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My avatar and me – Gender and personality predictors of avatar-self discrepancy

Robert Andrew Dunn [a,*], Rosanna E. Guadagno [b]

[a] East Tennessee State University, Department of Communication, ETSU Box 70667, Johnson City, TN 37614, United States
[b] University of Alabama, Department of Psychology, 505 Hackberry Lane, P.O. Box 870348, Tuscaloosa, AL 35487-0348, United States

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ABSTRACT

This study examined the influence of gender, the Big 5 personality factors, and self-esteem on virtual self-representation in the form of avatar-self discrepancy. To examine this, participants designed characters to play in a video game, spent 20 min playing the video game, and then had their actual pictures taken. Our results indicated that, consistent with predictions, men and women generally selected self-representations consistent with ideal male and female bodies. This finding was pronounced for men and women high in agreeableness. Conversely, some results contradicted the normative prescriptions often associated with self-presentation. For instance, men did not build taller avatars than did women. Men who were high in openness to new experiences were more likely to select avatars with skin tone variations. Introverts – both male and female – and women high in neuroticism were more likely to build attractive avatars. Moreover, those with low self-esteem were more likely to select lighter skin tones than those with high self-esteem. Thus, the effects of gender and personality have considerable implications for online self-presentation and self-representation.

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1. Introduction

Computers have promised a host of transformative abilities since their inception and integration into contemporary society. They have changed the way people work, play, and communicate. However, are these machines capable of changing people themselves? Some have argued that computers have at least changed the way people think about themselves and the way they reveal themselves to others (Bailenson & Beall, 2006; McKenna & Bargh, 2000; Rheingold, 1993; Turkle, 1995; Wellman & Gulia, 1999). One area of computing is particularly germane to discussions of identity is that of the avatar – a representation of oneself within computer-mediated environments that is typically graphical in nature (Blascovich et al., 2002). The notion of an avatar as an online self-representation has its theoretical basis in Goffman's (1959) theory of self-presentation. Goffman argued that people convey an expression of themselves to others, who then interpret those expressions. In virtual worlds, the user can not only convey an expression of themselves verbally (either by text or in spoken word) but also pictorially (either by photograph or by graphical representation). Researchers have argued that virtual environments, such as video games, are ideal for research into identity and the presentation or representation of the self—particularly given that attributes, such as race and gender, can be experimentally controlled within such environments (Bailenson, Blascovich, & Guadagno, 2008; Blascovich et al., 2002). This paper will further investigate these issues by examining the relationship between gender, personality characteristics, self-presentation online, and avatar-self discrepancies.

Avatars are particularly attractive for investigations into identity because they provide people with the means to present themselves through their avatar's appearance and behavior (Bailenson & Beall, 2006). While considered by some artifacts of video games or insignificant playthings, we argue that avatars are in actuality much more. Not only are they ubiquitous online, emerging research indicates that avatars reflect aspects of the self (cf. Bailenson et al., 2008). Also indicative of the importance of avatars is their pervasiveness in contemporary culture. For instance, the TV sports network ESPN and video game publisher Electronic Arts introduced the "Virtual Playbook" in 2008. This allows sportscasters to interact with virtual players and virtual game simulations to explain key elements of the game to viewers (Brown, 2008). Furthermore, the TV news network CNN made television history during the 2008 election by conducting the first holographic interview (Welch, 2008). In addition, the biggest blockbuster movie of all time – in terms of sheer global revenue – is *Avatar* whose central plot features of the merging one's consciousness into another body (Segers, 2010).

Furthermore, many current video games today are playable online and start with the creation of an avatar. Therefore, such virtual environments are a convenient and ecologically valid way in which to study avatar selection (Bailenson et al., 2008; Castronova, 2004;

* Corresponding author. Address: East Tennessee State University, Department of Communication, ETSU Box 70667, Johnson City, TN 37614, United States. Tel.: +1 863 409 0932; fax: +1 423 439 7540.
E-mail addresses: dunnra@etsu.edu (R.A. Dunn), Rosanna@ua.edu (R.E. Guadagno).

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Rheingold, 1993; Yee, 2006). The evolution of identity exploration and experimentation begins began with the text-based worlds of MUDs and continues through to today's modern MMO games.

> On MUDs, one's body is represented by one's own textual description, so the obese can be slender, the beautiful plain, the "nerdy" sophisticated. . . . The anonymity of MUDs—one is known on the MUD only by the name of one's character or characters—gives people the chance to express multiple and often unexplored aspects of the self, to play with their identity and to try out new ones. MUDs make possible the creation of an identity so fluid and multiple that it strains the limits of the notion. (Turkle, 1995, p. 12)

Williams (2006) further explored the concept of role-playing with avatars by studying MMO games. He chose the massively multiplayer online role-playing game known as Asheron's Call 2 (AC2) to study virtual cultivation effects. While studying the game, he analyzed its customizable avatar system.

> This avatar is created and directed by the player and maintained indefinitely rather than for a single play session. In AC2, players create human characters and endow them with skills, abilities, and a customizable appearance, including height, build, skin and hair color, and gender. Players also choose weapons and control the avatar's actions within the game world, most of which consists of battling with monsters. (p. 73)

This added dimension of graphical representation provides a new facet of identity online. People are no longer relegated to text-based description and disclosure or even to simple pictures. Now, they can embody their online identity any way they see fit.

