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ORIGINAL ARTICLE

The Impact of Body Emphasizing Video Games on Body Image Concerns in Men and Women

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Abstract Two studies were conducted to determine if playing a video game that emphasized the body would increase negative body-image. Both studies [study 1 (N=51); college-aged males from the Midwestern USA; and study 2 (N=32); college-aged females from the Midwestern USA] had participants complete body image measures, play a video game that displayed muscular or thin characters for 15 min, and then complete post-game body image measures. Results showed that participants in both studies had significantly lower body esteem after video game play. Further, these findings were independent of the time spent playing video games and body mass index. This suggests that video games have a negative influence on the body-image of players.

Keywords Video games · Body image · Body esteem · Body satisfaction

Introduction

The way in which people think and feel about their bodies have important consequences for males and females. Research has suggested that males and females who think and feel negatively about their body have an increased probability of using steroids, engaging in unhealthy amounts of exercise, and eating disorder symptomatology (see Ricciardelli and McCabe 2004 for a review). The mass media (as well as other sources including family and peers) has been one factor that can influence how people feel and think about their bodies. Research has shown that media which emphasizes large muscles negatively affects males, while women are most negatively affected by media which emphasizes being thin. Research has shown that males and females of all ages are impacted by body-emphasizing mass media (Standford and McCabe 2002) and across a variety of media formats including television and magazines (see Groesz et al. 2002 for review).

To date, there has not been any published research investigating if video games that emphasize thin female characters and muscular male characters have similar effects in players. Video game statistics alone suggest that studying such effects are important, as research has shown that children play video games an average of nine hours a week (Anderson et al. 2007), while over 70% of college students classify themselves as avid video game players (Weaver 2003). In a content analysis of video games, Dietz (1998) found that females are portrayed as, "visions of beauty with large breasts and thin hips (pp. 435)" which is an example of the current standard of beauty that women strive to look like. Furthermore, video games (unlike television or magazines) offer an active role for players to become and control their video game characters. This allows players to become more immersed, or become a part of, the virtual world. Research has shown that video game play is related to immersion (e.g., Ivory and Kalyanaraman 2007), but has yet to be tested in terms of body image in media. Perhaps participants will be more likely to think and feel bad about their body more after video game play rather than television viewing because the players get to assume the role of the characters in a video game. Recent video games allow for a greater amount of immersion than earlier

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video games because the more modern video games allow the players to create characters in great detail, including hair color, eye color, face shape, hair style, height, weight, muscularity level, and so forth. Thus, in more recent video games, players have the ability to create players that closely resemble their actual or ideal appearance, which may further the amount of immersion in the game.

Two studies were conducted in order to determine if playing a video game that emphasized the male or female body would increase negative body-images in both male and female participants. Both studies utilized similar methodologies and sampled college-aged participants, who are especially at risk for eating disorders. Both studies had participants complete baseline measures of how they think and feel about their body, played a body-emphasizing video game for fifteen minutes, and then completed post-game body image measures. Overall, it was predicted that males and females would feel worse about their body after playing these games because of the frequent depictions of muscular male and thin female characters.

Negative Body-Images

Consistent across various psychological disorders (such as anorexia nervosa, bulimia, and muscle dysmorphia) are negative feelings about the body, or a negative body-image. For the purposes of the current research, the operational definition of a negative body-image is "a way of thinking and feeling about one's body that negatively influences the person's self-esteem, body esteem, and body satisfaction (Barlett et al. 2005, pp 877)." Using this definition, research has shown that exposure to body emphasizing mass media negatively impacts the viewer's self-esteem, body esteem, and body satisfaction (Fawkner and McMurray 2002). Each of these three constructs is related to one another, but conceptualized differently. Body esteem is defined as the affective, or feeling, component about the body (Franzoi and Shields 1984). Body satisfaction is the cognitive component and is associated with negative thoughts about the body (Baranowski et al. 2003). Finally, according to Rosenberg (1965), self-esteem is defined as an overall feeling of self-worth and happiness with your self. Self-esteem is not specifically isolated to self-worth about the body, but research has shown that body esteem and body satisfaction are significantly correlated with self-esteem (Barlett et al. 2005), which suggests that happiness with the body is just one portion of self-esteem.

In addition to body esteem and body satisfaction, drive for muscularity and positive attitudes towards muscularity are important variables for men. Ricciardelli and McCabe (2004) conceptualize the pursuit of muscularity as any behaviors that are indicative of having a negative body image, such as steroid usage. Thus, the drive for muscularity should be related to body dissatisfaction after socially comparing with "ideal" media images. Positive attitudes towards muscularity is operationalized as thoughts and feelings related to muscularity. One may have positive attitudes towards muscularity and then subsequently take steroids because thinking and feeling that muscles are good may subsequently influence social comparison processes. Research using both these scales (Hatoum and Belle 2004) found that positive attitudes toward muscularity and drive for muscularity are both related to pressure from the mass media to change one's body.

The extent to which one thinks and feels about their body and how one feels about their overall self-worth has been shown to be linked to psychological and behavioral negative outcomes. For example, research has shown that having a negative body-image is positively correlated with psychological disorders, such as feelings of depression (Cafri et al. 2002) and anxiety (Tantleff-Dunn and Thompson 2000). Having a negative body-image is also related to various behavioral outcomes, such as excessively exercising (Ricciardelli et al. 2000), dieting (Hausenblas and Fallon 2002), and having a higher probability of using steroids (McCabe and Ricciardelli 2004). These types of behaviors often lead to, or are related to, a variety of life-threatening illnesses, such as eating disorders.

Since negative body-images are related to serious psychological and behavioral actions, an important question is: Where do these negative body-images come from? The literature has shown that peers and family (Kearney-Cooke 2002; Murray et al. 1995; Phares et al. 2004) are two important sources of where individuals get a sense for how they should think and feel about their body. Another source of negative body-image attainment is the mass media. Research has shown that a variety of mass media outlets can impact one's body-image, including magazine pictures (Frederick et al. 2005) and television commercials (Stice and Shaw 1994).

Negative Body-Images in Females by the Mass Media

The majority of work on negative body-images induced by the mass media has used female samples, and research has shown that after exposure to thin female models, women have more of a negative body-image and every component of a negative body-image is impacted. Specifically, research has shown that women will have lower body satisfaction (Hargreaves and Tiggeman 2002), body esteem (Ogden and Mundray 1996), and self-esteem (Champion and Furnham 1999) after viewing thin female models. Further, it has been shown that after viewing thin female media depictions, women will have more eating disorder symptomatology (Stice and Shaw 1994) and anxiety (Lin and Kulik 2002). These results are robust, as research has shown that these

effects are generalizable across multiple media formats, including celebrity pictures (King et al. 2000), television programs (Stice and Shaw 1994), and even Barbie (Dittmar et al. 2006).

