My avatar and I. A study on avatars, personality traits, self-attributes, and their perceived importance

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My avatar and I. A study on avatars, personality traits, self-attributes, and their perceived importance

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Abstract
The study's objective was to examine the effects of gender, personality traits, and self-views on self-representation through avatars. The importance users attach to self-attributes was also taken into account. The target group was 268 university students. Data for both self- and avatar-attributes were collected using the short version of the Self-Attributes Questionnaire and the users' personality was assessed using the Greek version of the 50-item International Personality Item Pool. The results indicated that the avatars depicted "better" versions of their creators, with females focusing on intellectuality and males focusing on attractiveness. Neurotics and introverts created more socially skilled avatars than themselves. Neurotics also amplified their avatars' attractiveness, whereas extroverts' exaggerated their athletic abilities. Additionally, the avatars of individuals high in openness were more intellectually gifted than themselves, while individuals low in openness created avatars more athletic than themselves. The inclusion of the importance of self-attributes allowed gender differences to emerge and highlighted differences in personality traits. The study's implications are also discussed.

Keywords 3D virtual environments · Avatar · Big-five · Importance of self-attributes · Personality traits · Self-attributes

1 Introduction

3D virtual environments (VEs) are simulations of real or imaginary environments in which many users can be simultaneously present. Although VEs are, basically, social networks, they also have some unique features. Indeed, users can create and trade virtual content and are engaged in activities and social interactions resembling the real world. VEs platforms/hosts such as Second Life, Opensimulator, Active Worlds, and Sansar, draw the attention of users, researchers, and institutions. In fact, 57 million accounts were created since 2003 in Second Life (the largest of the above VEs). In its peak, it had around a million monthly active users, who spent the equivalent of 482,000 years (since 2003) using this platform, for visiting virtual destination (e.g., fantasy and adventure environments), playing games, attending virtual events (e.g., parties, lectures, and art shows), and interacting with other users (e.g., exchanging more than 50 million chat messages per day) (Schultz 2018). Following a decline

of the interest in such applications, the last five years saw the emergence of another generation of VEs together with the emergence of technologies that allow more interactions, better graphics, and increased immersion into the digital environment, sparking a new wave of research in VEs.

Regardless of the underlying technology and software platform, what all VEs have in common is that users are represented in the digital environment through the use of their 3D virtual representations called avatars (Coleman 2011). In terms of their physical appearance, the avatars can be human-like, animal-like, or fictional creatures (Ahn et al. 2012). Developers provide users with the tools to extensively customize their avatars (e.g., skin color, body shape/physique, facial characteristics, clothes, and accessories). Thus, they are free to imagine possible selves and to create unique personas/appearances to support their presence and social interactions in the VEs. In fact, earlier research has demonstrated that avatar customization is the norm in VEs, as most users spend a substantial amount of time amending/fine-tuning their avatars in an effort to signify characteristics essential to them (e.g., physical, behavioral, ideological, and personality related) (Ducheneaut et al. 2009; Neustaedter and Fedorovskaya 2009; Ratan and Hasler 2011). It is not uncommon for users to construct virtual identities/selves
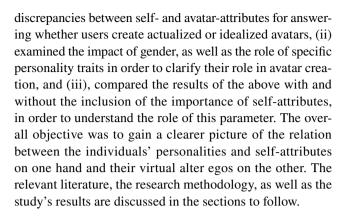

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significantly different from what they really are but, at any rate, suitable for their purposes (Sheth and Solomon 2014).

In real-life, individuals adjust their appearances and behaviors to fit in different situations; thus, it can be supported that the self is a malleable construct, influenced by social roles and cues (Markus and Nurius 1986). Then again, in VEs identities become even more fluid, given that avatars are highly customizable, allowing for opportunities and experiences otherwise impossible (Morie 2008). Additionally, avatars can be viewed as a form of computer-mediated communication in which the hyperpersonal model suggested by Walther (1996) can be applied. That is because avatars provide individuals a host of communicative advantages over face-to-face communication, such as identity shift and impression management through the exaggeration or the selective representation of self. Thus, as Jin (2010) suggested, it is rather important to study the concept of self in avatar-based media. Indeed, a body of literature examined how individuals' self-views are reflected in their avatars in an attempt to clarify the above matters (e.g., Ducheneaut et al. 2009; Hooi and Cho 2014; Villani and Riva 2017). Alas, the issue is far from being resolved, as the studies' results were rather conflicting. For example, some provided evidence that users create avatars very similar to their real-selves (e.g., Cacioli and Mussap 2014; Kendall 2002). Then again, other studies concluded that users created idealized avatars (e.g., Lin and Wang 2014; Sibilla and Mancini 2018; Van Looy et al. 2014). Similar is the situation regarding the effects of users' personalities and personality traits on avatar creation, as there were, once again, contradictory results (e.g., Bessière et al. 2007; Jónsson and Snorrason 2012). Gender, as well as the context in which the avatars are used, have varying effects depending on the studies' settings and target groups (e.g., Guadagno and Cialdini 2007; Triberti et al. 2017).

There is still another quite significant issue. The level of importance individuals attach to specific self-attributes has a substantial impact on their self-views (Pelham and Swann 1989). For that matter, how one ranks self-attributes (in terms of their importance) is taken into account in psychology-related research (e.g., Vater et al. 2015). Yet, it seems that the importance of self-attributes has been totally overlooked in research regarding personality traits and self-attributes and how the latter are reflected in an avatar. In short, we do not know whether the discrepancies between real self-attributes and the corresponding virtual self-attributes (henceforth avatar-attributes) are due to users' choice to emphasize (or de-emphasize) certain attributes because they consider them as being more important (or unimportant) than others.

The study at hand attempted to fill the research gaps and uncertainties identified in the previous paragraphs. Having as a target group university students, it: (i) explored the discrepancies between self- and avatar-attributes for answering whether users create actualized or idealized avatars, (ii) examined the impact of gender, as well as the role of specific personality traits in order to clarify their role in avatar creation, and (iii), compared the results of the above with and without the inclusion of the importance of self-attributes, in order to understand the role of this parameter. The overall objective was to gain a clearer picture of the relation between the individuals' personalities and self-attributes on one hand and their virtual alter egos on the other. The relevant literature, the research methodology, as well as the study's results are discussed in the sections to follow.

2 Background

As already stated, past research has addressed—to some extent—the issues of avatar creation in relation to one's personality, self-attributes, and gender. In the following sections, a brief review of the literature is presented, highlighting gaps and potential research paths.