Thus, Turkle (1995) and Williams (2006) suggest that the veracity of self-representation online can only be assumed. This reasoning is consistent with the classic research on self-presentation in which Goffman (1959) acknowledged that recipients of self-presentation can only assume what the actor is presenting is the truth. He also argued that people will present themselves in a positive light, as have those who expounded on his theory such as Schlenker (1980), who called this advantageous self-presentation "impression management," and Walther (1996), who argued mediated environments were particularly advantageous for such management. Consistent with this, research has shown that when designing their own avatars, people will vacillate between what Higgins (1987) referred to as the "actual self"—a concept similar to Bargh, McKenna, and Fitzsimmons's (2002) "true self," Amichai-Hamburger, Wainapel, and Fox's (2002) "real me," and Lee's (2004) "para-authentic self"—and alternative or even idealized versions of the self, depending on the kind of message the avatar is meant to convey (Vasalou, Joinson, Bänziger, Goldie, & Pitt, 2008). Further, role-playing is sometimes enhancing these discrepancies between a person and their avatar. So how can researchers predict these discrepancies? The answer to this research question may be found by examining malleable characteristics, such as gender and personality.

Much of the research conducted on avatar creation, design, and selection, however, has been based on self-report (e.g., Vasalou et al., 2008; Yee, 2006). Thus, research has not examined the extent to which individuals' avatars are objectively similar to them. As the research reviewed above suggests, it would stand to reason that someone who has crafted an avatar possessing positive traits might evaluate their avatar as being more similar to themselves than would an objective observer. To address this limitation of self-report research, the present study relies on both self-reported data as well as independent judgments and measurements made by coders unaware of our hypotheses. Whether judged by the oneself or by a third party, these distinctions between the real or true self and the virtual are based, in part, on appearance. This begs certain questions. For instance, how much does an individuals' virtual representation differ from its user based on the user's perception (i.e., what is the self-evaluated discrepancy)? How much does the virtual representation differ from its user based on others' measurements (i.e., what is the measured discrepancy)? Furthermore, what are some of the predictors for these discrepancies? We argue that gender and personality have predictive value for such differences.

1.1. Avatar-self discrepancies

One of the first graphics-based massively multiplayer online (MMO) games was introduced in 1979. Its title was *Avatar* (Bartle, 2003). However, the word's Digital Age definition is most often traced to the creators of Lucasfilm's *Habitat*, a 1986 computer game (Britt, 2008). *Habitat*, another early pioneer of MMO games, involved people logging into a network to play the same game with or even against one another. *Habitat* creators called the graphical representations of players "avatars," which offered some very limited customization abilities (Rheingold, 1993). Today's video games offer much more detailed levels of avatar customization. It is within this customization that we find some of the discrepancies between the real person and their selected avatar (Ducheneaut, Wen, Yee, & Wadley, 2009). Lee's (2004) discussion of self presence suggests a continuum that has implications that are more practical to the electronic world. He argued that presence is really the measurable difference between the experience of reality and the experience of virtual reality. Self presence, he wrote, is the difference between the real person and the "para-authentic self" (a mediated representation of one's true self) or the "alter-self" (a mediated and unrepresentative version of the self). This alter-self would include selecting an avatar for role-playing purposes. Thus, this perspective suggests that the real person generally chooses an avatar that is somewhere between a para-authentic avatar and an alter-self avatar. Lee's proposed continuum is central to the present study, as we investigate the characteristics that predict discrepancies between the avatar and the self.

1.2. Gender

The present research will explore gender differences taking a social role perspective on distinctions between men and women (Eagly, 1987). Though much of the literature cited in the prior literature has discussed sex differences, we use the term "gender" instead. Whereas sex is nomenclature pertaining to physiological traits of males and females, gender pertains to social expressions, cultural expectations, and other aspects outside the realm of biology that define men and women (Unger, 1979). Recent research indicates that men and women follow these gender roles expectations for behavior even within the ostensibly liberating confines of cyberspace (Guadagno, Muscanell, Okdie, Burke, & Ward, 2011). Specifically, in a study of behavior in the virtual environment, Second Life, Guadagno and colleagues found that men were more likely to spend their time in Second Life building things, and owning and working their own property than were women. Men were also more likely to select non-human and opposite gender avatars compared to women. Women, however, were more likely to spend their time in Second Life meeting new people, changing their avatar's appearance, and shopping than were men. Thus, even in this virtual space, women were more to invest time in traditional feminine behavior by focusing on improvements to their appearance.

1.2.1. Men

Though perhaps Stern's (2004) research reflects only a narrow scope of identity online, in her examination of adolescents' Web sites, she found that boys were more likely to maintain personal

Web sites than girls were. Williams (2006) found that playing the MMO game *Asheron's Call 2* did produce cultivation effects, but only with men. He theorized that this could be due to a stronger identification of males to their avatars. He also noted that very few participants role-played with gender. Yee (2006) found that men were more likely to be motivated by achievement and manipulation. Williams, Consalvo, Caplan, and Yee (2009) similarly found that men were more driven to play MMO games by achievement.

In a study of self-presentation through blogs, Dominick (1999) found that men promote their own competence more than do women. Overall, men who play MMO games have been shown to be more aggressive than women have, but this aggression is particularly exacerbated when playing with romantic partners. Men who play in tandem with a romantic partner have been shown to be more aggressive than those who play alone (Williams et al., 2009). Though men may strive for achievement, some male players have admitted to gender bending purposely within such games to obtain attention and assistance (Bruckman, 1996). Similarly, as mentioned above Guadagno et al. (2011) found that men were more likely to create avatars less similar to themselves than were women. Therefore, it would seem that perhaps men also have the capacity for selecting avatars that are discrepant from their real selves.

The concepts of hypermasculinity, which argues that men often aspire to the macho stereotypes ascribed to their gender (Mosher & Tomkins, 1988), and into muscularity, which argues men often aspire to have more muscle definition (Pope, Gruber, Choi, Olivardia, & Phillips, 1997) suggest girth is particularly important to men. Thus research supports the colloquialism, "the bigger the better." Previous research has also suggested that height is particularly important to men, hence the colloquialism: "the taller the better" (Gunderson, 1965). Therefore, the first hypotheses are proposed.

H1a. Men will pick larger avatars than will women.

H1b. Men will pick taller avatars than will women.