Groesz et al. (2002) conducted a meta-analysis on how female participants felt about their body after being experimentally shown thin female models across multiple media formats (e.g., commercials, slides, and magazines). Results showed that across 43 effect size estimates female participants who were experimentally shown media of thin female models felt significantly worse about their bodies than those who were not exposed to such stimuli (d=−.31; negative values indicate a more negative body-image).

Negative Body-Images in Males by the Mass Media

Recently, there has been a focus on how males respond to mass media images in relation to feelings and thoughts about their body. Unlike the stimulus that increases negative body-images in females, research has shown that the "ideal" body image for men is muscular and that males are negatively impacted by muscular stimuli. Despite the difference between men and women on what stimuli increases their negative body-image, research has shown that like women, men will have a decrease in their body esteem (Leit et al. 2002), body satisfaction (Agliata and Tantleff-Dunn 2004), and self-esteem (Palladino and Pritchard 2003) after viewing muscular stimuli in the mass media. These results are robust, as research has shown that television commercials (Agliata and Tantleff-Dunn 2004), magazine pictures (Hausenblas et al. 2003; Humphreys and Paxton 2004), and even action figures (Barlett et al. 2005; Barlett et al. 2006) have this effect.

Recently, two meta-analyses conducted by Barlett et al. (2008) found that across 93 effect size estimates, males who were exposed to a muscular stimuli had a significantly higher negative body-image (d=−.20; negative values indicate more of a negative body-image). These results were robust to which media format, how muscular the male stimuli was, and across the different constructs that make up a negative body-image, including body satisfaction and body esteem.

Theoretical Frameworks

The tripartite influence model (Shroff and Thompson 2006; Smolak et al. 2005) proposes that three sociocultural influences (parents, peers, and the mass media) are directly related to body dissatisfaction. Once body dissatisfaction is increased due to one (or more) of the aforementioned sociocultural influences, it is predicted that behavioral outcomes (e.g., bulimia and steroid usage) will increase. Also, the three sociocultural factors also have an indirect link to behavioral outcomes. Internalization of societal standards and appearance comparison are both predicted to mediate this relationship. Thus, the reason why the mass media negatively influences self-image is because people will often compare their own body to the image they are viewing (appearance comparison process) or internalize the standards of "beauty" that the stimuli represent. Overall, those who view appearance-related mass media are predicted to have lower body satisfaction and will compare their own body to these depictions. Then, either directly or indirectly (through the aforementioned mediated pathways), people will have an increase probability of performing behavioral actions that reflect the consequences of feeling bad about one's body (e.g., steroid usage, bulimia). Interestingly, this model does not make any predictions about positive attitudes toward muscularity. However, we conceptualized drive for muscularity to be similar to behavioral intentions to engage in negative health related behaviors (e.g., steroid usage), which is consistent with similar theoretical frameworks (Ricciardelli and McCabe 2004).

As the aforementioned description of the Tripartite Influence Model states, there are no predictions made about the role of personological variables that are related to how one thinks and feels about one's body. For instance, this model does not posit that body mass index or the number of hours spent viewing the mass media moderates the overall relationship. Thus, people who are fat, thin, tall, short, muscular, or non-muscular are all predicted to be influenced by the immediate exposure of "ideal" images in the mass media. However, a model by Cafri et al. (2003) posits that certain biological factors (e.g., age, puberty timing) moderate the relationship between sociocultural factors and body dissatisfaction. Thus, testing moderating variables is important in the current study.

Study 1

Overview of the Current Study

The purpose of the current study was to determine if playing a video game that emphasized the muscular male body would increase negative body-images in males. Based on the Tripartite Influence Model and the past literature, the following hypotheses were derived:

H1: There will be a decrease in body esteem, body satisfaction, positive attitudes toward muscularity, and an increase in the pursuit of muscularity after playing a video game that emphasizes muscles.

Specifically, this hypothesis is a test of the Tripartite Influence Model and the past literature which has shown

that males will think and feel worse about their body after exposure to muscular stimuli.

H2: Participants who feel as though the muscular characters resembles the character will think and feel worse about their bodies compared to those who do not feel as though the character resembles them.

This hypothesis is a test to determine if the degree of immersion will impact the overall relationship between video game play and negative body image. Thus, rather than measuring immersion, we manipulated immersion by having participants create a character that resembles them as closely as possible. If confirmed, this will suggest that the degree to which the characters in video games resemble players is an important factor in thinking and feeling bad about one's body.

H3: Body mass index and the number of hours spent playing video games will not moderate the overall relationship between video game play and negative body-image.

In other words, this hypothesis states that there will not be any significant main effects or interactions involving the participant's body mass index (BMI) or hours spent playing video games on any dependent variable. If confirmed, this will support the Tripartite Influence Model, which does not make any predictions about personological (gender, hours spent viewing media, participant's BMI) factors moderating the overall relationship, rather than the model proposed by Cafri et al. (2003). Thus, exposure to the mass media should impact muscular and non-muscular males, heavy and non-heavy gamers and similarly.

Method

Participants

Fifty-one males from a large Midwestern University participated in the current study for partial course credit for their General Psychology class. The average age of this sample was 19.22 (SD=4.63) years. The majority of the participants were freshman or sophomore undergraduates (84.3%) and Caucasian (82.4%). The average height and weight of these participants was 5′6″ and 178.73 lb. Using the National Institute of Health's (NIH) BMI calculator (kg/m^2; http://www.nhlbisupport.com/bmi/), the average BMI was 24.74 (SD=3.42). According to classification system established by the NIH, 29 (56.9%) participants were classified as normal weight, 18 (35.3%) were classified as overweight, and 4 (7.8%) were classified as obese. On average, this sample played video games 6.56 (SD=5.68) hours per week (range = 0–24 h).

Materials

Video game The video game selected was *WWF Wrestlemania 2000*, for the Nintendo 64. This game is a wrestling video game in which the player has control over one character and uses wrestling moves to defeat a computer controlled character. In the single-player mode, when various wrestling moves (slams) were used, the screen zoomed into the characters, giving the player a close-up picture of what the "slam" looks like, while focusing on the bodies. This game contains all of the most popular WWF (World Wrestling Federation) wrestlers at the time the video game was released (2000; e.g., Stone Cold Steve Austin and The Rock).

As the player plays the game, their objective is to defeat their computer-controlled opponent in a wrestling match using a variety of wrestling moves and techniques and to avoid being defeated by the computer. There are three ways for the player to defeat the computer opponent. The first is to pin the opponent (a three count), the second is to put the opponent in a submission hold (e.g., a choke hold) causing the computer character submit, and the third is knock the opponent unconscious. The player has an unlimited amount of time to defeat the computer opponent.

