Real ideal:

The effects of attainable and unattainable video game bodies on users' body-image disturbance

Abstract

Two studies were conducted to determine whether playing a game featuring attainable or unattainable characters would negatively affect body image disturbance. In both studies (Study 1, undergraduate males (N = 63) and Study 2, undergraduate females (N = 48)), participants were asked to play 20 minutes of a video game featuring either an normal or ideal same sex character. Implicit reaction time tasks and explicit measures (e.g., bust, muscle, and body discrepancy) were used to assess body image disturbance. We found that males incurred more body image disturbance after playing a game featuring normal characters, whereas females exhibited greater body disturbance after playing a game with ideal characters. The results are discussed in terms of social comparison theory.

Keywords: body-image, video games, social comparison

"The girls of [Dead or Alive] continue to wiggle and jiggle in outfits no real woman could hope would swaddle their bosom while throwing a roundhouse" (Sines, 2007). This comment from a blogger dedicated to discussing video games highlights the general over-emphasis of attractive, idealized characters in games. Critics often target video games from the Dead or Alive series due to the prominence of featuring unrealistic body types. However, these impossible body representations are common among an array of video games (Janz & Martis, 2007). Consequently, rather than being misguided complaints, such commentary sheds light on a popular trend in general media representations.

Ideal body types are ubiquitous across media. Furthermore, media often portray body types that are physically unattainable for most (Fouts & Burggraf, 1999). Studies on the thin ideal indicate that people begin to accept the ideal as normative and central to attractiveness through repeated exposure (Brown, 2002). However, Social Comparison Theory (SCT; Festinger, 1954) suggests that people are less likely to make comparisons if they perceive a model as unrealistic or unattainable.

In this sense, modern video games are a curious case. Although they often present attainable body types that encourage comparison (Martins et al., 2008; Janz & Martis, 2007), their incorporation of body types beyond the limits of possibility (i.e., unattainable) may discourage comparison. Despite this, the few studies that have investigated body imagery in video games suggest that video games still elicit adverse effects (Barlett & Harris, 2008; Chandler et al., 2009; Rask, 2007). Although informative, most of this research is correlational and the extant experimental work does not directly compare the effects of attainable and unattainable body types. Thus, the current study aimed to illuminate this research area by

investigating how video game characters with body types that vary along this dimension affect males' and females' body image.

Literature Review

Body image in video games

Idealistic body image portrayals are a common characteristic of the video game environment. Although body image ideals pervade games across time, console, genre, and rating, these representations do not make up the majority of game content. In a seminal study that sampled games across time and consoles, Dietz (1989) found that women were largely absent from games and when they did appear, they were often portrayed as idealized sex objects having large breasts and thin hips. More recently, Jansz and Martis (2007) examined the introductory sequences of video games from multiple consoles and genres and found that 60% of male characters boasted extreme musculature and 77% of female characters exhibited large breasts and buttocks often combined with scanty, hypersexualized attire. In other words, only one-third of the characters in Janz and Martis study had normal or attainable body sizes.

It is important to note, however, that the presence of idealizations is typically not as common as Jansz & Martis (2007) report. The inflated results may be due to the out-of-game units of analysis (i.e., cinematic sequences instead of actual gameplay). When the units of analysis are in-game characters, over-idealized characters comprise the minority. For example, Children Now (2001) found that 11% of female characters had very large breasts and very small waists and nearly 20% of female character models had either unhealthy or unrealistic body sizes. Similarly, 35% of male character models were hyper-muscular. Also in 2001, Downs and Smith showed that, for female video game characters, 25% had unrealistic body proportions, 40% had small waists, and 26% percent had very large breasts.

Research indicates that rating has little to do with moderating the presence of idealized and sexualized imagery. Children Now (2001) reported that 37% of games rated "E for Everyone" featured partially nude characters or models wearing revealing clothing. Considering additional ratings, Downs and Smith (2010) found that games rated in the three primary categories "E for Everyone," "T for Teen," and "M for Mature" each included female characters with unrealistic and sexualized body proportions. Finally, a large-scale content analysis by Martins et al. (2009) reported that games rated for children had the thinnest female characters.

Experimental and correlational studies on body image

Taken together, content analytic work demonstrates that video games portray both attainable depictions of males and females as well as overly thin, sexualized females and hyper-muscular males from (console) generation[1] to generation and across genre and rating. These analyses help illustrate the body image landscape within video games and experimental work adds further nuance by investigating the effects of such content. Although effects studies concerning body image in the context of video game exposure are rare, other media boast a noteworthy foundation.