1.2.2. Women

Trammell and Keshelashvili (2005) found that teenage girls revealed more information about themselves on their blogs than boys did. Dominick (1999) found that adult women divulged more personal information and family or relationship details on their sites than men did. He wrote, women also "present themselves more positively on interpersonal and socio-emotional attributes" (p. 648). Williams et al. (2009) found that women actually played more hours and more characters than men did. Guadagno et al. (2011) reported that women use Second Life in a manner consistent with female gender role expectations. Thus, the literature supports the idea that women may choose avatars with more discrepancies from themselves than will men.

Artifacts of this gender role stereotyping have been noted since the early days of MUDs and, unlike the research cited above, suggest that women would be more likely to build alter-self avatars (Lee, 2004). For instance, MUD players were found to be more helpful to generous and helpful to other MUD players they believed to be female (Bruckman, 1996). Yee (2006) reported that women were more likely to be motivated by relationships, immersion, or escapism. He found that female players were more likely to be introduced to an MMO game by a romantic partner than men were. Women who play in tandem, on the other hand, have shown to be less aggressive than those who play alone (Williams et al., 2009). Yee (2006) also found that female users were generally older than male users, played MMO games with their romantic partners more, and were more likely to cherish their MMO friendships as much if not more than their real-life friendships. Williams and colleagues also reported that women MMO players were older than men who played MMOs. They further reported that women were more driven by social interaction to play.

Survey responses from female MMO players indicate that women experience sexism within the virtual world created by MMOs and perceive that such games are "made" for men (Yee, 2008). From the shapely design of the female avatar to the revealing clothing they are often outfitted with, female players are reminded of a male-centric focus. Men often assume all other players are also men unless proven otherwise. However, female players who do convince the male counterpart of her gender face further discrimination. Male players often will downplay females' abilities or engage in courtship. Much in the same way that men gender-bend to receive assistance, women sometimes report gender-bending to avoid the simple hassles of dealing with the issue of gender altogether (Yee, 2008).

Body image may be an additional facet for women in selecting their avatars, particularly as it pertains to virtual representations of physical features. Research has suggested that, compared to themselves, women often view other women as being thinner and more physically motivated to remain (Sanderson, Darley, & Messinger, 2002). Such research speaks to what some have called the "thin ideal"—a notion that media propagate a consensus that thin is best, which women then internalize (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; Thompson & Stice, 2001). Consistent with this idea, Ducheneaut et al. (2009) also found that women were more likely to select avatars that represented more idealized versions of themselves than were men. We suggest that if internalization occurs, women will likely feel more pressure to be thin and, as a result, may make their avatar thin as well. Thus, a second hypothesis is posed.

H2. Women will select thinner avatars than men will.

1.3. Personality

Researchers have questioned whether personality accounts for some of the variability in people's decisions to either disclose details about themselves or remain anonymous; to commit to serious and meaningful relationships online or to remain detached and casual; and to be an aggressor or a victim (Amichai-Hamburger, 2002). Dimensions of personality examined in the present study are what have been dubbed the "Big Five (Benet-Martínez & John, 1998, p. 730)." The five proposed dimensions include: extraversion, neuroticism, agreeableness, conscientiousness, and openness to new experiences. Extraversion relates to socialization and expression, agreeableness to prosocial proclivity, conscientiousness to responsibility toward tasks and goals, openness to diversity of personal experience, and neuroticism to emotional reactivity. Though research reviewed above may suggest that gender accounts for differences in avatar selection, numerous studies have shown the effect of gender may be moderated by personality (Amichai-Hamburger, 2002; Amichai-Hamburger & Ben-Artzi, 2003; Amichai-Hamburger et al., 2002; Guadagno & Cialdini, 2007; Guadagno, Okdie, & Eno, 2008; Vazire & Gosling, 2004). Thus, the second hypothesis is posed.

H3. Personality will be a moderator for the impact of gender on avatar selection.

1.3.1. Extraversion

Parks and Floyd (1996) argued that online interaction, which would now include MMO games, offers the potential for overcoming introversion. Extraverts, derive more positive benefits than introverts from Internet use in terms of assuaging loneliness and producing overall well-being. More recent research found that introverts use the Internet to express their "real selves," whereas

extraverts use traditional forms of social interaction to accomplish the same (Amichai-Hamburger et al., 2002). Research has also shown that extraverted men were more likely to use leisure services on the Internet and introverted men were less likely to use information services (Amichai-Hamburger & Ben-Artzi, 2003).

Though personality likely affects the way a person presents himself or herself, people have also been found to engage in what Goffman (1959) would call misrepresentation about the true nature of their personality. One recent study found that people had exaggerated their own extraversion in their personal Web sites (Vazire & Gosling, 2004). In their study of World of Warcraft players, Bessiere, Seay, and Kiesler (2007) found that players rated their perception of their avatar's extraversion higher than their own. Is it any surprise that people would want to accentuate or dissemble such an intrinsically positive attribute? This begs the question of whether people who actually view themselves as being more extraverted will in fact be more comfortable presenting their true selves to the world. Thus, the following hypothesis is posed.

H4. Extraverts will be more likely to select avatars with fewer discrepancies from themselves than introverts will.

1.3.2. Neuroticism

Research has found that neurotics use the Internet to express their real selves, whereas non-neurotics use traditional forms of social interaction (Amichai-Hamburger et al., 2002). Neuroticism in women has been shown to predict the use of social sites (Amichai-Hamburger & Ben-Artzi, 2003) and blogging (Guadagno et al., 2008). Bessiere et al.'s (2007) study of MMO gamers found that players rated their avatars' neuroticism lower than their own. Such research indicates a link between neuroticism and computer-meditated communication and electronic social interaction. If neurotics turn to computer-meditated communication, they may seek solace in knowing they can control how they appear to or are received by others. Thus, a research question is posed.

H5. Neurotic participants will select avatars with more discrepancies from themselves than will non-neurotic participants.