This game was selected for a variety of reasons. The first is that, unlike previous body image research, the stimulus (i.e., the video game) was not a typical method to induce a negative body-image. Thus, it was unlikely that the participants knew what the true purposes of the study were, which alleviates social desirability concerns and demand characteristics. The second reason is that this wrestling video game put a strong emphasis on the male body, especially bodies that have a high degree of muscularity. *WWF Wrestlemania 2000* contained a multitude of characters that had large muscles that were well defined. The third reason this game was selected was that the researcher had a great deal of experimental control by pre-determining who the participant's computer character opponent would be. This game allowed the researchers to manipulate the body size, muscularity size, and clothing of characters, thus having control over the body type of the computer opponent. For the purposes of the current study, we chose to create a very muscular (well defined muscles) character and an obese character (not well defined muscles). A "thin" neutral character was not included because, although having the lowest possible body mass, the muscles of a thin character were very well defined, which was absent from the obese character. The final reason was that the player was asked to create a character that most resembled them. As previously stated, this game allowed for the manipulation of the body type, muscularity size, and clothing of the characters. The participants were asked to create a character that resembled themselves and play as that

character. This allowed for a higher degree of immersion because the character that the player is controlling was supposed to have skin and facial features like the participant, have a similar height and weight as the participant, and even have the participant's name as the characters name.

Although this video game and video game system were not the most modern at the time of the data collection, this game allowed for the optimal amount of experimental control, allowed the participants to create themselves as a wrestler, and was a relatively simple game for the participants to play. Other modern video games and video game systems did not allow for all of the aforementioned advantages to be utilized.

Questionnaires The first questionnaire was the Body Esteem Scale (Franzoi and Shields 1984), which was used to assess state body esteem. This scale contains 35 items, however, only 33 are applicable to men. This measure utilized a 1 (have strong negative feelings) to 5 (have strong positive feelings) Likert scale, with higher numbers indicating higher body esteem. The questions asked participants to respond to how they feel about certain parts of their body (i.e., biceps, arms) and certain behaviors indicative of good physical stature (i.e., physical coordination, physical stamina). Franzoi and Shields (1984) factor analyzed the items on this scale and found that, for men, the items significantly loaded onto three factors. The first is the Physical Attractiveness (PA) subscale, which contained 11 items, which assesses how physically attractive participants feel about various parts of their body (e.g., face). The second subscale is the Physical Condition (PC) scale, which contains 13 items to assess how participants feel about the parts of their body which are related to being in good shape (e.g., appearance of stomach, health, weight). The final subscale is the Upper Body Strength (UBS) scale, which contains nine items to assess how participants feel about various parts of the body that are related to upper body strength (e.g., body build, muscular strength). The range of possible total scores on the entire scale is 33–165. Reliability analyses showed that the BES was moderately reliable at baseline (α=.58) and reliable at time 2 (α=.89). It is predicted that the lower reliability of the BES at baseline is a function of the unreliable PA subscale at baseline (α=−.07), while the other two subscales were reliable (α_{PC}=.89 and α_{UBS}=.74). However, all of the subscales were reliable at time 2 (α_{PC}=.86, α_{PA}=.66, and α_{UBS}=.86).

The second measure was the Swansea Muscularity Attitudes Questionnaire (SMAQ; Edwards and Launder 2000). This is a 20-item measure that assesses attitudes toward muscularity which uses a 1 (definitely) to 7 (definitely not) Likert scale, with higher numbers indicating poorer attitudes toward muscularity. This is a state measure and the questions ask the participants to respond to a variety of items assessing how they think, feel, and would behave in certain scenarios. For example, one item states, "I feel bad about my body when I do not feel very big or muscular." This scale is divided into two subscales, based on the results from a factor analysis (Edwards and Launder 2000). The first subscale is the Positive Attitudes toward Muscularity (PAM), which is a ten-item subscale. An example item includes, "Being muscular gives me confidence." The second subscale is the Drive for Muscularity (DFM), which is a ten-item subscale. An example item includes, "I aim to further develop my physique." The total range of possible scores on the entire scale is 20–140. For the purposes of the current study, both the PAM and DFM measured aspects of body satisfaction. Specifically, the DFM is similar to the drive for thinness in females and the PAM measures both thoughts and feelings about muscularity. Reliability analyses showed that the SMAQ had acceptable reliability at baseline (α=.94) and time 2 (α=.96). The PAM and the DFM had acceptable reliabilities at baseline (α_{PAM}=.91 and α_{DFM}=.89) and at time 2 (α_{PAM}=.94 and α_{DFM}=.92).

The third measure was the Male Body Image and Esteem Scale (MBIES; Markunas et al. 2003), which measures the body esteem in men. Unlike the BES, this scale assesses how men feel about certain statements, which are related to their body, rather than how an individual feels about certain body parts or actions. One item reads, "I like to have my picture taken." This scale consists of 20 items that are scored on a 1 (not a characteristic) to 7 (extreme characteristic) Likert scale, with higher scores being indicative of higher body esteem. The total range possible on this scale is 20–140.

Past research which has used the MBIES (Barlett et al. 2005) has treated the items on the MBIES as a state measure. However, closer examination of certain items revealed that some of the items are assessing state and some are assessing trait male body esteem. The state items ask questions that could change as a function of exposure to a stimulus. For instance, "I'm content with the way I look" can change as a function of exposure to a stimulus (e.g., a muscular model in a magazine). Other items were written such that they should not change as a function of exposure to a stimulus, which suggests that some of the items as assessing trait body esteem. For example, one item read, "I go to the gym enough so that the employees know me by name." Independent of whether the participant just saw a muscular male model on a magazine or not, that should not affect the extent to which people actively go the gym enough such that the employees know the participant by name. Therefore, the MBIES was separated into two subscales. The first was a state measure of male body esteem, which contained ten items, and the second was a

trait measure of male body esteem, which also contained ten items. The Likert scale and interpretation of the results from each subscale are identical to the original MBIES. Reliability analyses showed that the MBIES (entire scale) had acceptable reliability at baseline (α=.88) and time 2 (α=.91). When the MBIES was divided into the state and trait portions, the results showed that both had acceptable reliabilities at baseline (α_{state}=.79 and α_{trait}=.87) and at time 2 (α_{state}=.88 and α_{trait}=.83).

The fourth measure was a demographic questionnaire. This measure assessed demographic variables, such as age, year in school, and ethnicity. Also assessed was height and weight of the participants, which was used to calculate their BMI, based off of the National Institute of Health's website (http://www.nhlbisupport.com/bmi/). Finally, amount of video game play was assessed by asking participants how often they played video games on every day of the week, on average. These items were summed to get an assessment of how often the participants played video games weekly.

The final questionnaire was a suspiciousness questionnaire. Due to the highly publicized nature of video game effects and the heavy emphasis on body image questions, two questions were asked to determine if the participants had been told about the hypotheses of the current study prior to being in the study, and if they were able to infer the predictions of the current study based on the questions asked on the scales. Analysis of this questionnaire revealed none of the participants knew the purposes of the current study prior to being debriefed.