Adverse effects of media exposure on body image have been found for both women and men. For example, Hargreaves and Tiggemann (2003) found that, when viewing commercial advertisements featuring thin, idealized actresses, adolescent females experienced higher body dissatisfaction compared to females who viewed commercials without the idealized content. In a study with male participants, Leit, Gray, and Pope (2002) showed that college-aged males experienced greater body dissatisfaction when viewing printed ads that featured idealistic, muscular male bodies compared to those who viewed ads that downplayed body image or

[1] Generation refers to a console generation. The current generation (seventh) includes the Playstation 3, Nintendo Wii, and Microsoft Xbox 360. The previous console generation (sixth) included the Playstation 2, Nintendo Gamecube, and Microsoft Xbox.

contained no model altogether. And in a study with both men and women, Harrison and Cantor (1997) surveyed 422 college students and found that those who reported the greatest overall media consumption of television and magazines correlated with greater eating disorder symptomatology (for females) and attitudes in support of personal thinness and dieting (for males).

Meta-analytic work also confirms that exposure to the thin ideal is related to body image concerns. Grabe, Hyde, and Ward (2008) analyzed the results of 77 experimental and correlational studies measuring the effect of exposure to mediated depictions of the thin ideal on female body image. The analysis revealed small to moderate effect sizes for women's body dissatisfaction (d = -0.28), internalization of the thin ideal (d = -0.39), and eating behavior and beliefs (d = -0.30). Barlett and colleagues (2008) analyzed the results of 25 studies measuring the impact of the muscular ideal on men's body image. The results revealed a small effect for both correlational (d = -.19), and experimental studies (d = -20).

Collectively, then, the research reported here has found a significant positive relationship between exposure to the thin/muscular ideal and body disturbance in both women and men. Noticeably absent from this literature are video games, one of the most popular forms of media today. This dearth in body image literature is surprising given the interactive nature of video game play. As Anderson et al. (2003) note, interacting with a media presentation should theoretically lead to more powerful effects in comparison to more passive forms of media (e.g., television, magazines, etc.) due to the user's engagement.[2]

To date, only two studies have examined the influence of video game play on body perceptions. In the first study, Rask (2007) surveyed 157 males to investigate whether video game play was related to unrealistic perceptions of ideal female beauty. The survey presented

[2] This term is used non-specifically to refer to an array of states (e.g., presence, immersion, attention, involvement).

participants with line drawings of the female form, ranging from very thin to large and having either small or very large breasts. Using the amount of weekly game play as the independent variable, the author found that hardcore gamers (those who played games 30 minutes or more each day), rated an average sized female figure as being overweight more often than non-gamers. Furthermore, hardcore gamers selected larger breasted female figures as the ideal more often when compared to non-gamers.

In the second study, Barlett and Harris tested whether playing a body-image-salient video game affected users' body image. Male undergraduate students were recruited to play a wrestling game and female students played a volleyball game. The authors found that males exhibited a decrease in general body esteem. This occurred when players wrestled against either an obese or a muscular character. Likewise, simply playing the volleyball game caused females to report decreased positive feelings toward both their bodies and their sexual attractiveness.

Although these studies are an important first step in documenting the impact of video games on body perceptions, they are limited in several ways. Rask's study (2007) examined the influence of video game play on body perceptions of the opposite sex. The study does not provide any information as to whether gamers compare themselves to video game characters, and whether such comparisons result in body image disturbance. Although Barlett and Harris (2008) did examine the impact of video game representations on body image, the authors did not distinguish between attainable and unattainable characters. Indeed, their results regarding the obese model's effect on body image suggests that males are comparing themselves to body types that are not always the ideal.

Theoretical approaches regarding video game presentations and body image

Given that body dissatisfaction is related to exposure to idealized media images, what are some theoretical explanations for this relationship? One such mechanism is social comparison theory (Festinger, 1954). This theory posits that individuals are driven to self-evaluate by comparing themselves with others, especially others who are similar to the self. These others can be individuals in the environment or models in the media. When such comparisons cast the individual in an unfavorable light, individuals are motivated to change their behavior in order to measure up to the target of comparison. Social comparison theory provides one explanation for how exposure to thin ideal is related to body image disturbance and disordered eating. Individuals who compare themselves to mass media depictions of the thin-ideal feel worse about themselves, and may engage in disordered eating behaviors that their body more closely approximates the thin ideal.

In support of this theoretical model, Botta (1999) surveyed 214 high school girls and found that social comparison moderated body image disturbance. Specifically, those who engaged in comparison had a greater desire to be thin, disliked their bodies greater, and engaged in unhealthy behavior more often than those who engaged in less comparison. Additionally, Hargreaves and Tiggeman (2009) showed 104 male college students in a 2 x 2 experiment commercials featuring muscular-ideal males or no such images and instructed them to socially compare or distracted them from comparison. Not only did the ideal commercials increase body image disturbance, those primed to socially compare exhibited even greater disturbance.

Returning to the idea that comparisons are more likely to be made when the model is similar to the self, social comparison theory has been used to explain racial differences in body image disturbance. For example, Botta (2000) surveyed 145 Caucasian and 33 African American high school girls to investigate how race affects social comparison tendencies. Their results show

that African American females have a larger personal ideal body size than Caucasian females. Furthermore, when a model matches the perceiver's race, the model appears more realistic, attainable, and necessary.