1.3.3. Openness

Bessiere et al. (2007), in their study of MMO gamers, found that players rated their own openness to new experiences and their ideal self openness as higher than that of their avatar. This ran counter to what the researchers had hypothesized.

> Although unexpected, this result makes sense. Characters in WoW typically do not enact a creative role; they act at the behest of the player. These results suggest that participants did not simply rate their characters positively across all personality dimensions but did so selectively for the Big Five characteristics most relevant to the virtual world. (p. 532)

Related to online self-expression, Guadagno et al. (2008) and Okdie, Guadagno, Rempala, and Eno (in press) found that openness was a significant predictor for blogging. The researchers also found that bloggers were likely to disclose details about themselves personally. Based on such research, a second hypothesis is posed.

H6. People high in openness to new experience will be more likely to pick avatars with fewer discrepancies from themselves than people less open to new experiences.

1.3.4. Agreeableness and conscientiousness

Few studies have found significant findings in terms of agreeableness and conscientiousness as predictors of self-presentation efforts. In a further example of Goffman's (1959) contemplation of misrepresentation, a recent study has shown that people with personal Web sites are not above embellishing their own levels of agreeableness (Vazire & Gosling, 2004). Similarly, Guadagno, Okdie, and Kruse (submitted for publication) found that men who expected to meet a prospective romantic partner through an online dating program exaggerated their agreeableness. Much like with extraversion, exaggerating agreeableness, an inherently positive trait, is not unexpected. As for conscientiousness, Bessiere et al. (2007) found that World of Warcraft players rated their perception of their avatar's conscientiousness as higher than their own. The researchers found no difference in players' judgments on their avatars' agreeableness versus their own agreeableness. Though these findings are noteworthy, they hardly offer enough support for formulating hypotheses. Thus, a fourth and fifth research question is posed.

RQ1: Does conscientiousness predict avatar-self discrepancies?

RQ2: Does agreeableness predict avatar-self discrepancies?

1.4. Self-esteem

According to Papacharissi and Rubin (2000), the Internet provides people with the ability to alter aspects of their identity they dislike, the ability to present or change their identity, and the ability to reinvent their identity. The researchers surveyed 279 college students and found that those who avoided face-to-face contact or had less success with face-to-face interactions, saw the Internet as a comparable alternative. The researchers also found that students had stronger affinity with the Internet if they were less happy with their lives and depended on the Internet for interpersonal interaction. They surmised that self-presentation online allowed people to express themselves more freely while experiencing less stress.

Bessiere et al. (2007) found that when *World of Warcraft* players rated themselves on self-esteem, there was a sizable difference between those with low and high self-esteem. However, when they rated their perception of their avatar's self-esteem, this difference disappeared. Ratings for their ideal self were higher than both the actual self and the avatar for both high and low self-esteem participants. Though MMO gamers who vary in self-esteem may rate their avatars' self-esteem similarly, both place the avatar somewhere between themselves and the ideal self. This suggests that lower self-esteem will relate more to self-presentation and impression management (Schlenker, 1980). Thus, a third hypothesis is posed.

H7. People with low self-esteem will be choose avatars with more discrepancies from themselves than will those with high self-esteem.

2. Method

2.1. Participants

For the purposes of the present study, we recruited 174[1] participants (64 men and 110 women). The sample was 85% white, 11% African-American, 3% multiracial or other, and 1% Asian or Pacific Islander. Furthermore, 3% of the sample reported that they were Hispanic. Students were recruited predominantly from the psychology department of a large public university with additional students recruited from the college of communication and information sciences of the same insti-

[1] An additional 38 participants were excluded for failing to follow instructions and one participant was excluded due to missing data.

tution. All participants either received extra credit for participation or had the opportunity to fulfill course requirements.

2.2. Procedure

Participants were told that their goal in the experiment was to evaluate a video game's—*Neverwinter Nights 2* (Monahan, 2008)—overall features and gameplay. Participants were then instructed to select a character to play with (an avatar) using the game's character selection menu. Subjects were made aware of the customization options but not told how or what to select for their character's gender, race, body size, or skin tone. Though size could depend on the race of character selected, all participants started at the same midpoint for physical dimensions such as height and girth. After avatar selection was complete, research assistants asked the subjects to step out of the room and proceeded to take a screenshot of the avatars without the subjects' knowledge. Research assistants then asked subjects to return to the computer and instructed subjects to play the game for 20 min.

After 20 min of game play, the subjects were presented with a computer-based post-test. The questionnaire included Rosenberg's (1965) Self-Esteem Scale, Benet-Martínez and John's (1998) Big Five Personality Scale ("Big 5"), demographic questions, and items assessing the perceived relationship between the participant and his or her avatar. Questionnaires were given after avatar selection and gameplay to maintain the deception and keep participants believing that they were there to evaluate the game rather than to participate in a study on avatar selection. Given that participants were not aware that their avatar selection was being studied, it would have had no effect on their answers to personality and self-esteem inventories. Additional analyses were conducted to determine the effect, if any, that playing the game may have had on the personality and self-esteem responses. The personality and self-esteem means for our sample correlated well to the means gathered in other studies using Big Five personality (Srivastava, John, Gosling, & Potter, 2003) and self-esteem (Rusticus, Hubley, & Zumbo, 2004) indexes with college-aged participants where the surveys were given prior to conditional treatments. Our sample only deviated in terms of neuroticism, which trended slightly lower than our survey's midpoint. Neuroticism in the Srivastava et al. study trended slightly above their survey's midpoint. Thus, we can reasonably say that our personality and self-esteem responses were not affected by gameplay.

After finishing the survey, participants who gave consent to be photographed were then led to a marker board (to measure height) with their subject number written on the board. Research assistants took head-to-toe photographs of the subjects with a digital camera under the pretense that the image would assist further research into better and more realistic character designs. Upon leaving the experimental laboratory, subjects were debriefed and dismissed. All participants agreed to be photographed.