Procedure

Upon completion of the informed consent and experimental credit slips, participants were randomly assigned to play the video game in either the muscular (n=27) or non-muscular (n=24) condition. Participants were given all baseline body-image measures to complete by either a male or female research assistant. These measures included the BES, SMAQ, and MBIES. Once these measures were completed, participants were then given an instruction sheet which informed them how to create a wrestler to resemble the appearance of the participants. Specifically, this sheet instructed participants to change a default looking wrestler to have the same skin color, hair color, hair cut, facial hair, height, weight, face shape, and muscle mass as they have. After the basic bodily features were changed to resemble the participant, the instruction sheet had participants dress the character such that the character was not wearing a shirt and had short wrestling shorts on (exposing the character's leg and upper torso). Finally, the participants were instructed to name the character their name in order to help aid in the immersion the participants could feel from creating a character in the video game. During this time the research assistant was present to answer questions and to time the length of time it took participants to create their character. Results show that it took participants an average of 6.72 (SD=2.18) minutes to create their character. Also, the research assistant rated on a 1 (not at all) to 7 (extremely) Likert scale how much the participant resembled the video game character the participant created. Results showed that the participants, on average, were able to create characters that looked like them (M=5.39, SD=.90), as the mean score was above the midpoint of the scale.

After the participants created the character that resembled their appearance as closely as possible, they were instructed to play the wrestling game for the remaining amount of time (which added up to 15 min). Those in the muscular condition were to use their character to wrestle a researcher-created computer controlled muscular wrestler. This wrestler was created to have the most muscular body that could be created in this game. Specifically, this wrestler had well-defined muscles and was wearing the same clothes as the participant's character. All facial features (e.g., face shape) did not differ from the default character. The participants used their character to wrestle the muscular character until the 15-min time frame had past. Those in the obese condition were to use their character to wrestle a research-created computer controlled obese wrestler. This wrestler was created to have an obese physique, which included a large stomach, not well-defined muscles, and fat thighs. Specifically, this character was obese and was wearing the same clothes as the participant's character. The participants used their character to wrestle the non-muscular character until the fifteen-minute time frame had elapsed.

Once the fifteen minute of video game play past, the participants completed all time 2 measures. These included the BES, MBIES, SMAQ, the demographic questionnaire, and a suspiciousness questionnaire. After completion of these measures, the participants were thanked and fully debriefed. It is important to note that the video game performance was never measured. Since a male and female research assistant ran the study and interacted with the participants, analyses were conducted to determine if their presence influenced the overall results. T tests on all dependent variables showed that there was no significant difference between the male and female research assistant on any of the variables.

Results

Prior to the main analyses, one note of caution is warranted. The results from the full 2 (time) × 3 (BMI) × 2 (video game type) analysis of variance will not be presented or interpreted for any significant NIH main effects or

interactions for any dependent variable. The distribution of participants was not equal across the cells in this design. Four participants were classified as obese, 18 were classified as overweight, and 29 were classified as normal weight, according to the NIH classification system. According to Howell (2002), unequal cell sizes in a factorial design puts too much weight on too few participants, thus possibly putting too much influence on the mean of that cell, which can influence the omnibus *F* test. However, the results from the overall analyses did show that NIH classification system significantly interacted with factors on the SMAQ, DFM, and PAM and marginally interacted with factors for the BES; thus it is inappropriate to take it out of the factorial design because this factor is needed in order to get a better estimate of the population variance, which it must account for (Cohen and Cohen 1983). Finally, treating BMI as a covariate is not appropriate because it violates the assumptions of a covariate, namely it significantly and marginally interacts with the other factors in the overall design (Howell 2002). Using these arguments, BMI was left in the factorial design, but any significant main effects or interactions with BMI should not be interpreted.

Correlation Between Measures

Correlations between all of the variables and their subscales were assessed (see Table 1). Results showed that the MBIES state and the MBIES trait measures were significantly correlated with the BES and its subscales (all *p*s <.05). This suggests that general body esteem and male focused trait body esteem are related to one another, as predicted. The state measure of the MBIES was significantly correlated (all *p*s<.05) with all variables with the exception of the SMAQ and its subscales (all *p*s>.05), suggesting that the state version of the MBIES is not related to positive attitudes about muscularity or the drive for muscularity. The SMAQ and its subscales showed high divergent validity with the other measures. Most notably, the SMAQ and its subscales were not significantly correlated with the BES (and its subscales) or the MBIES state measure (all *p*s>.05). This suggests that the attitudes one has towards muscularity and the drive for muscularity is a separate construct from general and male body esteem.

Body Esteem

In order to test the first hypothesis, which stated that playing a video game that emphasized muscular male bodies would decrease body esteem, a 2 (time) × 3 (BMI) × 2 (video game type) mixed analysis of variance (ANOVA) was conducted with the score from the BES as the dependent measure. The results show that there was a significant main effect for time, $F(1,45)=242.19$, $p<.001$, *partial* $\eta^2=.84$, such that body esteem decreased from baseline ($M=107.84$, SD=13.27) to post-video game play ($M=103.34$, SD=12.71), which supports the first hypothesis. No other main effects or interactions were statistically significant (see Table 2).

Each of the three subscales of the body esteem scale was analyzed in order to determine which construct of body esteem was the most influenced by video game play. The same 2 (time) × 3 (BMI) × 2 (video game type) mixed ANOVA was conducted on the responses from the Physical Condition (PC) subscale. The results show that there was a significant time X video game type interaction, $F(1,45)=5.04$, $p<.05$, *partial* $\eta^2=.10$. Examination of the means and standard deviations show that those in the muscular

Table 1 Correlations between the dependent variables in study 1.

	1	2	3	4	5	6	7	8	9	10
MBIES	–	.45**	.61**	.41**	.45**	.61**	.43**	.61**	.84**	.92**
SMAQ	.31*	–	.15	.95**	.96**	.08	.09	.19	.50**	.26
BES	.62**	.06	–	.18	.12	.71**	.66**	.72**	.51**	.55**
DFM	.24	.94**	.07	–	.83**	.13	.13	.15	.21	.47**
PAM	.34*	.96**	.06	.80**	–	.02	.04	.21	.28*	.49**
PC	60**	.06	.88**	.08	.04	–	.61**	.61**	.46**	.60**
PA	.36**	.01	.69**	.05	.05	.42**	–	.44**	.38**	.37**
UBS	.48**	.08	.83**	.01	.13	.68**	.31*	–	.46**	.60**
MBIES (s)	.90**	.18	.50**	.14	.20	.44**	.39**	.34*	–	.55**
MBIES (t)	.93**	.37**	.62**	.29*	.41**	.65**	.28*	.52**	.69**	–

Values above the diagonal are baseline measures and values below the diagonal are time 2 values. These correlations are from the male sample. *MBIES* Male Body Image Esteem Scale, *MBIES* (s) Male Body Image Esteem Scale state items, *MBIES* (t) Male Body Image Esteem Scale trait items, *SMAQ* Swansea Muscularity Attitudes Questionnaire, *DFM* drive for muscularity, *PAM* positive attitudes toward muscularity, *BES* Body Esteem Scale, *PC* physical condition, *PA* physical attractiveness, *UBS* upper body strength

* $p<.05$

** $p<.01$

Table 2 Means and standard deviations for the questionnaires for study 1 using the 2 (time) × (3 BMI) × 2 (video game type) mixed ANOVA for men.