2.1 Self-views and avatars

Individuals' firmly held beliefs and feelings about themselves can serve as a very broad definition of the term "self-views." In this respect, self-views encompass other aspects of self, such as self-esteem and self-concepts (Swan et al. 2007). Coming to avatars, a question that arises is whether they are meaningfully related to their creators' self-views. Different epistemological models and perspectives can be applied to interpret this relationship. Indeed, some consider avatars as mere tools (e.g., Cui et al. 2009). Others consider them as being partially connected to their creators (e.g., Veerapen 2011), as entities to which individuals are psychologically connected (e.g., Bessière et al. 2007), as extensions (e.g., Gee 2003) or as externalizations of the self (Webb 2001). The above correspond either (i) to a relational perspective, that treats avatars as being somehow related to the individuals' real-selves or (ii) to a socio constructionist perspective, that considers avatar's characteristics as being so much different from the real-selves of their creators, that they have to be conceptualized as tools which allow individuals to explore different identities (Vicdan and Ulusoy 2008). Most research has taken a relational perspective (e.g., Ducheneaut et al. 2009; Dunn and Guadagno 2012; Jónsson and Snorrason 2012; Mancini and Sibilla 2017; Messinger et al. 2019), examining either the physical resemblance or the resemblance of certain psychological characteristics and self-attributes.

A body of literature conjectured that individuals create actualized avatars, meaning that the avatars are very similar or slightly improved versions of how users view

themselves (e.g., in terms of physical appearance, attractiveness, social skills, and intellectual abilities) (Cacioli and Mussap 2014; Kendall 2002). Also, the avatars reflect their owners' personalities, as well as their stable and essential self-attributes/values (e.g., moral beliefs, fashion preferences, and cultural affiliations) (Schultze 2014; Vasalou et al. 2008). In contrast, another body of literature suggested that individuals can suppress or exaggeratedly express various physical and psychological attributes when creating their avatars. The result is avatars that possess positive and ideal attributes (idealized avatars), or avatars that deviate substantially from their creators' true-self (Lin and Wang 2014). For example, men create avatars that are well-muscled and slim to the point of being more muscular than their ideal bodies (Cacioli and Mussap 2014; Winder 2008). In contrast, women select attractive avatars or ones that represent the "thin ideal" (Thomas and Johansen 2012; Triberti et al. 2017). Others found that users only change their avatars' transient features (e.g., clothes) while keeping physical and/or symbolic features unchanged (e.g., in females, the attached accessories) (Triberti et al. 2017). Messinger et al. (2019) also found that users retain core identity elements (e.g., race, gender, and human form) while they change peripheral ones to a varying extent (e.g., hair color and clothing vary a lot and there is a mid-range variation of facial and body characteristics). Not only that, but some suggested that in VEs individuals tend to manifest behaviors consistent with their gender roles, as suggested by the social role theory (Eagly 1987). For example, males are engaged in masculine-typed behaviors/activities (e.g., working and building objects), while females are engaged in communal activities (e.g., shopping, and socializing) (Guadagno et al. 2011). Yet, other researchers rejected altogether the above, supporting that there is no link between actual-self and projected-self (e.g., Hart 2016).

To summarize, most researchers agree that in virtual environments people explore possible selves, vacillating between their "real me" version, their idealized, or even their distorted version. In essence, there is a constant negotiation between the real- and the virtual-self, as the self is revised and reshaped, due to life orientations, social interactions, and technology's affordances (Harley et al. 2018). This negotiation is reflected in differences observed between the users' self-views and the imprint of these views to their avatars. Then again, as Messinger et al. (2019) emphasized, researchers have not yet reached a consensus on whether users create idealized or actualized avatars. Thus, it remains important to gather insights into what kind of avatars users create in relation to specific self-attributes. Moreover, gender's role has to be further explored, as males and females seem to infuse their avatars

with different self-attributes. Consequently, in this study, the following research questions were addressed:

RQ1a The comparison of self-attributes, such as intellectual ability, social skills, artistic/musical ability, athletic ability, and physical attractiveness and the corresponding avatar-attributes, indicates that users create idealized or actualized avatars?

RQ1b Does gender have an effect on the discrepancies between the above self-attributes and the corresponding avatar-attributes?

2.2 Personality traits and avatars

Although personality cannot be easily defined, most agree that it is made up of traits that are shaped by genetics and experience, are constant and consistent, exhibiting what can be referred to as "temporal stability" (Boyle et al. 2008). Goldberg's (1993) five-factor model is the most commonly used conceptualization of an individual's personality traits. The so-called "Big Five" personality traits are agreeableness (related to pro-social inclination), conscientiousness (related to commitment to fulfill tasks), extroversion (related to expression and socialization), emotional stability (or neuroticism, related to emotional reactivity), and openness (related to the diversity of personal experiences). These traits are not necessarily associated (McCrae and Costa 2008); various combinations do occur. For instance, one can score high in emotional stability and score either low or high in openness. Then again, the five factors are not entirely unrelated. For example, highly neurotic individuals tend to be introverts as well.

The findings of previous research were mixed regarding the relationship between users' and their avatars' ratings across the Big-Five personality dimensions. Some concluded that there are significant correlations (Fong 2017), because users view their avatars as an extension of their actual personalities, although somewhat different (Sung et al. 2011). As per self-attributes, other studies indicated that the avatars' personalities tend to be idealized versions of the users' personalities (Ducheneaut et al. 2009). However, research indicated that avatars can also be infused with personalities even better than the ideal-self, as well as worse than the real-self (Mancini and Sibilla 2017). Studies also found differences in specific personality traits. For example, players rated their avatars higher in conscientiousness and extroversion, and lower in openness, neuroticism, and emotionality, compared to themselves (Jónsson and Snorrason 2012; Sung et al. 2011). Nevertheless, summarizing the relevant literature, the following can be noted with regard to the Big-Five personality traits and avatars:

Agreeableness As agreeableness is a positive trait, some amplification of this feature is expected. Indeed, men who use online dating applications exaggerate their agreeableness (Guadagno et al. 2012). Research suggested that the avatar's agreeableness can be predicted by the user's agreeableness (Hays 2018). Yet, another study concluded that players rated their avatars' agreeableness lower than their own (Jónsson and Snorrason 2012).

Conscientiousness As Dunn and Guadagno (2012) indicated, only a handful of studies (and not all in the context of VEs) found that conscientiousness is a significant predictor of self-presentation. Others concluded that this trait cannot be predicted from one's avatar (Bélisle and Bodur 2010; Fong 2017). The lack of evidence does not allow the formulation of any hypotheses for conscientiousness's role.

Emotional stability Research offered some interesting findings regarding neuroticism and the use of computer-mediated communication. For example, it was found that highly neurotic individuals were more likely to build avatars more attractive than themselves (Dunn and Guadagno 2012). That is because, in digital social interaction, they can control their self-representation and how they are received by others; therefore, neurotics use digital media in an effort to attract more social interaction.