As the previous studies indicate, individuals should not compare themselves to unrealistic or unattainable portrayals according to social comparison theory. However, recent research does not always support this idea. Bissell's (2006) work demonstrates that females socially compare themselves to idealized media models, regardless of relatedness or attainability. To study this, Bissell showed participants pictures of swimsuit models and either told them that the images had been digitally manipulated or did not impart knowledge of the manipulation. The results showed that females consistently rated pictures of models as more attractive and thin even when told the researcher told them that the images had been manipulated. In addition, females in this condition scored similarly to females not informed of the manipulation on disordered eating scales and on their desire to look like the models presented.

Conversely, research shows social comparison theory predicts outcomes when the participants are male. In an experiment, Arbour and Ginis (2006) exposed males to either moderately muscular or extremely muscular male physiques. They found that males who viewed images of moderately-muscular bodies experienced greater personal body dissatisfaction when compared to those exposed to hyper-muscular images. The authors suggested that males might have seen the extremely muscular physiques as unrealistic and unattainable standards for social comparison and thus, dismissed them.

Thus, the literature suggests a divergent outcome in social comparative processes by gender. As Sohn (2009) argues, this disparity may result from a fundamental difference in media representations. He contends that exposure alone elicits social comparison for females. For males

to engage in social comparison, they must endorse the ideal with which they are presented. However, males may be less inclined to make comparisons based on the universe of media content. Observing television, Sohn (2009) explains that most representations of females feature unattainable figures while male representations enjoy a range of body types. Because of this, the perceptual gap between one's current body and the mediated ideal is larger for females than it is for males. The larger perceptual gap leads to greater comparison and therefore salience of body image ideals (Sohn, 2009).

In summary, research linking video game imagery to body (dis)satisfaction is uncommon but the handful of studies tend to suggest the presence of aversive effects similar to those seen in traditional media. Moreover, social comparison theory suggests that females are more likely to compare themselves to both attainable and unattainable mediated ideals whereas men only compare themselves to attainable models, but research has not directly tested this assumption. The current research aims to investigate men and women's body image disturbance resulting from attainable and unattainable video game characters. Study 1 examines the effects of attainable and unattainable video game characters on men, and Study 2 examine the impact of these images on women.

Study 1

The purpose of the first experiment was to determine how different body types within video games affected males' body-image. Previous research outside of video games indicates that males only tend to compare to attainable, rather than unattainable bodies (Arbour & Ginis, 2006). Additionally, because SCT argues that people must see a model as realistic, it is likely that unattainable characters would affect males less than attainable ones. Because of this, we predicted the following:

H1: Attainable characters would cause more implicit body image disturbance than unattainable characters.
H2: Attainable characters would cause more implicit muscle disturbance than unattainable characters.
H3: Attainable characters would cause more body discrepancy than unattainable characters.
H4: Attainable characters would cause more muscle discrepancy than unattainable characters.

Pilot Study

Because body image norms are somewhat subjective, we conducted an initial pilot study to select which games and game scenarios best exemplified attainable and unattainable bodies. The stimuli were 39 (19 ultimately intended for female participants, 20 for males) videos of different video game scenarios that varied in the body types of the main characters. All of the selected games were third-person, meaning that users see the player character at all times. We conveniently sampled fifty-one participants using a popular social networking website to take an online survey. Participants were told the purpose of survey was to find video games that were going to be used in an experiment on body image. In addition to providing visual examples of attainable and unattainable bodies, we provided the following colloquial definitions: attainable bodies are human body types that are attractive AND relatively normal. Unattainable bodies include extremely muscular males and females with very large busts and/or exaggerated hip-to-waist ratios.

For each game scenario, the participants viewed 15-30 seconds of in-game footage. Then, we asked them to indicate how exaggerated they thought the characters' bodies were on a 1 (very exaggerated) to 5 (realistic) scale. For games featuring male protagonists, participants rated the

primary characters in *Alan Wake* as the most realistic in terms of body types (M = 4.78, SD = .42) and those in *UFC Undisputed 2010* as the most exaggerated (M = 3.92, SD = 1.01).[3]

Participants

Sixty-three males were recruited from a large Midwestern university for course credit. Regarding age, 95% of the participants fell within the 18-24 demographic and 5% were between 25 and 34 years old. Most of the participants were Caucasian (73%), followed by Asian (14%), African American (5%), other (5%), and Latino (3%). The average height and weight of the sample was 71.05 inches (about 5'11"; SD = 2.86) and 173.24 pounds (SD = 35.25). The mean Body-Mass Index (BMI) score was 24.04 (SD = 4.20). Using the National Institute of Health's BMI classification system, 3.2% of participants were underweight, 63.5% were normal weight, 25.4% were overweight, and 11.1% were obese.

Design

The current study was an experiment that manipulated the body types of video game characters. The video game characters' body types were either attainable or unattainable. Attainable game characters were those with healthy weights and with either small or average sized muscles (e.g., Cole from *InFamous*). Unattainable characters featured extremely large muscles (e.g., Kratos from *God of War*). Following the stimuli, subjects' feelings toward their body-images were assessed.

