burleigh et al., 2018). Neuroimaging (fMRI) studies have reported consistently that problematic gamers exhibit greater brain activity during avatar-reflection (Lemenager et al., 2014, 2016; Dieter et al., 2015; Choi et al., 2018) and less activity during self-reflection on actual self compared to controls (Klimmt et al., 2009; Choi et al., 2018). Burleigh et al. (2018) examined cross-sectional and longitudinal data and reported that gamer-avatar relationships were a significant individual risk factor for problematic gaming over time. Such evidence has been cited to support proposals to add avatar identification to the criteria for gaming disorder (e.g., in the DSM-5 or ICD-11) (Sioni et al. 2017) and as a target to address in treatment (Stavropoulos et al. 2020b). Despite these findings, avatar identification is not generally considered inherently problematic (i.e., it can often be an important part of the 'fun' and appeal of gaming; Neustaedter and Fedorovskaya, 2009; Yee and Bailenson, 2007).

Other researchers (e.g., Li, Liau, & Khoo, 2011; Stavropoulos, Pinches, Morcos, & Pontes, 2020) have proposed that avatar identification may more readily elicit problem gaming among more vulnerable individuals, particularly those with identity needs related to the avatar experience. Van Looy's (2015) multidimensional model of avatar 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, Šporčić and Glavak-Tkalić (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). Šporčić and Glavak-Tkalić 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; T'ng & 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 (Stavropolous 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, & Chamarro-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 (Stavropolous et al., 2020d).

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 (Šporčić & Glavak-Tkalić, 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 and embodied presence; and (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* = 4]).

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 customizability* (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 Marez, 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 (Usborne & 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 ($r = -0.39$).

Table 1
Avatar identification scores according to gender and avatar characteristics.

Avatar identification[a] Group	n	M (SD)	F (2,992)	Partial η^2	Post-hoc[b]
Gender					
1. Male	725	40.77 (15.39)	15.40*	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 creature	82	41.48 (15.49)			
3. Non-human non-creature	14	36.86 (15.19)			
Number of avatars controlled					
1. 1 main avatar	435	44.36 (14.88)	7.81*	0.02	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*	0.02	3 > 1–2
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*	0.02	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*	0.02	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*	0.02	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)			

*$p < .01$. [a]Higher scores indicated stronger avatar identification (Range: 17–85). Total score on the main subscale. [b]Bonferroni post-hoc analyses, except for gender and avatar customization 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.

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 ($b = 0.03$, $p < 05$). 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; Smahel 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 problem 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 2
Descriptive statistics and Pearson product-moment correlations between main study variables.

Variable	*M* (*SD*)	1	2	3	4	5	6
1. Problem gaming	2.68 (1.93)						
2. Weekly gaming time	25.85 (8.55)	0.19**					
3. Avatar identification (AI)	42.29 (15.18)	0.27**	0.02				
4. AI: Similarity identification	14.79 (6.27)	0.16**	-0.04	0.84**			
5. AI: Embodied presence	14.47 (6.55)	0.20**	0.001	0.85**	0.56**		
6. AI: Wishful identification	13.03 (5.56)	0.32**	0.09*	0.78**	0.49**	0.51**	
7. Self-concept clarity	38.90 (10.05)	−0.39**	−0.07	−0.27*	−0.12**	−0.23**	−0.33**

*$p < .05$; **$p < .01$.

Table 3
Multiple regression predicting problem gaming from similarity identification, embodied presence, wishful identification, self-concept clarity, and gaming time.

Predictor	*B*	*Beta (β)*	*p*
Similarity identification	0.01	0.03	0.376
Embodied presence	0.01	0.02	0.682
Wishful identification	0.06	0.18	<0.01
Self-concept clarity	−0.06	−0.32	<0.01
Weekly gaming time	0.02	0.11	<0.01
$R^2 = 0.206$, $F(5,987) = 51.10$, $p < .01$			

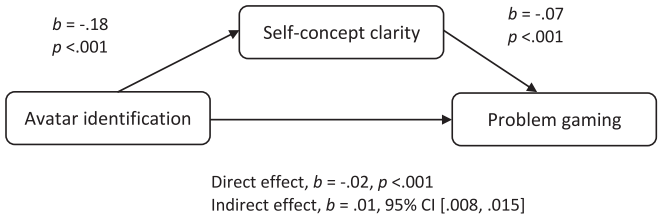

Fig. 1. The direct and indirect effects of self-concept clarity on the relationship between avatar identification and problem gaming, with gaming time as a covariate.

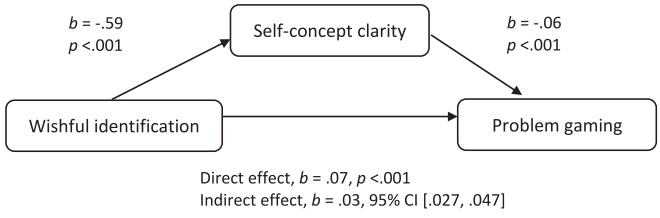

Fig. 2. The direct and indirect effects of self-concept clarity on the relationship between wishful avatar identification and problem gaming.

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). Stavropolous 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). 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; Wölfling, Jo, Bengesser, Beutel, & Müller, 2012; Wölfling 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

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.

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