Extroversion As with neurotics, introverts are also likely to turn to digital means of communication for facilitating their self-presentation, whereas extroverts prefer traditional social interaction (Amichai-Hamburger et al. 2002). In addition, introverts tend to build avatars more attractive than themselves compared to extroverts (Dunn and Guadagno 2012). Contrary to the above, a study found that extroverts were the ones who tend to create avatars more attractive than themselves (Messinger et al. 2019).

Openness It seems that openness is another trait that cannot be accurately inferred from one's avatar (Fong 2017). In the context of VEs, studies suggested that attractive avatars were perceived as being more open (Bélisle and Bodur 2010). Furthermore, Wei et al. (2017) suggested that users high in openness use their avatars together with their friends, while users low in openness prefer to do that alone.

From the above, it is evident that there is a quite diverse (and contradictory in terms of findings) body of literature examining the relationship between individuals' personality traits and the corresponding personality traits of their avatars. It also seems that a research path not adequately explored, to the point of being rather limited, is the impact of personality traits on the differences between self- and avatar-attributes. Indeed, the existing literature following this line of research has focused more on extroversion and

emotional stability and their impact on avatar attractiveness, neglecting other self-attributes (e.g., social competence and athletic ability). Given that, the following research question was explored in this study:

RQ2 Are individuals' personality ratings across the Big-Five personality dimensions/traits associated with the differences between self- and avatar-attributes (i.e., the differences in intellectual ability, social skills, artistic/ musical ability, athletic ability, and physical attractiveness)?

2.3 The importance of self-attributes

Personal relevance or the importance of a self-attribute, echoes the weight individuals attach to the given attribute (Dunning 1995). As Pelham and Swann aptly put it "… individuals do not only ask themselves, 'How good am I?' They also ask what it means to be good or bad at different things." (Pelham and Swann 1989, p. 673). For that matter, they argued that instead of inferring one's ranking of self-attributes by comparing them to others (e.g., using the average self-ratings of a study's participants), it would be better to measure importance by focusing on differential importance, the amount of importance imputed to a specific attribute relative to other attributes. Indeed, this idea was well used ever since it was introduced. For example, Rosenberg (2015) suggested that individuals who consider negative self-attributes as important are more likely to be low in self-esteem. Other examples in which the importance of self-attributes was taken into account include research in self- and group-identification (Hogg and Mahajan 2018), as well as research in personality disorders (Vater et al. 2015).

Though the above examples point to the direction that the importance of self-attributes should be considered when examining personality traits or self-views, and quite interestingly, the issue is not addressed (to the point of being totally overlooked) in the literature regarding self-views or self-attributes and how these are reflected in one's avatar. Although there are many meticulously designed studies, as presented in the preceding sections, none of them examined if and how the level of importance individuals attach to attributes essential to their self-views affects the effects the personality traits have on the differences between self-attributes and the corresponding avatar-attributes. Having identified this research gap, it was decided to re-examine the research questions set in the previous sections, by taking into account the level of importance individuals attach to self-attributes essential to their self-views. Thus, the following research questions were also addressed in this study:

RQ3a Do the different levels of importance users attach to self-attributes, such as intellectual ability, social skills, artistic/musical ability, athletic ability, and physical

attractiveness, play a role in the effects of gender on the discrepancies between these self-attributes and the corresponding avatar-attributes?

RQ3b Do the different levels of importance users (of both genders) attach to the above self-attributes, play a role in the effects the personality traits have on the discrepancies between these self-attributes and the corresponding avatar-attributes?

3 Method

On the basis of what was presented in the preceding sections and the research questions that emerged, a project was realized, details of which are presented in the sections below.

3.1 Measures

For exploring participants' self-views and how these were displayed in their avatars, two forms of the short version (5 items) of Self-Attributes Questionnaire (SAQ) (Pelham and Swann 1989) were used [one for participants (self-attributes) and one for their avatars (avatar-attributes)]. The five attributes in short SAQ are intellectual ability, social skills/social competence, artistic and/or musical ability, athletic ability, and physical attractiveness. The wording of the short SAQ, as was adapted for the study's purposes, was as follows (Pelham and Swann 1989, p. 680): "This questionnaire has to do with your (your avatar's) attitudes and about some of your (your avatar's) activities and abilities. For the five items below, you should rate yourself (your avatar) relative to other people of your own age and gender by using the following scale: 1 = bottom 5%, 2 = lower 10%, 3 = lower 20%, 4 = lower 30%, 5 = lower 50%, … 10 = upper 5%. An example of the way the scale works is as follows: if one of the traits that follows were 'height', a woman who is just below average height would choose '5′ for this question, whereas a woman who is taller than 80% (but not taller than 90%) of women her age would mark '8′, indicating that she is in the top 20% on this dimension."

Two additional items were included in the above questionnaire. The first was related to the importance of the five attributes. It was captured by asking participants to rank them without using any duplicate numbers (1 = least important to 5 = most important). The second item was presented in a ten-point Likert-type scale (anchored at 1—low and 10—high) and was worded as follows: are you satisfied with the "looks" of your avatar? Two were the underlying reasons for this question. First, to exclude participants not familiar or skilled at creating/modifying avatars. Second, the appearance of an avatar not only influences how others perceive the

given avatar, but also whether the avatar's creator considers it representative of him/herself (Nowak et al. 2009).

The Greek version of the 50-item International Personality Item Pool (IPIP) representation of Goldberg's markers for the Big-Five factor structure (Vakola 2018) was used for assessing the participants' personalities. Fifty descriptive phrases capture respondents' self-characterization in a 5-point Likert-type scale (anchored at 1 = very inaccurate and 5 = very accurate). The following personality traits are assessed: extroversion (solitary/reserved vs. outgoing/energetic), emotional stability (sensitive/nervous vs. secure/confident), agreeableness (challenging/detached vs. friendly/compassionate), conscientiousness (easy-going/careless vs. efficient/organized), and openness (consistent/cautious vs. inventive/curious).

3.2 Participants and sample size

Students attending (or have attended) a course related to VEs at a Greek university took part in the project, in exchange for course credit or the opportunity to fulfill the requirements of another course. They were recruited through a research announcement posted on the university's Facebook group. The initial qualification for research participation was to have created at least one avatar in any type of VE. The final sample (93 males and 175 females) consisted of participants who responded 8 and above to SAQ's question regarding the looks of their avatars.

3.3 Procedure

The study consisted of two parts. Part I took place three weeks prior to Part II, for reducing the possibility of demand effects. After informed consent was obtained, participants self-reported: (a) their personality traits using the Greek version of the 50-item IPIP and (b) their self-attributes using the self-attributes version of the short SAQ. In Part II, participants arrived at the computer lab and were given the following directions: "Please create an avatar representing yourself. The avatar does not need to look like you but should signify your personality." There was no time limit for avatar creation. That is because users prefer to customize their avatars and ignore ready-made ones (Taylor 2002). Consequently, it was considered important to give participants enough time to experiment and to put emphasis on details. In addition, although the lab could accommodate around forty students, it was decided only ten to be present at a time and not to allow discussions among participants. This was done in order participants to feel more relaxed, to have some privacy, and to avoid direct and influential comments from others.