Stimuli

Utilizing the results of the pilot study, the game for the attainable condition was *Alan Wake* for the Xbox 360. *Alan Wake* is a third-person, psychological thriller about a man named Alan who solves mysteries about a town during the day and battles supernatural horrors at night.

[3] The mean for *UFC Undisputed 2010* is unusually high because many of the games with lower mean scores (i.e., more exaggerated bodies) functioned poorly in an experimental setup. Furthermore, because this experiment was part of a larger study, *UFC* was selected for reasons beyond the scope of this single experiment.

Participants played the game on the easiest difficulty starting from the beginning sequence set within one of Alan's nightmares. Most players completed the introductory level and proceeded part way into the second level, where Alan begins exploring the town where he is vacationing.

UFC Undisputed 2010 for the Xbox 360 was the stimuli for the unattainable condition. *UFC* is a third-person, fighting game where players assumed the role of Todd Duffee, a famous heavyweight fighter. Players were setup to play a heavyweight championship tournament where they played against 12 other computer-controlled fighters. Their goal was to win each fight either by knocking out their opponent, grappling him into submission, or by technicality (similar to scoring in boxing). No player was able to complete the entire tournament in the allotted time.

Procedure

Due to space constraints, participants were processed one at a time. After providing consent to participate, participants were led to a private room with a large comfortable chair, a large flat-screen HDTV, and an Xbox 360. Then, they were randomly assigned to either the attainable or the unattainable condition. Similar to previous empirical game studies (e.g., Lachlan & Maloney, 2008), participants played for 20 minutes. Prior to game play, a researcher explained the premise of the game, the player's goal, and briefly describe the game controls. Additionally, participants were given a sheet illustrating all of the game controls for their reference.

After 20 minutes of game play, the researcher stopped the video game and administered two brief reaction time tasks (RT) and a questionnaire via Direct RT and SurveyMonkey respectively. Once participants completed the questionnaire, they were thanked for their participation and dismissed.

Measures

Implicit measures of body disturbance. This study indirectly measured body disturbance using reaction time tasks (RTT) similar to those developed by Markus, Hamill, and Sentis (1987) and used in subsequent work on body image (e.g., Stein & Corte, 2008). The first RTT asked participants to indicate as quickly as possible whether contour line drawings of figures of varying body sizes appeared generally similar or dissimilar to the way they looked. If participants thought a figure generally resembled them, they pressed the "E" key on a keyboard. The RTT explained that the "E" key stood for "me," as in "the figure resembles me." Conversely, the "W" key stood for "not me," as in the "the figure does not represent me." In case participants forgot the key mappings, the words ME and NOT ME appeared in bold text at the bottom-left and bottom-right of the screen respectively.

Figures from the popular Figure Rating Scale (FRS; Stunkard, Sørensen, & Schulsinger, 1983) were used as stimuli. Each figure from the FRS was shown one at a time. To avoid problems with outliers, participants saw each figure four times. Order effects were controlled for by randomizing the presentation of all 28 images (7 figures shown 4 times each). DirectRT software controlled the entire RTT: presentation, data collection, and randomization. From each trial, response latency in milliseconds and category selection were recorded.

The second RTT was identical to the first except the FRS figures were replaced with figures from the Muscle Silhouette Measure (MSM; Frederick et al., 2007). The MSM is a series of eight front view male figures that range from non-muscular to extremely muscular. Because the MSM had one additional figure than the FRS, there were 32 images total (8 figures shown 4 times each) in this RTT.

Explicit measures. In addition to RTTs, the current study used questionnaires aimed to evaluate participants' body discrepancy, muscle discrepancy, control variables, and

demographics. To measure body discrepancy, we presented participants with all 7 FRS figures and asked them to indicate which figure most closely resembled them (*1* = The smallest figure and *7* = The largest figure). Then, using the same scale, we asked them to note which body they would like to have. Similar to Harrison (2003), the difference between their perceived size and their desired size indicated body discrepancy.

We assessed muscle discrepancy in the same manner except we replaced the FRS with the MSM (*1* = The least muscular figure and *8* = The most muscular figure). Likewise, muscle discrepancy was the difference between their perceived and desired muscularity.