2.3. Variables

2.3.1. Independent variables

Gender served as a primary independent variable for this study. We also relied on Rosenberg's (1965) Self-Esteem Scale (with responses ranging between 0 and 3) and Benet-Martínez and John's (1998) Big Five Personality Scale (with responses ranging between 1 and 8) to come up with an additional six potential moderating variables. The appropriate items were combined to create the six corresponding variable indexes of self-esteem ($M = 2.44$, $S.D. = .44$, $\alpha = .82$), openness ($M = 5.25$, $S.D. = 1.19$, $\alpha = .84$), conscientiousness ($M = 5.48$, $S.D. = .97$, $\alpha = .77$), extraversion ($M = 5.47$, $S.D. = 1.29$, $\alpha = .88$), agreeableness ($M = 6.19$, $S.D. = .94$, $\alpha = .78$), and neuroticism ($M = 3.92$, $S.D. = 1.14$, $\alpha = .78$).

2.3.2. Dependent variables

The primary dependent variables were avatar-participant difference metrics. These metrics were determined by the ratings of two coders blind to our hypotheses and assessed the measured discrepancies between the participant and avatar in terms of appearance. Specifically, to derive the participant metrics reported in this study, two undergraduate research assistants, working independently and naive to our hypotheses, rated the skin tone, height, girth, and attractiveness of the subjects based on the photographs taken of them. This procedure was similar fashion to the student raters utilized in Averhart and Bigler's (1997) study. Skin tone was judged on a scale of 1, representing extremely pale, to 7, representing extremely dark. Height was judged on a scale of 1, representing extremely short, to 7, representing extremely tall. Girth was judged on a scale of 1, representing extremely thin, to 7, representing extremely overweight. Attractiveness was judged on a scale of 1, representing extremely unattractive, to 7, representing extremely attractive. Photographs were presented in random order, and we used Cronbach's (1951) *alpha* to determine intercoder reliability. Coders' scores that yielded an *alpha* of .70 or higher were averaged to create an index.

To add precision, photographs of each participant were measured. Independent coders using fabric rulers on computer screens took measurements (in millimeters) of chest sizes, waist sizes, hip sizes, and heights. Coders' scores that yielded an *alpha* of .70 or higher were then averaged. The averages of the coders' ratings served as the metric used to determine the dependent variables.

The second step to determining avatar-participant difference metrics involved deriving the avatar characteristics, which included the attractiveness, skin tone, girth, chest size, waist size, hip size, and height (both coded and measured) for the participants' selected avatars. Using the same coding scheme described above, the coders were randomly assigned screenshots of the avatars designed by participants. We again used Cronbach's (1951) *alpha* to determine intercoder reliability. Coders' scores that yielded an *alpha* of .70 or higher were averaged and used to create the dependent variables.

Again, in an effort to ensure precision, each avatar screenshot was measured. Independent coders using fabric rulers on computer screens took measurements (in millimeters) of chest sizes, waist sizes, hip sizes, and heights. Coder-determined and measured values for participants were then subtracted from correspondent coder-determined and measured values for avatars to derive a slate of eight avatar-participant difference metrics. These metrics served as the primary dependent variables (see Table 1 below).

Four survey items were also included as dependent variables (see Table 1 below). These items assessed the participants' views on the avatars they had selected and were self-reported. These items assess the self-evaluated discrepancies we referenced earlier. Two items, adapted from Guadagno and Cialdini (2007), assessed

Table 1
Dependent variables (avatar-participant difference metrics).

Variable	Range	Mean	Standard deviation
Attractive difference	−4.5 to 4	.03	1.89
Skin tone difference	−4 to 4.5	.43	1.56
Height (scale) difference	−4.5 to 3	−.51	1.51
Girth difference	−5.5 to 4.5	−.25	1.79
Chest (mm) difference	−15 to 5	−5.06	3.48
Waist (mm) difference	−16 to 1	−7.17	3.16
Hips (mm) difference	−17 to 1	−6.67	3.39
Height (mm) difference	−47.5 to 11.5	−17.11	10.80
Connected to avatar	1–7	3.11	1.64
Refer to avatar as we	1–7	2.30	1.44
Looks like me	0–3	.73	.94
Personality like me	0–3	1.28	1.00

Table 2
Inter-correlations for gender, personality, self-esteem, and avatar metrics.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Gender	–	.08	−.04	.13	−.35**	−.20**	−.05	−.04	.18*	−.04	.15	.22**	.14	.20**	−.22**
2. Attractiveness		–	−.16*	−.05	−.36**	−.24**	−.25**	−.18*	.19*	−.09	−.17*	.01	−.11	.09	−.04
3. Skin tone			–	.11	.05	−.11	−.12	−.15*	−.10	−.16*	.03	−.07	−.01	.14	.06
4. Height				–	.09	.07	.05	.01	.26**	−.07	.03	.07	−.06	<.01	−.03
5. Girth					–	.39**	.33**	.28**	−.04	−.02	−.02	−.15*	.04	−.04	.05
6. Chest						–	.89**	.88**	.48**	.05	−.05	−.07	.09	−.12	.05
7. Waist							–	.92**	.52**	.04	.01	.03	.15	−.14	.01
8. Hips								–	.59**	.08	.02	.03	.15*	−.14	.03
9. Measured height									–	−.02	−.02	.09	.07	−.01	.02
10. Self esteem										–	.30**	.41**	.43**	−.54**	.05
11. Extraversion											–	.28**	.23**	−.21**	.08
12. Agreeableness												–	.39**	−.31**	.05
13. Conscientiousness													–	−.22**	.03
14. Neuroticism														–	−.05
15. Openness															–

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

participants' connectedness to their avatars. The first item was an adapted a measure of oneness, also known and inclusion of other in the self, created by displaying pictures of two circles, one labeled "self," the other labeled "avatar" on a scale ranging from 1, completely separate, to 7, completely superimposed. Participants selected the set of concentric circles that best described the overlap between themselves and their avatar. The second oneness items asked participants to select how likely they would be to use the word "we" to describe themselves and their avatars (from 1, not at all, to 7, extremely likely). The other two items were author generated and assessed how much participants' avatars looked like them (from 0, strongly disagree, to 3, strongly agree) and how much their avatars shared their personality (from 0, strongly disagree, to 3, strongly agree).