Scale	Baseline		Time 2		Endpoints
	Mean	SD	Mean	SD	
MBIES	81.43	18.06	79.47	19.55	20–140
MBIES (state)	44.48	8.64	43.31	9.57	10–70
MBIES (trait)	36.59	11.82	36.16	11.70	10–70
BES**	107.84	13.27	103.34	12.71	33–165
PC	46.65	7.76	46.45	6.86	13–65
PA	38.22	4.69	36.96	4.75	11–55
UBS	32.27	5.30	32.20	5.27	9–45
SMAQ**	91.25	20.09	89.63	21.48	20–140
DFM**	48.80	9.93	47.75	10.33	10–70
PAM**	43.06	11.09	41.88	12.29	10–70

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

MBIES Male Body Image Esteem Scale, *MBIES* (s) Male Body Image Esteem Scale state items, *MBIES* (t) Male Body Image Esteem Scale trait items, *SMAQ* Swansea Muscularity Attitudes Questionnaire, *DFM* drive for muscularity, *PAM* positive attitudes toward muscularity, *BES* Body Esteem Scale, *PC* physical condition *PA* physical attractiveness, *UBS* upper body strength

condition had a decrease in their scores from baseline (M=48.37, SD=6.28) to time 2 (M=46.70, SD=6.80). Those in the non-muscular condition had an increase in their scores from baseline (M=44.71, SD=8.87) to time 2 (M=46.17, SD=7.06). The results from the remaining two subscales yielded no significant main effects of interactions.

A 2 (time) × 3 (BMI) × 2 (video game type) mixed ANOVA was conducted with the scores from the trait section of the MBIES as the dependent variable. The results show that none of the main effects or interactions were statistically significant, all Fs<2.61, all ps>.05. The ANOVA using the state items showed a significant time X video game type interaction, $F(1,45)=4.97$, $p<.05$, *partial* $\eta^2=.10$. Simple effects analysis showed that there was a significant, $F(1,45)=6.47$, $p<.05$, *partial* $\eta^2=.12$, decrease in body esteem from baseline (M=45.11, SD=9.59) to post-game play (M=42.22, SD=10.10) for those who played the muscular video game.

Attitudes Toward Muscularity

In order to test the first hypothesis, which stated that playing a video game that emphasized muscular male bodies would decrease positive attitudes toward muscularity, a 2 (time) × 3 (BMI) × 2 (video game type) mixed ANOVA was conducted with scores from the Swansea Muscularity Attitudes Questionnaire (SMAQ) as the dependent variable. The results showed a significant main effect for time, $F(1,45)=15.78$, $p<.001$, *partial* $\eta^2=.26$, such that there was a significant decrease in positive attitudes toward muscularity from baseline (M=91.86, SD=20.09) to post-video game play (M=89.63, SD=21.48). Similar results were found for the analysis with the DFM subscale, $F(1,45)=16.40$, $p<.001$, *partial* $\eta^2=.27$. However, this result was qualified by a significant time by video game type interaction, $F(1,45)=23.76$, $p<.001$, *partial* $\eta^2=.35$. A simple effects analysis showed that those in the non-muscular video game condition had a significant change in their drive for muscularity over time, $F(1,45)=39.84$, $p<.01$, *partial* $\eta^2=.47$. Examination of the means and standard deviations show that those in the non-muscular condition had a significant decrease from baseline (M=49.58, SD=9.70) to post-game play (M=47.08, SD=10.27). Overall, these results showed that if one plays the wrestling video game against an obese opponent, then they are going to have a lowered drive for muscularity.

The results from the analysis on Positive Attitudes Toward Muscularity (PAM) subscale found a significant main effect for time, $F(1,45)=11.38$, $p<.001$, *partial* $\eta^2=.20$, such that there was a decrease in positive attitudes toward muscularity from baseline (M=43.06, SD=11.09) to post-video game play (M=41.88, SD=12.29). However, this result was qualified by a significant time X video game type interaction, $F(1,45)=14.16$, $p<.001$, *partial* $\eta^2=.24$. A simple effects analysis showed that those in the non-muscular condition had a significant change in their scores, $F(1,45)=25.47$, $p<.01$, *partial* $\eta^2=.36$. Examination of the means and standard deviations showed a decrease in attitudes from baseline (M=42.67, SD=11.70) to post-game play (M=40.00, SD=12.92). This suggests that playing the video game that emphasized the male body was related to lower attitudes about how positive muscularity factors are to that participant.

Character Appearance and Body Image

In order to test the second hypothesis, which stated that those who had a character that more closely resembled their own image would feel worse about their bodies after video game play, regression analyses were conducted with the researcher codings of resemblance as the independent variable. Results showed that codings did not account for a significant portion of variance in any of the scales (all Fs<1.18, all ps>.05). Thus, no matter how closely related the characters were to resembling the appearance of the participant, results suggest that there was still a decrease in the dependent variables. These results do not support the second hypothesis.

BMI and Video Game Play

In order to test the third hypothesis, which stated that BMI and the number of hours spent playing video games would

not moderate the overall relationship between video game play and negative body images, the raw BMI scores were used as the independent variable in a regression analysis in order to determine if the BMI would account for a significant portion of the variance in the dependent variables at time 2. The results showed that the BMI did not account for a significant portion of the variance in any of the dependent variables (all Fs<3.22, all ps>.05). This suggests that the results from the main analyses are robust and independent of the BMI and that the bodies of the characters in the video games are very powerful, which supports the third hypothesis.

Further regression analyses were conducted with the average video game play time per week as the independent variable and the scores on the scales and subscales as the dependent variables in order to see if the amount of time spent playing video games accounted for a significant portion of the variance in these dependent variables. The results showed that the average video game play time per week did not significantly account for significant portions of the variance in any of the dependent variables (all Fs< 2.82, all ps>.05). This suggests that the results from the main analyses are robust and independent of the video game play habits of the participants, which supports the third hypothesis.

Discussion

Overall, the results from this study suggest that when male participants played a video game that emphasized muscular male bodies, they had an increase in their negative body-image. Specifically, these results showed that those who played the video game, independent of condition, had a decrease in positive feelings toward their body, had a decrease in their general body esteem, had a decrease in their positive attitudes toward muscularity, and had a decrease in the drive for muscularity. This suggests that the participant's affective and cognitive component of a negative body-image were significantly impacted by video game play. These findings support our hypotheses as well as the theorizing.

One finding that was interesting was that there was a significant decrease in the drive for muscularity after playing the video game for those in the non-muscular condition. Thus, after playing a video game that did not put as heavy an emphasis on muscles, males had a decrease in the drive for muscularity. This suggests that not priming participants with all muscular images decreased the probability of intending to engage in negative health related behaviors. This is consistent with our theorizing about how mass media images impact the pursuit of muscularity (Ricciardelli and McCabe 2004) because less muscular exposure is related to fewer intentions to obtain those muscles.