Results

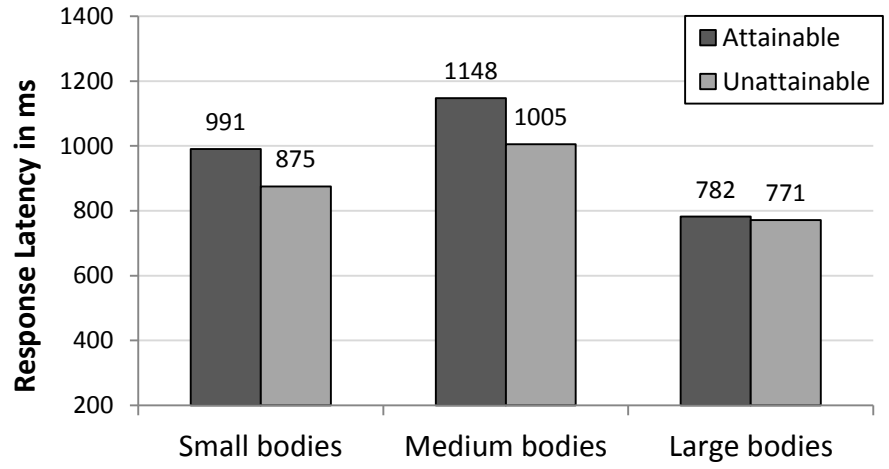
Prior to running analyses we ran one-way ANOVAs to test for possible control variables (e.g., age, race, BMI, game skill). BMI had a significant effect on men's reaction times to large bodies, $F(1, 62) = 17.98$, $p < .001$, $\eta^2 = .24$, me/not responses to small bodies, $F(1, 62) = 11.94$, $p = .001$, $\eta^2 = .17$, me/not me responses to large bodies, $F(1, 62) = 13.89$, $p < .001$, $\eta^2 = .20$, me/not me responses to small muscles, $F(1, 62) = 4.64$, $p < .05$, $\eta^2 = .08$, and body discrepancy, $F(1, 62) = 40.45$, $p < .001$, $\eta^2 = .42$. Additionally self-reported game skill (see Matthews, 2011) significantly interacted with men's response times to medium sized muscles, $F(1, 62) = 5.1$, $p < .05$, $\eta^2 = .08$. Thus, BMI and skill at video games was controlled for in the subsequent analyses.

Hypothesis one predicted that unattainable characters would cause more implicit body image disturbance than unattainable characters. To test this, we operationalized implicit body image disturbance in two ways: response latency and me/not-me category selection toward FRS figures. We collapsed the seven FRS figures in three groups: small bodies (figures 1 and 2), medium bodies (figures 3-5), and large bodies (figures 6 and 7). Response latency was strongly positively skewed. To avoid violating the assumption of normality, we performed a log

transformation to normalize all reaction time data. Furthermore, we screened for outliers using a ± 3.3 standard deviations criterion to minimize erroneous data influencing the results. Rather than remove outliers, we replaced them with mean values to preserve power.

An omnibus MANOVA revealed non-significant mean differences between conditions for reaction times to small, medium, and large bodies $F(1, 62) = 1.90$, $p = .14$, $\eta^2 = .09$ (see Figure 1) and me/not me responses $F(1, 62) = .21$, $p = .89$, $\eta^2 = .01$. However, an individual ANOVA showed that attainable bodies ($M = 2.996$, $SD = .019$) caused significantly greater response latency than unattainable bodies ($M = 2.942$, $SD = .018$) when responding to small bodies, $F(1, 62) = 4.33$, $p = .04$, $\eta^2 = .08$ (see Figure 1). Similarly, an individual ANOVA indicated that attainable bodies ($M = 3.060$, $SD = .019$) caused significantly greater response latency than unattainable bodies ($M = 3.002$, $SD = .019$) when responding to medium bodies, $F(1, 62) = 4.60$, $p = .04$, $\eta^2 = .03$ (see Figure 1). This provides partial support for hypothesis one. Attainable character types caused more implicit body disturbance than unattainable characters, as greater response latency indicates more body-image disturbance.

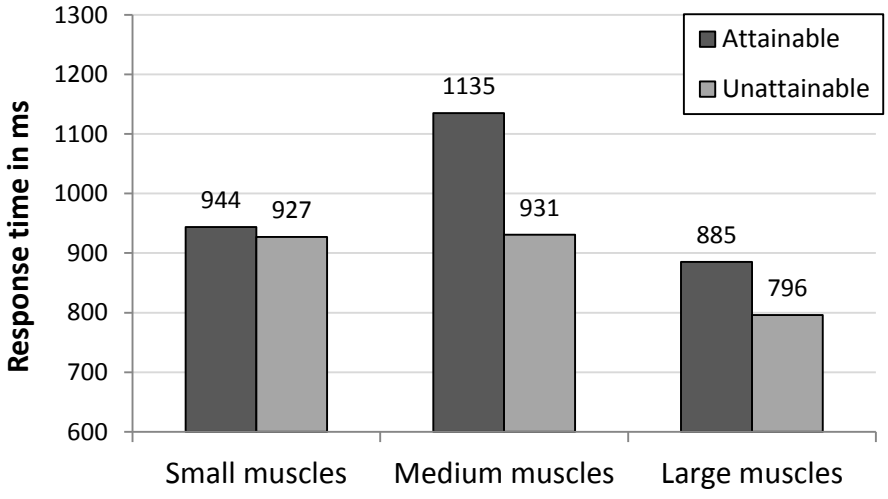
Figure 1. Response latency toward small, medium, and large bodies by condition (transformed back into milliseconds).