Participants used Opensimulator (https://opensimulator.org) and had at their disposal more than 250 ready-made
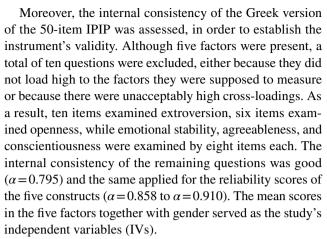

avatars, more than a 1000 avatar parts (e.g., body shape and skin color), and more than 2000 items that could be attached to the avatar's body (e.g., clothes, accessories, and hair). As it is allowed to combine elements (e.g., the body shape of one avatar, the skin color of another, and the clothes of a third) and as it is allowed to alter the shape and size of almost all body parts, the possible outcomes were virtually limitless. It has to be noted that the virtual world was the simulation of a very small island (50×50 m) with natural surroundings (there were just trees; no buildings or other items were placed). Thus, the virtual world was somehow neutral as there was no purpose explicitly enforced by a specific environment and as it did not provide any obvious context clues. Immediately following this procedure and still having their avatar displayed in their screens, participants were asked to rate them using the avatar-attributes version of SAQ.

These settings, as well as the wording of the above instructions, tried to avoid two threads to the study's validity: (a) external influences and (b) a context in which the avatar was going to be used. Both threads emerge from the fact that self-representation is constantly adjusted/redefined so as to fit in a given situation, achieve a strategic goal, or convey a certain impression to others (Goffman 2017). Self-presentation strategies occur in virtual environments too; how users present themselves through avatars depends on the context they are going to be used (Triberti et al. 2017). Consequently, by not providing any context clues and by minimizing external social effects, it was considered more probable personality traits to be the major driving force behind the differences between avatar- and self-attributes. This issue is further elaborated in the "Discussion" section.

3.4 Initial data processing and data transformations

Data from both SAQs and the 50-item IPIP were imputed into SPSS 25 and they were checked for missing or unengaged responses (none was found). As the study's focus was on the differences between self- and avatar-attributes, five new variables were computed representing these differences in intellectual ability, social skills/social competence, artistic and/or musical ability, athletic ability, and physical attractiveness. The importance of self-attributes was incorporated into the above by computing another five variables (one for each attribute) using the following formula: [(attribute$_{avatar}$ − attribute$_{self}$) × ranked importance]. The preliminary analysis revealed that the residuals in these ten variables were not normally distributed. The issue was addressed by computing a set of ten new variables using the two-step transformation to normality technique described by Templeton (2011). These transformed to normality variables, served as the study's dependent variables (DVs).

Moreover, the internal consistency of the Greek version of the 50-item IPIP was assessed, in order to establish the instrument's validity. Although five factors were present, a total of ten questions were excluded, either because they did not load high to the factors they were supposed to measure or because there were unacceptably high cross-loadings. As a result, ten items examined extroversion, six items examined openness, while emotional stability, agreeableness, and conscientiousness were examined by eight items each. The internal consistency of the remaining questions was good ($\alpha = 0.795$) and the same applied for the reliability scores of the five constructs ($\alpha = 0.858$ to $\alpha = 0.910$). The mean scores in the five factors together with gender served as the study's independent variables (IVs).

As multiple regression analyses were to follow in order to find the relationship between the predictors and the outcome variables, it was examined whether the assumptions for this type of testing were met (Hair et al. 2010). The rule of thumb for at least 20 participants per each IV, was satisfied since there were 268 participants and six IVs. An analysis of standard residuals was carried out, which showed that the data contained no outliers since there were no values exceeding the |3| limit. The data also met the assumption of independent errors (Durbin-Watson statistic between 1.72 and 2.13). Variance inflation factor (VIF) and tolerance were used for checking multicollinearity. It was concluded that multicollinearity was not an issue, as there were no cases in which VIF was above the value of 4. Moreover, tolerance was, in all cases, well above the recommended minimum of .25. Finally, heteroscedasticity, as assessed using the Breusch–Pagan test, was not an issue.

4 Results

As already mentioned, 268 university students (93 males, 175 females), all Greeks, around 20 years old ($M = 20.42$, $SD = 1.74$) participated in the study. Descriptive statistics for the ranked importance of self-attributes in both genders are presented in Table 1, while descriptive statistics for the rest

Table 1 Descriptive statistics for the importance of self-attributes by gender

Attributes' importance	Males ($N=93$)		Females ($N=175$)	
	M	SD	M	SD
Artistic ability	1.86	0.90	1.75	0.88
Intellectual ability	2.78	1.16	3.55	1.18
Athletic ability	3.42	1.52	3.35	1.44
Attractiveness	3.81	1.23	2.85	1.39
Social skills	3.13	1.39	3.49	1.28

of the study's variables are presented in the Appendix. From this table, it can be inferred that the artistic ability was the least important attribute for both genders. Physical attractiveness was the most important for males, closely followed by athletic ability. For females, the intellectual and social abilities were the most important ones, closely followed by athletic ability.

For examining RQ1a, participants' scores in self- and avatar-attributes were compared using the Wilcoxon signed ranks test (as the data in self- and avatar-attributes were not normally distributed). Out of the five pairs of attributes, three statistically significant differences were noted, as reported in Table 2. Given that in the artistic ability the effect size was small to medium, while in all the other cases the effect sizes were large, it can be inferred that participants created avatars that were "better" versions of themselves with regard to physical attractiveness and social skills.

For examining RQ1b, RQ2, RQ3a, and RQ3b, two sets of two-step hierarchical multiple regression analyses were run. In both sets, the IVs were the mean scores in the five personality traits. Also, in both, gender was entered at step one of the regression, to control for the effects of this variable. In the first set, the DVs entered at step two were the five variables representing the transformed differences in avatar- and self-attributes. In the second set, the DVs entered at step two were the five variables representing the transformed differences in avatar- and self-attributes in which the importance of self-attributes was included. Tables 3 and 4 present the results of these analyses.

When the importance of self-attributes was not included, no statistically significant differences regarding gender were noted (see Table 3, rows 3 and 6). On the other hand, when the importance of self-attributes was included, statistically significant gender differences were found in the intellectual [$F(1, 266) = 4.330$, $p = .038$] and physical attractiveness [$F(1, 266) = 4.272$, $p = .038$] attributes (see Table 4, rows 3 and 6). It seems that there was a greater difference in the intellectual ability attribute in females than in males ($t = 2.081$, $p = .038$), while it was the other way around for physical attractiveness ($t = -2.167$, $p = .038$). Thus, for answering RQ1b, it can be supported that females tend to

create avatars more intellectual than themselves compared to males, while males tend to create avatars more attractive than themselves compared to females. As for RQ3a, it can be supported that the inclusion of the importance of self-attributes allowed the above gender differences to emerge.