Also, those in the non-muscular condition had a decrease in positive attitudes toward muscularity. This finding is not consistent with our hypotheses because it was predicted that playing a video game that contained all muscular characters would be related to an increase in the positive attitudes toward muscularity. Thus, exposure to an obese wrestler lowered body satisfaction compared to those who were exposured to the muscular condition. The exact reason why this effect was found is unknown; however several possible explanations exist. One possible reason is that one may not necessarily expect an obese person to be as strong as the video game portrayed these characters to be. Thus, the participants may be thinking that the obese wrestler is non-muscular, but can do complex wrestling moves that require muscles. Further, the participants may be thinking that they are in better shape than the obese wrestler, but still cannot lift a person off the floor, for example.. Another possible explanation is that the player's character may have been muscular. It was rare that both characters were obese. Therefore, all participants got exposed to some muscular cues in the video game, regardless of the body shape of their randomly assigned computer controlled opponent. Although these are plausible explanations, more work is needed to specifically examine this effect.

Study 2

Overview of the Current Study

The results from study 1 suggest that, after male participants played a video game that emphasized the muscular male body, they had a decrease in their body esteem and attitudes toward muscularity. The purpose of study 2 was to determine if playing a video game that emphasized the thin female body would increase negative body-images in female participants.

Based on the past literature, the Tripartite Influence Model, and the results from Study 1, the following hypotheses were derived:

H1: There will be a decrease in body esteem and body satisfaction after body emphasizing video game play for females.

H2: Body mass index and the number of hours spent playing video games will not moderate the overall relationship between video game play and negative body- image.

If confirmed, both hypotheses would replicate the results from study 1 by showing that both men and women will have more of an increase in negative body-images after playing a video game that emphasizes the body. Also, like study 1 body mass index and the number of hours spent playing video games would not moderate the overall relationship.

The current study differed from study 1 in a number of regards. The first was that the video game had to be changed because the wrestling video game used in study 1 did not allow much exposure to the thin female body. The second change was that the female participants were not asked to make a character look like them, because the results from study 1 showed that this variable did not significantly impact the results (via a regression analysis). The third change was that the measures of negative body-image were in study 1 were specific to men. Therefore, the current study used measures specific to women. Overall, the statistical design of study 1 could not overlap with that of study 2 for a number of reasons. First, the game used did not allow the players or the researchers to make characters. In fact, we had difficulty finding any game that would allow us to manipulate a female character and still portray the female characters in such a way to emphasize the body. Second, NIH classification did not need to be treated as a between-subjects variable, like in study 1 due to the lower overall sample size. Thus, NIH classification and video type were not factors in the current study.

Method

Participants

Thirty-two female participants from a large Midwestern University participated in the current study. The average age for this sample was 18.94 (SD=1.05) years, and the majority of the sample were Caucasian (81.3%) freshman (81.3%) undergraduate students. The average height of this sample was 5′2″ and the average weight was 130.47 lb. According to the National Institute of Health's classification, the majority of the participants were classified as normal weight (n=26; 81.3%), while only four were classified as overweight (12.5%), two were underweight (6.3%), and no participants were classified as obese. The average video game play time for this sample was .87 (SD=2.47) hours per week, and the range for this sample was 0.00 h and the maximum was 12.00 h per week.

Materials

Video game The video game selected for the current study was *Extreme Heat Beach Volleyball* for the PlayStation 2 video game system. This game was selected for a variety of reasons. The first is that the participants could select their character based on how much they thought it resembled them. The results from study 1 showed that the degree to which the character looked like the participant did not significantly influence the results, and thus the current game and procedure did not have the female participants make such a character. The second reason that this game was selected was because all of the female characters had small waists and wore only bikinis. This allowed for the participants to get the optimal exposure to the "ideal" body image, which we predicted would be related to a negative body-image. Also, after every five points were scored by either team, all of the characters would change sides on the volleyball court, and the game would zoom in on the females' bending underneath the net, which further exposed their flat stomach and large breasts.

This game was a two-on-two volleyball game. The participants selected one character and the computer selected the other three (one teammate and two opponents). The objective of this game was to beat the opposing computer team in a game of volleyball, which was explained to the participants. Standard beach volleyball rules were enforced in this game (e.g., only hitting the ball three times before it has to go over the net).

Questionnaires There were four different questionnaires used in the current study. The first was the Body Esteem Scale (BES; Franzoi and Shields 1984), which was identical to the one in study 1 and measured the affective component of a negative body-image. However, unlike the first study, research using the BES has found a different factor structure for the BES for women (Franzoi and Shields 1984). Specifically, there were three factors. The first was sexual attractiveness (SA), which consisted of 13 items. The second factor was weight concern (WC), which consisted of ten items. The final factor was physical condition (PC), which was identical for males and females. The scoring and interpreting of the scores were identical to that of study 1. The reliability for the Body Esteem Scale was acceptable at baseline (α=.95) and at time 2 (α=.95). Each subscale of the Body Esteem Scale had acceptable reliability at both baseline and time 2. Specifically, the reliabilities for the Sexual Attractiveness subscale (α=.90 for baseline and α=.91 for time 2), the Weight Concern subscale (α=.91 for baseline and α=.92 for time 2), and the Physical Condition subscale (α=.80 for baseline and α=.89 for time 2) were acceptable.

The second questionnaire was the Body Shape Questionnaire (BSQ; Cooper et al. 1987), which measured body satisfaction, the cognitive component of a negative body-image. For the purposes of the current study, we used the 24-item version, which asks participants to respond on a 1 (never) to 6 (always) Likert scale to various concerns females have about their appearance. A sample item included, "Have you become afraid that you might become fat or fatter?" The items were summed together, such that higher scores are indicative of more concern about their weight and body. Hence, higher scores are indicative of lower body satisfaction. Reliability analyses showed that the Body Shape Questionnaire had acceptable reliability at baseline (α=.95) and at time 2 (α=.98).

The third questionnaire was a demographic questionnaire, which was used to assess age, ethnicity, and year in school. Also, this questionnaire assessed the height and weight of the sample, which was used to calculate their BMI. Finally, the participant's video game habits were asked, by measuring how often they played video games in an average week, if they had played the video game before, and if they owned a video game system.

The final questionnaire was a suspiciousness questionnaire. Due to the highly publicized nature of video game effects and the heavy emphasis on body image questions, two questions were asked to determine if the participants had been told about the hypotheses of the current study prior to being in the study, and if they were able to infer the predictions of the current study based on the questions asked on the scales. Analysis of this questionnaire revealed that two (5.56%) of the participants knew the purposes of the current study prior to being debriefed, and these were excluded from further analyses.