3. Results

RQ2 asked whether personality moderated the effect of gender on avatar selection. In order to answer RQ2, we conducted a series of multiple regression analyses to determine the interaction of gender with each of the of personality measures (i.e., the Big 5 and self-esteem) on each of the avatar-participant metrics and the four self-report items. In order to conduct such analyses, all of the personality factors were centered by subtracting the mean from the variable in accordance with guidelines established by Aiken and West (1991). These centered values were also used to create the interaction terms.

In order to answer the other hypotheses and research questions, we also conducted a series of independent sample *t*-tests to determine the main effects of gender on the avatar selection metrics and a series of linear regressions[2] to determine the Big 5 factors and self-esteem effects on the avatar selection metrics and the self-report items. (See Table 2 above for a correlation matrix of gender, personality, self-esteem, and the avatar selection metrics.)

3.1. Gender

To test H1a, H1b, and H2, there were a number of avatar-participant difference metrics hypothesized to be affected by gender. There was a significant difference between men and women for avatar-participant chest differences, $t(168) = 2.71$, $p = .008$. Men were more likely to create avatars with larger chests relative to themselves than were women. Given the findings, H1a is supported.

There was a significant difference between men and women for avatar-participant measured height differences, $t(168) = -2.33$, $p = .02$. Women were more likely to create taller avatars relative to themselves than men were. This is counter to our predictions. Thus, H1b is not supported.

There was a significant difference between men and women for avatar-participant girth differences. However, equal variances could not be assumed, $t(157.91) = 5.17$, $p < .001$. Women were more likely to create avatars with smaller girths (thinner) relative to themselves than were men. Therefore, H2 is supported.

There was a significant difference between men and women on whether participants thought their avatars looked like them. Equal variances, however, could not be assumed, $t(159.53) = -2.29$, $p = .02$. Women were more likely to think their avatars looked like them than men were.

3.2. Personality and gender

3.2.1. Extraversion

To test H1, we conducted simple linear regression analyses using the extraversion index as the predictor variable and the eight individual avatar-participant difference metrics as the outcome variables. Extraversion was a significant predictor for only avatar-participant attractiveness differences ($F(1,172) = 4.95$, $p = .03$, $\beta = -.17$, $R^2 = .03$). Introverts were more likely to create more attractive avatars relative to themselves than were extraverts, when controlling for gender. This supports our hypothesis that extraverts would be more likely to select avatars with fewer discrepancies from themselves. Thus, H4 was supported.

3.2.2. Neuroticism

Neuroticism did not predict for any of the avatar-participant difference metrics nor the self-report data. Thus, there are no findings to support H5.

There was a significant interaction effect between gender and neuroticism on differences in attractiveness between the avatar and participant, $t(172) = 2.12$, $p = .04$, $\beta = .27$. A test of simple slopes revealed that women high in neuroticism created the more attractive avatars relative to themselves, whereas men high in neuroticism created the least attractive avatars relative to themselves (see Fig. 2). This finding is consistent with previous research reporting neuroticism as a moderator for gender's effect on self-presentation among individuals who vary in neuroticism (Amichai-Hamburger & Ben-Artzi, 2003; Guadagno et al., 2008).

[2] We also tested the relationships between gender, personality and the avatar-metrics using multiple regression analysis techniques and found similar results to the linear regression analyses.

3.2.3. Openness

There was a significant interaction between gender and openness to new experience on avatar-participant skin tone differences, $t(172) = -2.81$, $p = .006$, $\beta = -.34$. Men who were high in openness created the darkest-skinned avatars relative to themselves, whereas men who were low in openness selected the lightest-skinned avatars relative to themselves (see Fig. 1).

For H2, we explored the relationship between participants' openness to new experiences and their perceptions of the avatar they selected. Openness was a significant predictor for three of the four self-report items. Specifically, openness predicted whether people felt connected to their avatars, $F(1,172) = 4.64$, $p = .03$, $\beta = .16$, $R^2 = .03$. People who were more open to new experiences were more likely to feel connected to their avatars than were people who were less open to new experiences, when controlling for gender.

Openness was also a significant predictor for whether people were more likely to use the word "we" to describe themselves and their avatars, $F(1,172) = 7.69$, $p = .006$, $\beta = .21$, $R^2 = .04$. People who were more open to new experiences were more likely to use the word "we" to describe themselves and their avatars than were people who were less open to new experiences, when controlling for gender.

Openness predicted whether people were more likely to report that their avatars shared their personalities, $F(1,172) = 5.54$, $p = .02$, $\beta = .18$, $R^2 = .03$. People who were more open to new experiences were more likely to say their avatars shared their personalities than were people who were less open to new experiences, when controlling for gender. Based on such findings, H6 was supported. Participants who were more open to new experiences were indeed more likely to select avatars with fewer discrepancies from themselves.

3.2.4. Conscientiousness

To answer RQ1, we explored conscientiousness's effect on the avatar-participant difference metrics and the four self-report items. Conscientiousness was a significant predictor for avatar-participant hip differences, $F(1,168) = 4.10$, $p = .04$, $\beta = .14$, $R^2 = .02$. The less conscientious the participant was, the smaller they made their avatar's hips relative to their own.

Conscientiousness was a marginally significant predictor for avatar-participant waist differences, $F(1,168) = 3.71$, $p = .056$, $\beta = .15$, $R^2 = .02$. The less conscientious the participant was, the smaller they made their avatar's waist relative to their own.