A comparison of Tables 3 and 4, also reveals that the inclusion of the importance of self-attributes resulted in some differentiation in the effects of the personality traits (in Table 3 there are four statistically significant results, while in Table 4 there are seven). Specifically, the following statistically significant effects were added: (a) emotional stability on social skills, (b) conscientiousness on attractiveness, and (c) openness on athletic ability. Thus, for answering RQ3b, it can be concluded that the role of the importance users attach to their self-attributes was notable.

Coming to RQ2, the findings in Table 4 indicate that none of the five personality traits had an effect on the observed differences between avatar- and self-artistic abilities. As far as the differences between avatar- and self-intellectual abilities are concerned, Openness was the only statistically significant trait and its effect was positive ($t = 4.073$, $p < .001$), meaning that the more open to new experiences participants were, the more intellectually gifted than themselves were their avatars. Extroversion had a positive effect on the differences between avatar- and self-athletic abilities ($t = 3.450$, $p < .001$); the more outgoing/energetic participants were, the more athletic than themselves were their avatars. On the other hand, openness negatively affected the differences in this attribute ($t = -2.210$, $p = .028$), meaning that the more consistent/cautious participants were, the more athletic than themselves were their avatars. Emotional stability had a negative impact on the differences between avatar- and self-attractiveness ($t = -7.773$, $p < .001$); the more sensitive/nervous participants were, the more attractive than themselves were their avatars. Conscientiousness also had a negative impact ($t = -2.101$, $p = .037$); the more efficient/organized participants were, the less attractive than themselves were their avatars. Finally, Extroversion negatively affected the differences between avatar- and self-social skills ($t = -6.325$, $p < .001$); the more solitary/reserved participants were, the more social than themselves

Table 2 Self- and avatar-attributes contrasts

	Wilcoxon signed ranks test ($N = 268$)									
	Artistic ability		Attractiveness		Social skills		Intellectual ability		Athletic ability	
	Self	Avatar	Self	Avatar	Self	Avatar	Self	Avatar	Self	Avatar
Median	5	6	5	8	6	8	6	5	6	6
Z	−2.59		−9.84		−8.30		−0.20		−0.66	
p	.010		<.001		<.001		.844		.509	
d	0.23		0.94 (large)		0.77 (large)		–		–	

d effect size (Cohen's *d*)

Table 3 Effects of gender and personality traits (importance not included in the DVs)

	Attributes (DVs)														
	Avatar—self-artistic ability					Avatar—self-intellectual ability					Avatar—self-athletic ability				
Step 1 model summary	$F(1, 266)=1.030$, $p=.311$, $R=.062$, $R^2=.004$					$F(1, 266)=0.764$, $p=.383$, $R=.054$, $R^2=.003$					$F(1, 266)=0.091$, $p=.763$, $R=.019$, $R^2=.0004$				
Step 2 model summary	$F(6, 261)=0.642$, $p=.668$, $R=.110$, $R^2=.012$					$F(6, 261)=2.533$, $p=.021$, $R=.235$, $R^2=.055$					$F(6, 261)=3.084$, $p=.006$, $R=.257$, $R^2=.066$				
Step 1 IV	b	SE B	β	t	p	b	SE B	β	t	p	b	SE B	β	t	p
Gender	−.123	.121	−.062	−1.02	.311	.107	.122	.054	.874	.383	.038	.127	.019	.302	.763
Step 2 IVs															
Gender	−.105	.123	−.053	−.857	.392	.083	.122	.041	.680	.497	.003	.125	.002	.026	.979
Extroversion	.035	.069	.033	.500	.617	.028	.069	.026	.414	.679	*.277*	*.070*	*.249*	*3.924*	*<.001*
Emotional stability	−.003	.069	−.003	−.041	.967	.063	.069	.058	.919	.359	−.093	.070	−.083	−1.327	.186
Agreeableness	.151	.082	.119	1.845	.066	−.013	.081	−.010	−.164	.870	.078	.083	.059	.936	.350
Conscientiousness	−.022	.072	−.019	−.306	.760	−.041	.071	−.036	−.582	.561	−.102	.073	−.084	−1.394	.164
Openness	−.022	.085	−.016	−.260	.795	*.312*	*.084*	*.229*	*3.701*	*<.001*	−.091	.087	−.065	−1.050	.295

	Attributes (DVs)									
	Avatar—self-attractiveness					Avatar—self-social skills				
Step 1 model summary	$F(1, 266)=2.904$, $p=.090$, $R=.104$, $R^2=.011$					$F(1, 266)=2.961$, $p=.086$, $R=.105$, $R^2=.011$				
Step 2 model summary	$F(6, 261)=13.810$, $p<.001$, $R=.491$, $R^2=.241$					$F(6, 261)=9.047$, $p<.001$, $R=.415$, $R^2=.172$				
Step 1 IV	b	SE B	β	t	p	b	SE B	β	t	p
Gender	−.208	.122	−.104	−1.704	.090	−.213	.124	−.105	−1.721	.086
Step 2 IVs										
Gender	−.211	.109	−.105	−1.923	.056	−.118	.116	−.058	−1.021	.308
Extroversion	.077	.062	.071	1.239	.216	−*.418*	*.065*	−*.382*	−*6.408*	*<.001*
Emotional stability	−*.537*	*.062*	−*.489*	−*8.703*	*<.001*	−.084	.065	−.076	−1.291	.198
Agreeableness	−.013	.073	−.010	−.176	.860	−.019	.077	−.014	−.242	.809
Conscientiousness	−.009	.064	−.008	−.140	.889	−.067	.068	−.056	−.988	.324
Openness	−.020	.076	−.015	−.267	.789	−.038	.080	−.028	−.475	.635

b unstandardized beta coefficients, *SE B* standard errors for *b*, *β* standardized error coefficients, *t* t test statistic, *p* probability value, the italicized rows indicate statistically significant findings

were their avatars. Emotional stability also had a negative impact ($t=−2.2333$, $p=.026$); the more sensitive/nervous participants were, the more social than themselves were their avatars.