Hypothesis 2 predicted that attainable characters would cause more implicit muscle disturbance. This hypothesis received partial support. Similar to the previous analysis, we operationalized body disturbance and response latency and me/not me category selection to the figures from the MSM. We collapsed the eight MSM figures in three groups: small muscles (figures 1-3), medium muscles (figures 4 and 5), and large muscles (figures 6-8). For the same reasons as preceding analyses, we performed a natural log transformation of the reaction time data and screen for outlier using the same criteria.

An omnibus MANOVA revealed significant mean differences between conditions for reaction times to small, medium, and large muscles $F(1, 62) = 4.53$, $p < .01$, $\eta^2 = .20$ (see Figure 2). However, mean differences for me/not me responses was not significant $F(1, 62) = .56$, $p = .64$, $\eta^2 = .03$. This provides partial support for hypotheses two. Attainable character types caused more implicit body disturbance than unattainable characters, as greater response latency indicates more body-image disturbance.

Figure 2. Response latency toward small, medium, and large muscles by condition (transformed back into milliseconds).



Hypothesis 3 predicted that attainable characters would cause more explicit body discrepancy. This prediction was not supported. The mean differences in body discrepancy

between the attainable and unattainable conditions were not significant, as indicated by an ANOVA, $F(1, 62) = .01$, $p = .94$, $\eta^2 = 0$. This suggests that explicit body discrepancy was not influenced by differences in presented body types.

Finally, Hypothesis four posited that attainable characters would elicit more explicit muscle discrepancy than unattainable bodies. The data did not support this prediction. An ANOVA revealed that the mean differences in muscular discrepancy between both conditions were not significant, $F(1, 62) = .002$, $p = .96$, $\eta^2 = 0$. This finding indicates that the different body types did not affect explicit muscular discrepancy.

Discussion

The results of study 1 suggest males' exposure to attainable characters causes greater body disturbance than their exposure to unattainable characters. These findings are consonant with theoretical predictions that subjects would not socially compare as readily with unrealistically (unattainable) portrayed characters. However, only male subjects participated in study one. To explore whether the findings diverge upon gender as other studies have suggested, we conducted a second experiment that contained only female participants.

Study 2

The purpose of the first experiment was to determine how different body types within video games affected females' body-image. Existing research excluding video games indicates that females compare to both attainable and unattainable imagery (Bissell, 2006). Additionally, although SCT argues that people must see a model as realistic, females commonly socially compare to unrealistic representations of beauty. However, because video games sometimes feature *extremely* exaggerated body types, we posed the following research questions:

RQ1: Would unattainable or unattainable characters cause more implicit body image disturbance?

RQ2: Would attainable or unattainable characters cause more implicit bust disturbance?

RQ3: Would attainable or unattainable characters cause more body discrepancy?

RQ4: Would attainable or unattainable characters cause more bust discrepancy?

Pilot Study

We conducted a pilot study in the exact same manner as the men's study. Fifty-one conveniently sampled participants rated the attainability of the video game characters' bodies after watching 39 (19 ultimately intended for female participants, 20 for males) 15-30 second video clips. For games including female protagonists, participants rated the main characters in *Beijing Olympics 2008* as the most realistic (M = 4.66, SD = .58) and those in *Mortal Kombat* as the most exaggerated (M = 1.42, SD = .65).

Participants

Forty-eight females were recruited from a large Midwestern university for course credit. All participants fell within the 18-24 demographic. Most of the participants were Caucasian (77%), followed by Asian (17%), Latino (4%), and other (2%). The average height and weight of the sample was 65.05 inches (about 5'5"; SD = 3.43) and 135.18 pounds (SD = 24.64). The mean Body-Mass Index (BMI) score was 22.51 (SD = 3.70). Using the National Institute of Health's BMI classification system, 7.5% of participants were underweight, 77.4% were normal weight, 20.4% were overweight, and 2.2% were obese.

Design

Study two had an identical design to study one. We had two conditions, attainable (e.g., Alyx from *Half-Life 2*) and unattainable (e.g., Ivy from *Soul Caliber*) in-game body presentations using the same definitions as study one. Following the stimuli, subjects' body-image disturbance was assessed.

Stimuli and Procedure

Utilizing the results of the pilot study, the game for the attainable condition was *Beijing Olympics 2008* for the Xbox 360. *Beijing Olympics* is game aimed to simulate many popular Olympic events. Participants played the high dive event as a Finnish Olympian. They had to complete a series of dives from a third-person perspective using both control sticks simultaneously. Because the event was relatively short, we instructed participants to repeat the competition as many times as they could to attempt to get the highest possible score. Most players completed the event three times.

Mortal Kombat for the Xbox 360 served as the stimuli for the unattainable condition. *Mortal Kombat* is a third-person fighting game where players assumed the role of Jade, a masked female fighter. Players played the single-player tournament on the easiest difficulty. Their goal was to win as many fights as possible. No one completed the entire tournament in the time provided.

Because the measures were largely the same, the procedure for study two was identical to study one.