Procedure

Upon completion of the informed consent, participants completed baseline measures of the Body Esteem Scale and the Body Shape Questionnaire. Participants then received a brief tutorial on how to play *Extreme Heat Volleyball* and were asked to select their character. Specifically, participants were asked to select a female character and select which color of bathing suit the character was to have. In order to complete this task, the female participants were forced to look at each character's body and see which color of bathing suit looked good on them. All female characters were very thin with large breasts and had the supermodel-like appearance. After the character selection was completed, participants played the video game for 15 min. After that time frame had subsided, participants completed the post-video game questionnaires, which consisted of the Body Esteem Scale, the Body Shape Questionnaire, a demographic questionnaire, and a suspiciousness questionnaire. After the final scale was completed, the participants were thanked and fully debriefed. Since a male and female research assistant ran the study and interacted with the participants, analyses were conducted to determine if their presence influenced the overall results. *T* tests on all of the dependent variables showed that there was a statistically significant difference between the male and female research assistant for the Weight Concern subscale of the Body Esteem Scale, $t(30)=2.13$, $p<.05$. Examination of the means and standard deviations showed that when the male experimenter was in the room, there was a significantly higher mean Weight Concern score ($M=35.25$, SD=7.88) than when the female experimenter was in the room ($M=28.67$, SD=9.41). However, since the main effect for this subscale was not statistically significant, this difference should not change the overall results.

Results

Reliability and Validity of Measures

Correlation analyses were calculated between each scale and subscale (see Table 3). As expected, baseline measures for all questionnaires were highly correlated with their time 2 questionnaire (all rs>.80, all ps<.01). Also, as expected, the subscales of the BES and the BES total score were all significantly related to one another (all rs>.40, all ps<.05). Further, as expected, time 2 measures of the BSQ were negatively correlated with the BES and all subscales; however only the post-video game measures of the BES total ($r=-.50$, $p<.05$), the WC subscale ($r=-.60$, $p<.01$), and the PC subscale ($r=-.46$, $p<.01$) were significantly correlated with BSQ at time 2. This suggests that body

Table 3 Correlations between the dependent variables in study 2.

	1	2	3	4	5	6	7	8	9	10
BSQ1	–	.97**	−.45*	−.50*	−.25	−.28	−.60**	−.57**	−.20	−.46**
BSQ2	–	–	−.48**	−.55**	−.28	−.33	−.60**	−.60**	−.25	−.54**
BES1	–	–	–	.90**	.90**	.87**	.86**	.68**	.72**	.78**
BES2	–	–	–	–	.83**	.87**	.79**	.85**	.62**	.86**
SA1	–	–	–	–	–	.96**	.66**	.54**	.67**	.70**
SA2	–	–	–	–	–	–	.65**	.60**	.63**	.72**
WC1	–	–	–	–	–	–	–	.80**	.43*	.57**
WC2	–	–	–	–	–	–	–	–	.40*	.67**
PC1	–	–	–	–	–	–	–	–	–	.87**
PC2	–	–	–	–	–	–	–	–	–	–

These correlations are from the female sample.
BSQ Body Shape Questionnaire, *BES* Body Esteem Scale, *SA* sexual attractiveness, *WC* weight concerns, *PC* physical condition
*$p<.05$
**$p<.01$

satisfaction is significantly related to body esteem, weight concerns, and being in good physical condition. Also, these results suggest that body satisfaction is not related to sexual attractiveness.

Body Esteem

In order to test the first hypothesis, which stated that playing a video game that emphasized the "ideal" body would decrease body esteem, a one-way repeated measures analysis of variance (ANOVA) was conducted in order to determine if there would be a change in body esteem from baseline to after video game play. The results showed a significant main effect for time, $F(1,29)=4.92$, $p<.05$, *partial* $\eta^2=.15$, for the BES. Examination of the means and standard deviations show that there was a significant decrease from baseline ($M=124.33$, SD=19.21) to post-game play ($M=120.60$, SD=21.22). This suggests that the video game play decreased positive feeling toward the body, supporting the first hypothesis (see Table 4).

Further one-way repeated measures ANOVAs were conducted on each subscale of the BES. The results showed a marginally significant main effect for the sexual attractiveness subscale, $F(1,29)=3.08$, $p=.09$, *partial* $\eta^2=.09$. Examination of the means and standard deviations show that there was a marginal decrease from baseline ($M=47.83$, SD=7.68) to post-game play ($M=47.03$, SD=8.37). Although the means and standard deviations show that there was a decrease in the weight concern subscale and physical condition subscale, these decreases were not statistically significant (all Fs<1.10, all ps>.05).

Body Satisfaction

In order to determine if body satisfaction would get worse after video game play that emphasized the body, a one-way repeated measures ANOVA was conducted on the scores from the Body Shape Questionnaire. The results show that there was not a significant main effect for time, $F(1,29)=1.50$, $p=.23$. Examination of the means and standard deviations show that there was a non-significant increase in body satisfaction concern scores from baseline ($M=61.53$, SD=25.14) to post-game scores ($M=63.67$, SD=31.68), which does not support the first hypothesis.

Table 4 Means and standard deviations for the questionnaires in study 2 using a one-way repeated measures ANOVA for women.

Scale	Baseline		Time 2		Endpoints
	Mean	SD	Mean	SD	
BES**	124.33	19.21	120.60	21.22	36–180
SMAQ*	47.83	7.68	47.03	8.37	13–65
WC	32.50	8.52	31.17	8.69	10–50
PC	33.50	4.69	32.87	6.11	13–65
BSQ	61.53	25.14	63.67	31.68	24–144

*$p<.10$, **$p<.05$
BSQ Body Shape Questionnaire, *BES* Body Esteem Scale, *SMAQ* Swansea Muscularity Attitudes Questionnaire, *WC* weight concerns, *PC* physical condition

Body Mass Index and Video Game Play

In order to test the second hypothesis, which stated that BMI and the number of hours spent playing video games would not moderate the overall relationship between video game play and negative body images, the raw BMI scores were the independent variable and each scale and subscale at time 2 as the dependent variable. The results from all regression analyses show that none of the regression models were statistically significant (all ps>.05). This suggests that the prior analyses were independent of the participant's BMI, thus supporting the second hypothesis.

Regression analyses were also conducted in order to determine if the amount of video game play significantly predicted scores on the dependent variables at time 2. The results from these analyses show that the average number of video game play hours per week did not account for a significant portion of the variance in any of the dependent variables (all ps>.05). This suggests that the prior analyses are independent of the participant's average video game play time, thus supporting the second hypothesis.

Discussion

The results of the current study suggest that women participants, after playing a video game that emphasized the female body, felt significantly worse about their bodies. Specifically, it was found that women had a decrease in their positive feelings toward their body and a marginal decrease in their positive feelings of their sexual attractiveness. Interestingly, the results showed that there was not a significant change in the participant's body satisfaction scores, which suggests that the affective component (body esteem) of the negative body-image is impacted, but not the cognitive component (body satisfaction). These results partially support the hypotheses, because it was predicted that the video game would negatively influence the participant's body esteem and body satisfaction, however, only the body esteem was impacted.