5 Discussion

The data analyses, as presented in the preceding section, delivered a series of interesting findings. One of the research questions aimed at clarifying whether users create avatars that are improved versions of themselves with regard to certain self-attributes. On the basis of the results, participants' avatars were "better" versions of themselves in three out of five self-attributes that were examined (see Tables 3, 4). Previous research reported that both genders tend to create avatars with positive attributes (e.g., Sung et al. 2011; Triberti

et al. 2017), consistent with the ideal male and female bodies (Dunn and Guadagno 2012; Thomas and Johansen 2012). Thus, in terms of physical attractiveness, the study's findings further support these views. In addition, it provides evidence that the social skills and the artistic abilities of users are enhanced as well. Thus, an issue that has to be addressed is whether the avatars reflected the users' actualized or idealized versions. Considering that (a) not all avatar-attributes were statistically significantly different from their matching self-attributes and (b) the effect sizes were medium in the physical attractiveness and social skills attributes and small in the artistic abilities attribute, the most logical conclusion is that the avatars were definitely "better" versions of their creators in some features but the term "idealized" would be an overstatement. Therefore, the findings of the study fall somewhere between the findings of previous research in which "actualization" was reported (Cacioli and Mussap

Table 4 Effects of gender and personality traits (importance included in the DVs)

	Attributes (DVs)														
	Avatar—self-artistic ability					Avatar—self-intellectual ability					Avatar—self-athletic ability				
Step 1 model summary	$F(1, 266) = 1.473$, $p = .226$, $R = .074$, $R^2 = .006$					$F(1, 266) = 4.330$, $p = .038$, $R = .127$, $R^2 = .016$					$F(1, 266) = 0.827$, $p = .364$, $R = .056$, $R^2 = .003$				
Step 2 model summary	$F(6, 261) = 0.847$, $p = .534$, $R = .138$, $R^2 = .019$					$F(6, 261) = 3.750$, $p = .001$, $R = .281$, $R^2 = .079$					$F(6, 261) = 3.405$, $p = .003$, $R = .269$, $R^2 = .073$				
Step 1 IV	b	SE B	β	t	p	b	SE B	β	t	p	b	SE B	β	t	p
Gender	−.154	.127	−.074	−1.214	.226	*.264*	*.127*	*.127*	*2.081*	*.038*	.115	.127	.056	.910	.364
Step 2 IVs															
Gender	−.143	.129	−.069	−1.108	.269	.242	.125	.116	1.929	.055	.090	.125	.043	.720	.472
Extroversion	.048	.073	.043	.659	.510	−.003	.071	−.002	−.036	.971	*.244*	*.071*	*.218*	*3.450*	*.001*
Emotional stability	.020	.073	.018	.275	.783	.106	.071	.093	1.506	.133	−.064	.071	−.056	−.904	.367
Agreeableness	.150	.086	.112	1.738	.083	−.011	.084	−.008	−.130	.897	.063	.084	.047	.754	.452
Conscientiousness	.019	.075	.016	.250	.803	−.012	.073	−.010	−.165	.869	−.104	.073	−.086	−1.420	.157
Openness	−.015	.089	−.011	−.168	.866	*.353*	*.087*	*.249*	*4.073*	*<.001*	*−.192*	*.087*	*−.136*	*−2.210*	*.028*

	Attributes (DVs)									
	Avatar—self-attractiveness					Avatar—self-social skills				
Step 1 model summary	$F(1, 266) = 4.272$, $p = .038$, $R = .126$, $R^2 = .016$					$F(1, 266) = 0.172$, $p = .679$, $R = .025$, $R^2 = .001$				
Step 2 model summary	$F(6, 261) = 11.371$, $p < .001$, $R = .455$, $R^2 = .207$					$F(6, 261) = 9.276$, $p < .001$, $R = .419$, $R^2 = .176$				
Step 1 IV	b	SE B	β	t	p	b	SE B	β	t	p
Gender	*−.261*	*.126*	*−.126*	*−2.167*	*.038*	−.053	.127	−.025	−.415	.679
Step 2 IVs										
Gender	−.234	.073	−.120	−1.843	.052	.040	.118	.019	.342	.732
Extroversion	.065	.065	.058	1.001	.318	*−.421*	*.067*	*−.377*	*−6.325*	*<.001*
Emotional stability	*−.508*	*.065*	*−.447*	*−7.773*	*<.001*	*−.149*	*.066*	*−.131*	*−2.233*	*.026*
Agreeableness	.062	.077	.046	.803	.423	−.041	.079	−.031	−.524	.601
Conscientiousness	*−.142*	*.068*	*−.117*	*−2.101*	*.037*	−.070	.069	−.058	−1.011	.313
Openness	−.036	.080	−.025	−.443	.658	−.021	.082	−.015	−.258	.796

b unstandardized beta coefficients, *SE B* standard errors for *b*, *β* standardized error coefficients, *t* t test statistic, *p* probability value, the italicized rows indicate statistically significant findings

2014; Kendall 2002) and studies in which their findings pointed toward "idealization" (Sibilla and Mancini 2018).

A number of researchers concluded that the differences between virtual- and real-self depend on the settings the avatar is used (e.g., Triberti et al. 2017). In a way, the context forces users to overemphasize some attributes, downgrade others, or use multiple avatars (Triberti et al. 2017). On the other hand, this can be viewed as a quite significant limitation of the studies examining avatars or other digital self-representations and users' personalities. For example, in a study examining users' profiles in dating sites, quite logically it was found that they overemphasized their attractiveness (Guadagno et al. 2012). Correspondingly, in the context of a massive online multiplayer game, it was somehow expected users to downgrade their neuroticism (Bessière et al. 2007). Interestingly enough, the differences found in this study emerged despite the fact that both social interactions/influences and context clues were minimal. Thus, it can be supported that due to the above it was more probable users, through their avatars, to have expressed what they truly desire or aspire to be as others suggested (e.g., Wallace 2015). Moreover, the study's settings resemble what is applicable in almost all VEs. Indeed, users can visit a multitude of diverse environments hosted in the same VE, though they are allowed just one avatar. This "one size fits all" approach, forces users to consider what attributes are really important to them and customize their avatars accordingly. In this respect, there is a good chance for the study's findings to be valid for any "general purpose" VEs.

It was also examined how gender affected the discrepancies between avatar- and self-attributes. Two statistically significant differences were observed: (a) the distance between virtual and actual intellectuality was greater in females than in males and (b) the distance between virtual and actual

physical attractiveness was greater in males than in females. Although the above effects of gender were eased when the five personality traits were included in the model, still, they cannot be overlooked. The results are difficult to interpret and rather puzzling. Some studies found that females select avatars that represented more idealized versions of self compared to males, including physical attractiveness (e.g., Ducheneaut et al. 2009), conforming to the "thin ideal" (e.g., Thomas and Johansen 2012; Triberti et al. 2017) or by highlighting characteristics typical to their gender (Villani et al. 2016). Other studies found that males created muscular avatars (Cacioli and Mussap 2014; Winder 2008) and that they were engaged in behaviors typically assigned to males (Guadagno et al. 2011). In essence, although individuals make creative use of virtual worlds' customization options, they stick to gender and cultural rules and norms (Martey et al. 2014). Given the above, the study's results were unexpected. A more logical outcome would have been participants to have followed their gender stereotypes as previous research noted (Dunn and Guadagno 2012; Martey et al. 2014; Villani et al. 2016); thus, it was expected males' avatars to be more athletic (i.e., more fit and muscular) than themselves compared to females and females' avatars to be more attractive than themselves compared to males. Alas, neither the first nor the second assumption was confirmed.