Conscientiousness was a significant predictor for whether participants thought their avatars looked like themselves, $F(1,172) = 5.00$, $p = .03$, $\beta = .17$, $R^2 = .03$. The more conscientious a participant was, the more they thought their avatar resembled their own likeness.

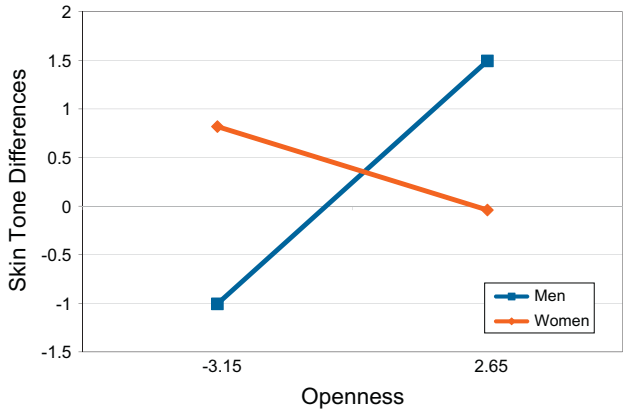

Fig. 1. The figure shows the avatar-participant skin tone differences for men and women based on level of openness.

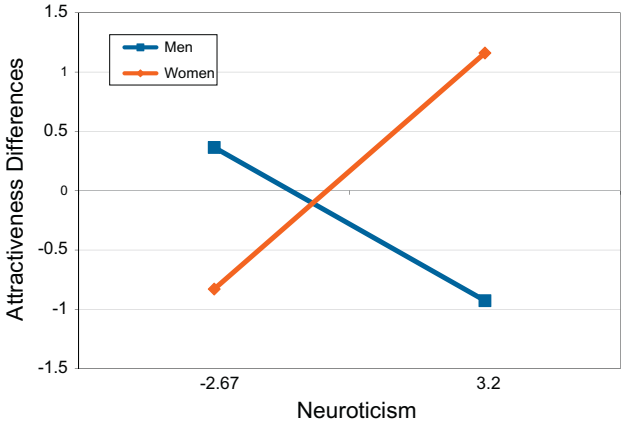

Fig. 2. The figure shows the avatar-participant attractiveness differences for men and women based on level of neuroticism.

Therefore, in answer to RQ1, conscientiousness was a significant predictor for avatar selection, in particular selection of hip size and marginally so for waists. Additionally, conscientiousness was a predictor for how participants view their avatars' similarity in likeness.

3.2.5. Agreeableness

To answer RQ2, we explored the effect agreeableness had on the avatar-participant difference metrics and the four self-report items. Agreeableness was a marginal predictor for one item: whether participants thought their avatars looked like themselves, $F(1,172) = 3.78$, $p = .053$, $\beta = .15$, $R^2 = .02$. The more agreeable a participant was, the more they thought their avatar resembled their own likeness. Based on such findings, there is limited support for agreeableness as a predictor for avatar selection.

There was a significant interaction effect between gender and agreeableness on avatar-participant chest differences, $t(172) = -2.17$, $p = .03$, $\beta = -.26$. Men who were high in agreeableness selected avatars with the largest chests as compared to themselves, whereas women who were high in agreeableness selected avatars with the smallest chests as compared to themselves (see Fig. 3).

There was a significant interaction effect between gender and agreeableness on avatar-participant hip differences, $t(172) = -2.45$, $p = .02$, $\beta = -.30$. Men who were high in agreeableness selected avatars with the largest hips as compared to themselves, whereas men who were low in agreeableness selected avatars with the smallest hips as compared to themselves (see Fig. 4). Thus, H3 is supported.

Agreeable men may have picked larger chests and hips to conform to the big, muscular, masculine ideal (Olivardia, Pope, Borowiecki, & Cohane, 2004; Pope, Olivardia, Gruber, & Borowiecki, 1999). Agreeable women may have selected smaller chests and hips in an effort build less bulky avatars to fulfill the thin ideal (Harrison, 2000; Harrison & Cantor, 1997). Both agreeable men and women may also be attempting to select characters that will engender likeability.

3.2.6. Self-esteem

H7 predicted that participants with low self-esteem would pick avatars with more discrepancies from themselves than would participants with high self-esteem. Self-esteem was a significant predictor for only avatar-participant skin tone differences, $F(1,172) = 4.64$, $p = .03$, $\beta = -.16$, $R^2 = .03$. Participants with low self-esteem picked darker skinned avatars as compared to them-

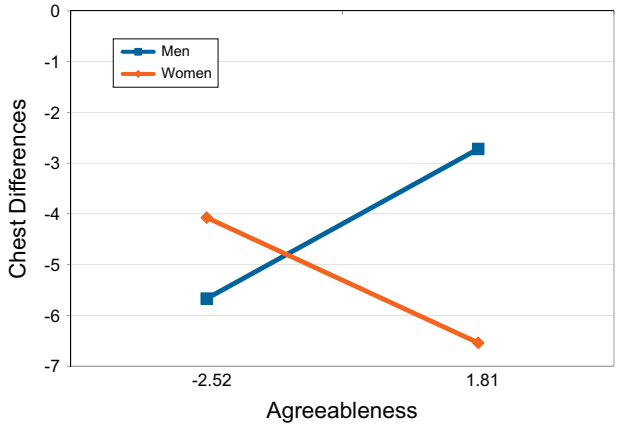

Fig. 3. The figure shows the avatar-participant chest differences for men and women based on level of agreeableness.

selves than participants with high self-esteem. This finding also supports H7. Participants with low self-esteem did select avatars with more discrepancies from themselves than did participants with high self-esteem.

3.2.7. Personality as a moderator

Several regression analyses cited above provide support for H3. Gender's effect on avatar selection is moderated by personality on four metrics. Gender, as moderated by agreeableness, predicted the differences between avatar and participant chest and hip sizes. Gender, as moderated by neuroticism, predicted the differences between avatar and participant attractiveness. And gender, as moderated by openness to new experiences, predicted the differences between avatar and participant skin tones. Therefore, H3 is supported. Personality is a significant moderator for gender's effect on avatar selection and creation.