Measures

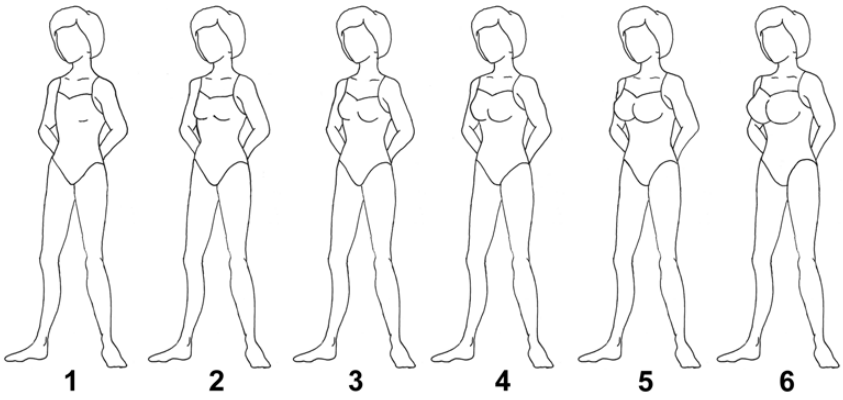
Implicit measures of body disturbance. The format for measuring females' implicit body disturbance was identical to the males' RTTs. The scales themselves, however, were changed.

For the first RTT, female participants viewed the female version of the FRS. As in the previous study, DirectRT software controlled the presentation, data collection, and randomization of all 28 images (7 figures show 4 times each). From each trial, response latency in milliseconds and category selection were recorded.

For the second RTT, we presented participants with hand-drawn contour images of female figures that varied only in their bust size. Because we could not find an existing scale that possessed the anatomic accuracy and range that we desired, we developed our own scale (see Figure 3). We designed the Contour Bust Size Scale (CBSS) to display a variety of busts along common cup sizes (AA, A, B, C, D, DD). Similar to the other RTTs, each of the six figures were shown four times each for a total of 24 trials.

To test the validity of the CBSS, we performed a bivariate correlation between the absolute value of bust discrepancy (see below) and the breast item from the popular Body Esteem Scale[4] (BES; Franzoi & Shield, 1984). The resultant correlation, $r = -.37$, $p = .01$, revealed that the CBSS measure was an adequate assessment tool.

Figure 3. The Contour Bust Size Scale (CBSS)



Explicit measures. The current study used a questionnaire to evaluate participants' body discrepancy, bust discrepancy, control variables, and demographics. Identical to first study, we assessed body discrepancy by presenting the full FRS and asking participants to indicate which body they thought was most like their own and which they would like to have. The difference between their perceived size and their desired size signified body discrepancy.

[4] The BES data presented here was part of a larger study.

We assessed bust discrepancy the same way except we replaced the FRS with the CBSS. Similarly, bust discrepancy was the difference between their perceived and desired bust size.

Finally, we collected demographics, BMI, and information on all the possible control variables included in study one.

Results

As in Study 1, prior to running analyses we ran one-way ANOVAs to test for possible control variables (e.g., age, race, BMI, game skill). BMI had a significant effect on women's reaction times to large bodies, $F(1, 62) = 14.764$, $p < .001$, $\eta^2 = .25$, me/not responses to small bodies, $F(1, 62) = 5.916$, $p = .02$, $\eta^2 = .19$, me/not me responses to medium bodies, $F(1, 62) = 7.716$, $p < .01$, $\eta^2 = .15$, me/not me responses to large bodies, $F(1, 62) = 65.01$, $p < .001$, $\eta^2 = .58$, body discrepancy, $F(1, 62) = 12.26$, $p < .01$, $\eta^2 = .22$, and bust discrepancy, $F(1, 62) = 8.35$, $p < .01$, $\eta^2 = .16$. Because of this, BMI was controlled for in the subsequent analyses.

Research question one asked if attainable or unattainable characters would cause more implicit body image disturbance for females. To answer this question, we operationalized implicit body-image disturbance the same as in study one: response latency and me/not-me category selection toward FRS figures. Like before, we collapsed the FRS figures in three groups: small bodies (figures 1 and 2), medium bodies (figures 3-5), and large bodies (figures 6 and 7). As in study one, response latency was strongly positively skewed and contained a number of outliers. To correct the skew, we performed a log transformation to normalize the data. To eliminate outliers, we mean replaced all values greater than or equal to ± 3.3 standard deviations.

