



Full Length Article

Virtual vs. real body in exergames: Reducing social physique anxiety in exercise experiences

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ARTICLE INFO

Article history:

Available online 4 May 2014

Keywords:

Exercise
Game
Avatar
Body image
Presence

ABSTRACT

Research indicates that people with body image dissatisfaction (BID) are not benefited from exercising in group contexts. The current study tested whether exercise video games (exergames) can provide unique opportunities for exercise interventions through the use of avatars. An experiment was conducted using a 2 (BID: High vs. Low) × 2 (Exercise context: Solitary vs. Group) between-subjects design. Results demonstrated that individuals with high BID reported similar or more favorable exergame experiences compared to individuals with low BID. Further, individuals' social physique anxiety was significantly reduced during exergame play. Self-presence mediated the relationship between exercise context and exergame experiences.

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1. Introduction

Kinetic, and Wii Fit, require players' active movements through physical activities such as dancing, aerobics, or kick-boxing in game contexts. Exergames have been reported to enhance effective exercise outcomes. For example, exergames help players burn calories (Hancock, 2008) as well as increase overall physical activity levels (Yang, Vasil, & Graham, 2005), aerobic exercise effects, and cardio-physiological benefits (Unnithan, Houser, & Fernhall, 2005).

One of the attractive features of current exergames is that players can create their own game characters, known as *avatars*. Avatars influence players' virtual experiences in many ways. For example, use of avatars increases enjoyment during the virtual experience and affect the way people behave in virtual environments (Fox & Bailenson, 2009; Yee & Bailenson, 2007). However, the current literature has paid less attention to how the use of a virtual body affects players' exergame experiences, especially among those with body image concerns.

Moreover, although abundant studies have tested the effects of exercise context (e.g., Solitary vs. Group) on exercise experiences in medical and sports psychology domains, little is known in the exergame context. Individuals with body image concerns may

not enjoy exercising in traditional public exercise environments (e.g., fitness centers, local gyms). However, in the exergame context, body image concerned-individuals may enjoy exercise experiences as they can use a virtual body through an avatar that does not reflect their real body image. Thus, the present study tests whether use of avatar in the exergame contest can be an effective way to promote exercise.

2. Theoretical framework

2.1. Effects of exercise context and body image dissatisfaction

Exercise context is an important predictor of exercise experience (Hausenblas, Brewer, & Van Raalte, 2002; Rejeski, 1994). For example, McAuley, Blissmer, Katula, and Duncan (2000) found that individuals engaged in group exercise reported more positive well-being and less psychological distress compared to individuals who exercised in a solitary context, regardless of exercise intensity and duration. The positive effect of a group setting, however, depends on individual differences such as one's level of body image dissatisfaction (BID). BID serves as an exercise barrier (Ball, Crawford, & Owen, 2008; Kruger, Lee, Ainsworth, & Macera, 2008) by decreasing exercise motivation especially in settings where body image may be more salient, such as workout groups or mirrored environments (Ginis, Jung, & Gauvin, 2003; Hausenblas et al., 2002; James, 2000; Katula & McAuley, 2001; Spink, 1992).

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One of the reasons that people with low BID report unfavorable exercise experiences in group settings may be related to social physique anxiety. Social physique anxiety refers to a feeling that one's body is being evaluated by others and has been identified as a major hurdle for exercise practice in group settings or within the presence of others (Belling, 1992; Ginis et al., 2003; Hausenblas et al., 2002; James, 2000; Spink, 1992). Studies report that people with social physique anxiety tend to experience embarrassment in a group setting, which results in loss of exercise motivation (Belling, 1992; Spink, 1992).

2.2. Virtual body and presence in virtual environments

According to the Proteus Effect, a theoretical perspective explaining the impact of avatars on technology users, people in virtual environments make inferences about their expected dispositions from their avatars' appearance and conform to the expected attitudes and behaviors of the avatars (Yee & Bailenson, 2007; Yee, Bailenson, & Ducheneaut, 2009). A great deal of empirical studies have confirmed the Proteus Effect in a variety of contexts (e.g., Bailenson, Yiengar, Yee, & Collins, 2008; Ersner-Hershfield, Bailenson, & Carstensen, 2008; Fox & Bailenson, 2009; Fox, Bailenson, & Binney, 2009; Groom, Bailenson, & Nass, 2009; Messinger et al., 2008; Yee & Bailenson, 2007; Yee et al., 2009). For example, a study found that individuals using attractive and tall avatars were less interpersonally distant to other avatars, exhibited higher self-disclosure, and showed more confidence than those using less-attractive, shorter avatars in virtual environments (Yee & Bailenson, 2007). Similarly, individuals using more attractive avatars demonstrated more outgoing and extroverted behaviors in virtual environments (Messinger et al., 2008).