4. Discussion

Overall, our findings indicate strong connections between people's selection of avatars as a means of self-representation and impression management (Schlenker, 1980). Men and women both selected avatars that differed from themselves in ways that correspond to societal norms. Aside from size, our results indicate that attractiveness and skin tone are particularly important aspects of avatar selection. There also seems to be some significant differences between the user and their avatar for those higher in introversion and neuroticism and lower in self-esteem.

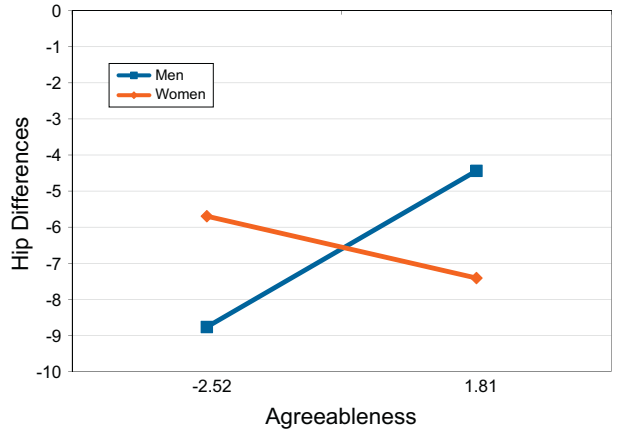

Fig. 4. The figure shows the avatar-participant hip differences for men and women based on level of agreeableness.

4.1. Gender

The results with respect to gender supported our predictions. In terms of the difference between participants and the avatars they designed, gender was a significant predictor for differences in girth, chests, and heights. Additionally, gender was a significant predictor for how participants' viewed their avatars' likenesses. Thus, our findings suggest that some of the gendered expectations for men and women may cross over into certain aspects of virtual life and fall short in others. Consistent with the thin ideal, the belief that thinner is better (Harrison, 2000; Harrison & Cantor, 1997), women did design avatar bodies that were less bulky. Conversely, men selected bulkier avatars, which supports previous research on men and muscularity, and is consistent with body image research (Olivardia et al., 2004; Pope et al., 1999). Surprisingly, men did not appear to value height as much as previously thought, at least in terms of their representation in the virtual world.

4.2. Personality

Our results indicate that personality also impacts how people chose to represent themselves in virtual environments and this effect intersects with gender. For instance, agreeableness alone did not have a strong impact on avatar selection. However, in conjunction with gender, agreeableness was a significant moderator. This suggests that agreeable men may attempt to conform to the idea that society (at least virtual society) would value a big, muscular, and masculine man (Olivardia et al., 2004; Pope et al., 1999). Similarly, agreeable women may not be selecting smaller avatars as a means of reducing body bulk, which would be well within the line of the thin ideal (Harrison, 2000; Harrison & Cantor, 1997). Thus, those who want to please others may do so even when selecting an avatar.

Openness to new experiences was the one Big 5 factor that yielded the greatest number of significant effects on avatar selection. For instance, our findings revealed that men high in openness were more likely to choose darker skin tones relative to their actual skin tone. This makes sense in that men who are open to new experiences would also be open to experimenting with skin colors, tones, or ethnicities as many games allow for and would be less concerned about potential ostracism. The fact that women did not reveal as much variation in terms of avatar skin tone as a function of openness to new experience suggests there may be other factors at play determine why women select the skin tones they do. Furthermore, we found that people who were high in openness to new experience also felt more kindred to their avatars. It stands to reason that if one is interested in trying out new life experiences, they would also be interested in trying previously unobtainable facets of life within a virtual realm (such as darker skin tones). However, as they role-play, those high in openness to new experience may be likely to enveloped by their role-play. Thus, they may naturally see their avatar as a true extension of themselves even though others may not see it as such.

Additionally, introverts were more likely to select attractive avatars than their extravert counterparts were. This is consistent with what other researchers have found previously – that introverts are more likely to turn to computer-mediated communication to facilitate self-presentation (Amichai-Hamburger et al., 2002). Creating more attractive avatars can be seen as an effort to reach out, to attract more social interaction.

Neuroticism served as a moderator for the effect of gender on avatar attractiveness. Women high in neuroticism selected the most attractive avatars. This is consistent with prior research demonstrating that, relative to women low in neuroticism, those who are high in neuroticism, are more likely to use social sites (Amichai-Hamburger & Ben-Artzi, 2003) and to blog (Guadagno et al.,

2008). This suggests that neurotic women may use avatars to present themselves in the best light. Future research should examine this finding particularly in terms of the notion that women high in neuroticism may derive value from the control that self-representation in computer-mediated environments affords them.

4.3. Self-esteem

In terms of our findings regarding self-esteem and self-representation, we found that people with low self-esteem were more likely to pick darker skin tones relative to their actual skin tones and to those people with high self-esteem. The majority of our participants were of Caucasian origin. Recent research has found that some people with lighter skin tones will choose avatars with darker skin tones (a more tan persona; Vasalou et al., 2008). It is reasonable that people with low self-esteem may compensate for pale skin in such a way.

In sum, our research further supports the idea that people use avatars as a means of self-presentation in a virtual world. Participants in the present study often portrayed themselves in advantageous ways that were also consistent with their gender and their personality traits. Thus, it seems that gender and personality can serve as moderating exceptions to what has been the assumption that people will always try to present themselves in the most positive light if afforded the opportunity to do so in a mediated-communication environment (Walther, 1996). Based on our research, men and women will likely select avatars that are consistent with and advantageous for their gender. People who are already on the less than advantageous side of the personality spectrum (introverted, neurotic, low self-esteem) will likely use avatars to, in some way, compensate for such personality shortcomings. Such findings offer a wealth of predictability to theoretical understandings of avatars and avatar selection.

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