The topic of how physical attractiveness is perceived by both genders is vast and well beyond the scope of this study. Then again, there are some considerations that should be taken into account when trying to interpret the above outcome. First, although the relevant item in SAQ clearly refers to "physical attractiveness," men and women do not use the same criteria when rating this abstraction (Townsend and Wasserman 1997). Thus, a misinterpretation or a reflection of different perceptions cannot be ruled out. Second, although masculinity is positively correlated with male physical attractiveness (Mehrabian and Blum 1997), men also try to appear as genuine, trustworthy, and extroverted (Fiore et al. 2008). In addition, women rated men as more attractive when the latter had some feminine characteristics, such as warmth and kindness (Fiore et al. 2008). The above implies a deviation from the typical image of an attractive male (that of being muscular, well-fit, and athletic) and it is probable that these parameters were considered by male participants when creating their avatars. The confirmation of this assumption comes from the results in Table 1. Physical attractiveness was the most important attribute for males, while the athletic ability was second. Similar mechanisms might have come into play in females. Though, taken as a whole, participants' avatars were not more intellectually gifted than their creators, females created more intellectually gifted avatars than themselves compared to males. Once more, the results in Table 1 indicate that

intellectuality was considered the most important self-attribute for females. Given that, a logical assumption is that females' avatars were more "intellectual" than themselves in an effort to convey the message that "women are not just looks, they are brains too." Finally, one has to keep in mind that the sociocultural background shapes gender stereotypes. In this respect, it is quite possible the study's results to have reflected the specific views of young Greek university students which might have small or large differences from other samples used in previous research in terms of ethnicity, race, and age.

Coming to the correlations between the Big-Five personality traits and the five self-attributes, agreeableness did not appear as a contributing factor in any case. Indeed, there are only a few studies offering significant findings for the role of this personality trait in avatar creation (e.g., Hays 2018). Together with the study's findings, it can be concluded that its role is marginal or negligible. As for conscientiousness, again, the literature is limited (e.g., Bélisle and Bodur 2010; Fong 2017; Hays 2018). The study's findings make (a small) contribution to this body of knowledge, as it was found that efficient/organized individuals tend to create avatars that are less attractive than themselves. Then again, the evidence provided by this study might also be circumstantial. At any rate, the results of just one study are not enough so as to formulate a theory explaining this specific finding.

As for extroversion, it was found that (a) introverts amplified their social skills and (b) extroverts did the same for their athletic ability. The latter was, more or less, expected. Extroversion is an inherently positive trait, exaggerating it is not a surprise (Guadagno et al. 2012). What is more, extroverts are energetic individuals; previous research has demonstrated that extroversion is a common characteristic of athletes (Dobersek and Bartling 2008), to the point of being highly associated with risk-taking ones (e.g., Kajtna et al. 2004). Augmentation of introverts' social skills was also expected. As others pointed out, introverts prefer social media for communicating, since they can control how they appear to (or how they are received by) others (e.g., Amichai-Hamburger et al. 2002). Thus, on the basis of the study's findings, the conclusions of previous research regarding the behavior of introverts in social networks can be extended to VEs as well, by stating that introverts' avatars are also likely to be more sociable than themselves.

Neurotics created avatars that were more physically attractive than themselves. They also amplified the social abilities of their avatars. Both findings confirm and, at the same time, extend the results of previous research. That is because Dunn and Guadagno (2012) found that neurotic women were the ones who usually built attractive avatars and not male neurotics. Also, Guadagno et al. (2008)

indicated that neurotic women exaggerated their social skills through their avatars.

As with conscientiousness and agreeableness, the literature regarding openness's role in avatar creation is limited, leading some to support that openness cannot be inferred from one's avatar (Fong 2017). Nevertheless, the existing literature indicated that attractive avatars are perceived as being high in openness (e.g., Bélisle and Bodur 2010). Other studies concluded that men high in openness experiment with their avatars' skin tone (Dunn and Guadagno 2012). In this study, it was found that individuals high in openness created avatars that were more intellectually gifted than themselves. Although no link can be established between the study's results and previous research, this finding is not irrational if seen in the light of exaggeration; individuals high in openness (i.e., inventive, creative, and curious) created intellectual avatars exactly for overemphasizing their intellectuality. Furthermore, it was found that consistent/cautious individuals tend to create avatars that are more athletic than themselves. Again, this finding can be interpreted if seen in the light of exaggeration.

5.1 Implications for research and practice

The study's implications for research are related to the impact of the importance individuals attach to self-attributes. The inclusion of this parameter produced differences in the results regarding the impact of personality traits and allowed gender differences to emerge. On the other hand, as the differences before and after its inclusion were not dramatic, it can be supported that it acted like a magnifying lens; some small differences, otherwise passed unseen, became statistically significant (i.e., gender differences). This, in turn, allows for a better understanding of how users imprint avatars with certain attributes (i.e., attractiveness and intellectuality). On the basis of this reasoning, it is recommended to include the personal relevance of a self-attribute in future studies.

Research in assessing users' personality and inner state through avatars, as well as interventions aiming to behavior modifications, should take into account the impact of external influences on avatars' features. One such influence is the VEs' context, which seems to play an important role in avatar creation (Triberti et al. 2017). As already stated, the results can be attributed (up to a certain point) to the study's settings in which social interactions were restricted and the VE's purpose was not explicitly enforced by a specific environment (as it did not provide any obvious context clues). These settings probably constrained users from aligning their avatars to a given situation, theorizing that by doing so, participants expressed their true-selves. Thus, it is advisable for future research to provide neutral VEs when assessing users' personalities.

In virtual worlds, it is the first impression that really matters (Cummings and Dennis 2018). In this respect, VEs' developers can also benefit from the study's results, given that certain personality traits influenced the avatar-attributes, a deviation from gender stereotypes was noted, and differences in what self-attributes males and females impute to their avatars were observed. Thus, for avatar creation, designers can provide even more options/tools to users (or better aligned to their needs) so as to allow them to effectively communicate the messages they want. Moreover, they can provide more specific clues (or detailed information) regarding the context of their virtual environments, so as users to take that into account. Such interventions can lead to increased enjoyment and satisfaction, as player-avatar identification is related to both (Trepte and Reinecke 2010).