Similarly, recent research examined whether the reflection of physical attributes of an ideal self, compared to an actual self, had any influence on individuals' technology experiences. Results found that people who used an ideal version of self—a self they hope to be—reported stronger perceived interactivity during video game play compared to people who used a self that reflected their current attributes (Jin, 2009).

Examining how and why avatars influence user experiences is crucial to assessing the effects of avatars. The theoretical concept of self-presence explains the link between users and avatars. As one of three types of presence (i.e., physical, social, and self-presence), self-presence refers to technology users' sense that a virtual self (e.g., an avatar) is felt like an actual, physical self (Lee, 2004). That is, technology users experience self-presence through the relationship between their actual body and the avatars' body, emotion, and identity (Ratan & Hasler, 2010; Ratan, 2010). Various empirical studies found a significant mediating role of presence in various virtual experiences (e.g., Jin & Park, 2009; Song, Kim, Tenzek, & Lee, 2010). For example, Song et al. (2010) found that competition in game increases enjoyment through presence.

In sum, based upon the existing empirical and theoretical evidence, the current study examines how the use of a virtual body through an avatar affects individuals' exercise experiences. Particularly, the study explores whether BID would be attenuated in virtual environments and whether BID would impact exercise experiences in solitary or group play. Finally, the study explores a role of self-presence during exergame play.

RQ1a–c: How do body image dissatisfaction and exercise context affect individuals' (a) enjoyment, (b) mood, and (c) perceived exercise accomplishment during exergame play?

RQ2: In the group context, will social physique anxiety be reduced during exergame play?

RQ3: What is a role of self-presence in predicting perceived exercise accomplishment?

3. Method

3.1. Participants

The study employed an experiment using a 2 (BID: High vs. Low) \times 2 (Exercise context: Solitary vs. Group) between-subjects design. Initially, a total of 225 students were recruited from a mid-sized Midwestern university in the U.S. Upon participants' agreement, an online survey was administered to identify participants who meet the criteria of the study. Based upon the score of BID ($M = 4.97$, $SD = 1.77$, $Me = 5.44$), a high BID group (upper 30%, participants with a BID score higher than 6.3 out of 10) and a low BID group (lower 30%, participants with a BID score lower than 4.5 out of 10) were identified. Respondents meeting the criteria were invited to the experiment, and the remaining group of respondents, who did not meet the criteria, were thanked and dismissed from the study.

Thus, a total of 72 individuals participated in the study. A total of 33 individuals (45.8%) were placed in a low BID group ($M = 2.6$, $SD = 0.9$), and 39 individuals (54.2%) were placed in a high BID group ($M = 7.0$, $SD = 1.1$). There were slightly more males ($n = 38$; 52.8%) than females ($n = 34$; 47.2%) in the sample.

3.2. Procedure

Participants were invited to come to a research lab at a scheduled time. They were randomly assigned to either group ($n = 38$) or solitary ($n = 38$) context, and asked to play Nintendo Wii's boxing video game. In the group context, each group was composed of two to six strangers and included mixed gender and mixed BID groups. In other words, it was ensured that each group has both male(s) and female(s) and nature of high BID and low BID. Group were allowed to play a game for a total of 20 min, continuously rotating turns throughout the allotted time. Participants played against the computer by sharing the same generic avatar, which was randomly pre-picked from the default set; body sizes of all the avatars were the same in medium range. The rationale for using the same avatar for each participant in groups is to avoid any potential for perceived differences of avatar's body image.

In the solitary context, participants played the game alone for a minimum of five minutes, but were allowed to play up to 20 min if they wished. Game conditions were identical to those of the group context, except that no other players were present during the play. In both contexts (group and solitary), experiments were conducted in the lab without any outside observation to avoid any possible effects of researchers' presence. After the game play, all participants completed follow-up questionnaires.

3.3. Measures

The screening test included items measuring BID and social physique anxiety. BID ($\alpha = .88$) was measured with nine items (e.g., "I feel satisfied with the shape of my body," a reversed item), adopted from an existing measure (Garner, Olmstead, & Polivy, 1983). Social physique anxiety ($\alpha = .88$) was measured with seven items (e.g., "I am concerned about how others might judge my appearance"), modified from previous research (Yao & Flanagan, 2004).

After game play, participants filled out questionnaires measuring exergame experiences. Enjoyment ($\alpha = .86$) was measured with six items (e.g., "It was fun"), modified from previous research (Klimmt, Rizzo, Vorderer, Koch, & Fischer, 2009). Mood ($\alpha = .82$) was measured with five items (e.g., "I feel refreshed after exercising with this game"), modified from previous research (Song, Peng, & Lee, 2011). Self-presence ($\alpha = .81$) was measured with four items

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