General Discussion

Overall, the current research sought to determine if playing a video game that emphasized the ideal male body would

cause negative body-images in male participants, and if playing a video game that emphasized the ideal female body would cause negative body-images in female participants. Across both studies, the results showed that after playing such video games male and female participants had a decrease in their body esteem. For men, this effect was seen in the significant decrease in the BES scores and the marginal decrease in the MBIES state scores. For women, this was seen in the significant decrease in the BES scores. This results supports past research that shows men and women will have a significant decrease in body esteem after viewing stimuli that emphasizes the ideal body for each gender. Despite this similarity between men and women, the results also indicated that men had a decrease in their positive attitudes toward muscularity and their drive for muscularity, which was operationally defined as indicative of body satisfaction. Females did not have a decrease in their body satisfaction. This conclusion should be interpreted with a great deal of caution, because the questionnaires used to assess body satisfaction in males and females were different.

Interestingly, these results are independent of a number of measured or manipulated factors in these studies. First, and most important, the impact that video games have on the body of those who play such games is consistent across gender, as both men and women are negatively affected by video games that emphasize the body. Second, these results are independent of the participant's BMI. Therefore, the body type of the participant did not significantly moderate the overall relationship between body-emphasizing video game play and negative body-images. Third, these results are independent of how many hours the participants spend playing video games during an average week. Thus, it can be speculated that it is the immediate short-term exposure to these video game character's body rather than long-term exposure to video games.

Theoretical Implications

Theoretically, this adds to the existing literature by showing that yet another mass media format (video games) can contribute to negative body-images in males and females. These results support the Tripartite Influence Model (Smolak et al. 2005) and the Cafri et al. (2003) models by showing that exposure to the mass media that emphasizes the male and female body will increase various component constructs of negative body-images. However, results showed that BMI and the amount of time spent playing video games did not moderate the overall effect between video game play and negative body image, which supports the Tripartite Influence Model. Both of these models state that these negative body-images increase the probability of eating disorders in women and increased behaviors associated with the pursuit of muscularity (e.g., steroid usage) in males.

As previously stated, there has been research which has used magazine pictures (Humphreys and Paxton 2004), television commercials (Agliata and Tantleff-Dunn 2004), and action figures (Barlett et al. 2005; Barlett et al. 2006) as a negative body-image inducing stimuli. There has not been any published research on the impact that video games have on negative body-images. Determining which media format has the most impact on negative body-image may be the first step to determine which format is the most harmful, which may help with negative body-image prevention programs. Interestingly, Groesz et al. (2002) found that the media format did not significantly moderate the overall relationship between media and negative body-images; however, this may be a function of the small number of studies for each media category. It is speculated that playing a video game that emphasizes the ideal body may have the most impact because video games often have an immersion factor, which is defined by how involved the player can be in the game (Schneider et al. 2004). In other words, in a video game the player typically assumes the role of the main character, which leads to a higher degree of immersion in that video game. If that character is a muscular male or thin female, then the player will assume the role of that character, which may have explained the effects of the current study. Future research should look to determine if the amount of immersion is correlated with negative body-image after body-emphasizing video game play, and if higher negative body-images are attained by different types of mass media (e.g., video games versus television versus magazines).

Limitations and Future Research

Despite the results, there are some limitations of this research. The first is that the samples in both studies did not vary much on their BMI. In fact, using the National Institute of Health's classification system, there were unequal cell sizes when BMI was used as a categorical variable making the results from such a classification uninterpretable. Future research should sample participants who have a wide variation in their BMI and determine if video game play impacts everybody, independent of their BMI.

The second possible limitation is the inability to directly compare males and females to see which gender is the most impacted by body-emphasizing video game play. The current study could not make such a comparison for many reasons including: (a) different video games, (b) different video game systems, and (c) different questionnaires. If comparison between men and women needs to be done, the first two reasons are easily managed as long as an

appropriate video game can be found for the same video game system. Perhaps more recent wrestling video games allow for participants to play as either a muscular male wrestler or a thin yet muscular female wrestler. *Extreme Heat Beach Volleyball* has both muscular males and thin female characters, but the procedure of study 1 did not allow for this game to be used. Finally, because females are most impacted by thin female models and males are most impacted by muscular male models, developing questionnaires that can be applied to both males and females may be difficult. Even the Body Esteem Scale, when given to males and females, has a different factor structure when analyzed (Franzoi and Shields 1984). Future research should use questionnaires that can be used by males and females, such as the BISS (Cash et al. 2002), in order to make gender comparisons to see who is the most impacted. Future research should also include measures to assess other pertinent variables, such as depression and body image anxiety, as these are all relevant variables that could be impacted by body-emphasizing video game play.

Another limitation is that the participants completed baseline and post-game measures of the same variables. This is a limitation because of practice effects of having completed the measures twice. Future research should try to use multiple games and have the participants complete body image measures post-game play only. However, in order to complete this, researchers need to make sure that the different video games are equally as fun, exciting, difficult, and both have human characters, but differ in how the characters bodies are presented. For instance, a control game for the volleyball game used in study 2 would consist of only female characters that are fully clothed engaging in some competitive behavior while providing no information to the player about body type.

Performance (i.e., success or failure in the game) may have impacted self-image (i.e., feeling like a failure if one does not do well in the game), but was never assessed. This is a limitation because performance may predict body-image change during video game play. Future research should test this assumption, by recording how well the participant does in their respective video game and determine if performance impacts body image variables.

One final limitation is that study 1 did not have participants rate how well they thought that the character resembled their own appearance, as that was the participant's task. The current study had the researchers code how closely the character resembled the participant; however, we were unable to determine if the researcher's codings closely resembled the participant's codings. Future work should check for such a relationship, because how well the participant's feel as though they resembled the character may have been a better indicator of immersion.

Overall Conclusions

There are many possible avenues for future research based on the results from these studies. The first would be to test high versus low video game players in order to determine if there would be differences in the levels of immersion and how these two groups of gamers differ from one another in how they feel and think about their body after idealized video game play. Future research should measure performance to see if the success or failure in the video game would make men and women feel like more of less of a man or woman after playing and competing in video games. Such performance could mediate the overall relationship between video game play and a negative body-image.

The scope of the current research was to investigate the short-term, immediate, impact that body-emphasizing video games had on male and female players. Thus, long-term conclusions cannot be made from the results of this study. However, research has shown that playing video games is related to changes in children's personality only a few months later (Anderson et al. 2007). Also, the Tripartite Influence Model posits that constant exposure to sociocultural factors are related to feeling worse about one's body, rather than one single exposure. Given the high frequency of video game play by children of both sexes, playing such games for long periods of time may be related to negative thoughts and feelings about one's body, which may be related to negative behavioral outcomes.

Men and women are both negatively impacted from the mass media. The present study found that male and female participants, after playing a body-emphasizing video game, increased their negative body-image. This study is one of the few to study men and the findings add to the literature on body image concerns in men. Also, this study adds to the literature by investigating how video games can influence body image concerns in men and women, which has not been extensively studied. Video game players and parents of children who play video games should attempt to monitor what video games are being played so they do not get a negative body-image. Recall that negative body-images are related to behaviors that are maladaptive and generally dangerous, such as steroid use (see Ricciardelli and McCabe 2004). Video game consumers should be careful in how they perceive video games that emphasize the body.

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