5.2 Limitations and future research

This study has several limitations that may outline directions for future studies. Data were collected using questionnaires; the trustworthiness of participants' responses is always a concern. Participants were university students; this sample may not be representative of all VEs users. Additionally, participants' rather narrow age spread did not allow the examination of the impact of this parameter. Moreover, the study was based on the assumption that the avatars highlighted (or allowed the emergence of) certain preferences, interests, or personality aspects of their holders. On the other hand, since it was conducted in a controlled environment, it is equally possible for participants to have suppressed such personal disclosures. It is also quite probable the avatars to have reflected temporary/passing mood/feelings/views and not perpetual self-attributes. Finally, it is unknown whether long-term engagement in avatar creation diffuses or emphasizes self-presentation. In this respect, the study of active/experienced VEs' users and their avatars, might yield more reliable results. The correlation of users' personalities and their degree of engagement with avatar creation (e.g., time spent in creating/modifying an avatar and the number of customizations) is also an interesting field for future studies. The importance of self-attributes certainly needs a more thorough examination. For example, in this study, the importance of self-attributes was multiplied with the difference between an avatar- and the corresponding self-attribute, making the assumption that it remains constant in both cases. Yet, it is possible users, for their own reasons, to consider an important self-attribute as being less important when reflected in an avatar and vice versa. Another interesting research path is to deviate from the mainstream research, which assumes a largely fixed understanding of the real and virtual personalities (as suggested by the relational perspective, that considers one's avatar as being

closely related to his/her the real-self) and to examine both as social constructs, constantly adjusting to everyday conditions as suggested by Goffman (1978). This would allow a broader understanding of the dynamic relationship between real- and virtual-self. Finally, the study's participants were young Greek university students. It would be interesting to conduct comparative studies and examine differences in avatar creation depending on participants' ethnicity, race, age, and socioeconomic background.

6 Conclusion

In sum, despite the above limitations, the study contributes to the relevant literature: (a) by providing further support to the idea that avatars are a form of self-presentation, although it was noted that participants' physical attractiveness, social, and artistic skills were amplified in their avatars, (b) by indicating that, contrary to gender stereotypes, males created more attractive avatars than females, whereas females created more intellectually gifted avatars than males, (c) by revealing that extroverts are expected to create avatars more athletic than themselves, while introverts and neurotics are likely to create more socially skilled ones (and more attractive in case of neurotics), (d) by indicating that when individuals are open to new experiences they will probably create avatars more intellectually gifted than themselves, whereas cautious ones are expected to create avatars with athletic abilities better than their own, (e) by providing evidence that the avatars of efficient and well-organized individuals are likely to be more attractive than themselves, and (f) by highlighting the importance of the importance of self-attributes, concluding that it plays a role in how self-views are reflected in avatars and how avatars are imbued with personalities. Thus, the study's results might prove useful to researchers in understanding the interactions between personality traits and self-views responsible for shaping one's avatar.

Compliance with ethical standards

Appendix

See Tables 5 and 6.

Table 5 Descriptive statistics for the study's variables (N = 268)

Variable	M	SD	Range	Variable	M	SD	Range	Variable	M	SD	Range	Variable	M	SD	Range
Gender	1.65	.48	1	Conscientiousness	3.24	.82	3.88	Self_intellectual	5.48	2.70	9.00	Self_attractiveness	5.33	2.67	9.00
Extroversion	3.23	.89	3.90	Openness	4.15	.70	3.17	Avatar_intellectual	5.43	3.53	9.00	Avatar_attractiveness	7.60	2.00	9.00
Emotional stability	2.89	.87	4.00	Self_artistic	5.19	2.90	9.00	Self_athletic	5.67	2.88	9.00	Self_social skills	5.73	2.54	9.00
Agreeableness	3.85	.74	3.63	Avatar_artistic	5.57	2.83	9.00	Avatar_athletic	5.81	2.78	9.00	Avatar_social skills	7.53	2.09	9.00

Table 6 Correlations between the study's variables (Pearson correlation)

Variable	Gender	EXT	EST	AGR	CSN	OPN	Self_art	Avatar_art	Self_int	Avatar_int	Self_athl	Avatar_athl	Self_attr	Avatar_att	Self_soc	Avatar_soc
Gender	1	.116	.015	−.096	.031	.036	−.018	−.075	.039	.052	−.035	−.013	.075	−.018	.108	−.020
EXT	.116	1	.189**	−.213**	.056	−.134*	.036	.041	−.138*	−.099	.015	.346**	.090	.091	.538**	.096
EST	.015	.189**	1	.067	−.088	−.155*	.115	.127*	−.098	−.056	.034	.015	.626**	.124*	.152*	−.010
AGR	−.096	−.213**	.067	1	.079	.134*	−.138*	−.059	.070	.067	.000	−.015	.001	−.059	−.075	.014
CSN	.031	.056	−.088	.079	1	.007	−.017	−.030	.018	−.021	.044	−.034	−.038	.010	.113	.019
OPN	.036	−.134*	−.155*	.134*	.007	1	−.137*	−.158**	.510**	.496**	−.005	−.120*	−.111	−.087	.000	.060
Self_art	−.018	.036	.115	−.138*	−.017	−.137*	1	.664**	−.058	−.082	−.011	−.003	.080	.023	.058	−.042
Avatar_art	−.075	.041	.127*	−.059	−.030	−.158**	.664**	1	−.116	−.128*	.035	.035	.108	.045	.044	.036
Self_int	.039	−.138*	−.098	.070	.018	.510**	−.058	−.116	1	.852**	−.053	−.062	.032	.055	−.088	−.011
Avatar_int	.052	−.099	−.056	.067	−.021	.496**	−.082	−.128*	.852**	1	−.050	−.062	.041	−.004	−.041	−.049
Self_athl	−.035	.015	.034	.000	.044	−.005	−.011	.035	−.053	−.050	1	−.021	−.017	.047	−.032	.049
Avatar_athl	−.013	.346**	.015	−.015	−.034	−.120*	−.003	.035	−.062	−.062	−.021	1	.018	.065	.120	.003
Self_attr	.075	.090	.626**	.001	−.038	−.111	.080	.108	.032	.041	−.017	.018	1	.231**	.122*	.027
Avatar_att	−.018	.091	.124*	−.059	.010	−.087	.023	.045	.055	−.004	.047	.065	.231**	1	.048	.031
Self_soc	.108	.538**	.152*	−.075	.113	.000	.058	.044	−.088	−.041	−.032	.120	.122*	.048	1	.199**
Avatar_soc	−.020	.096	−.010	.014	.019	.060	−.042	.036	−.011	−.049	.049	.003	.027	.031	.199**	1

*Correlation is significant at the 0.01 level (2-tailed)

**Correlation is significant at the 0.05 level (2-tailed)

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