A MANOVA revealed non-significant mean differences between conditions for reaction times to small, medium, and large bodies $F(1, 47) = .285$, $p = .84$, $\eta^2 = .02$ and me/not me

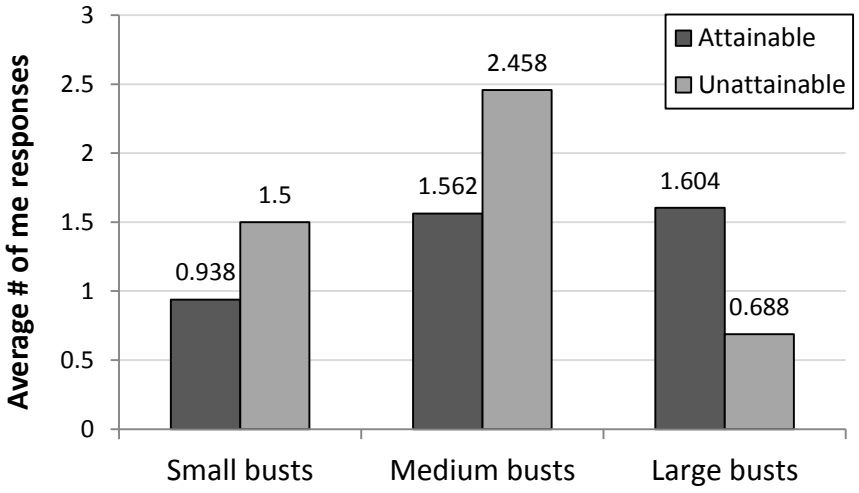
responses $F(1, 47) = 2.097$, $p = .12$, $\eta^2 = .13$. The findings suggest that attainable and unattainable characters cause an equivalent amount of implicit body image disturbance for females.

Research question two asked if attainable or unattainable characters would cause more implicit bust disturbance. Similar to the previous analysis, we operationalized body disturbance and response latency and me/not me category selection to the figures from the CBSS. We collapsed the six CBSS figures into three groups: small busts (figures 1 and 2), medium busts (figures 3 and 4), and large busts (figures 5 and 6). We performed a natural log transformation of the reaction time data and screened for outliers using the same criteria as previous analyses.

An omnibus MANOVA failed to find significant mean differences between conditions for reaction times to small, medium, and large busts $F(1, 47) = 1.927$, $p = .14$, $\eta^2 = .12$. However, mean differences for me/not me responses was nearly significant, $F(1, 47) = 2.736$, $p = .055$, $\eta^2 = .16$ (see Figure 4). Furthermore, an individual ANOVA showed that unattainable bodies ($M = 2.458$, $SE = .2.69$) caused significantly "me" responses than attainable bodies ($M = 1.562$, $SE = .269$) when responding to medium busts, $F(1, 47) = 10.468$, $p = .02$, $\eta^2 = .12$ (see Figure 4). Similarly, an individual ANOVA indicated that unattainable bodies ($M = .688$, $SD = .302$) caused significantly less me responses than attainable bodies ($M = 1.604$, $SD = .302$) when responding to large busts, $F(1, 47) = 11.428$, $p = .03$, $\eta^2 = .11$ (see Figure 4).

These findings suggest that unattainable character types caused more implicit body disturbance than attainable characters, as females were more likely to say that small and medium sized busts were more representative of themselves and were less likely to say that large busted figures represent them.

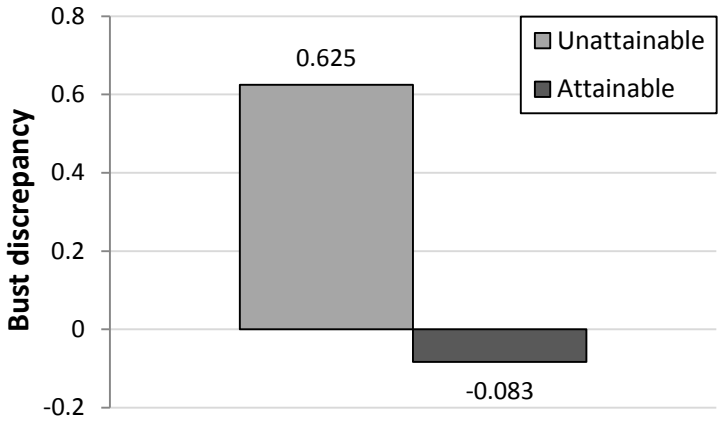
Figure 4. Number of me responses to small, medium, and large busts by condition.



Research question three asked whether attainable or unattainable characters would cause more explicit body discrepancy. To answer this question, we compared the mean differences in body discrepancy between the attainable and unattainable conditions. An ANOVA indicated that the means were not significantly different, $F(1, 47) = 2.564$, $p = .12$, $\eta^2 = .06$. This suggests that the presented body types equally affected explicit body discrepancy.

Finally, research question four asked whether attainable or unattainable characters would elicit more explicit muscle discrepancy. To explore this question, we analyzed the mean differences in bust discrepancy between conditions. An ANOVA revealed that the differences were significant, $F(1, 47) = 6.404$, $p = .03$, $\eta^2 = .11$ (see Figure 5). Females in the unattainable condition desired larger busts significantly more than those in the attainable condition. This finding indicates that unattainable body types caused more explicit bust discrepancy than attainable body types.

Figure 5. Explicit bust discrepancy by condition.



Discussion

The results of Study 2 suggest females' exposure to unattainable characters cause greater body disturbance than their exposure to attainable characters. Although these data may seem unexpected, they are consistent with other findings that females engage in social comparison regardless of unrealistic, unachievable character presentation (Bissell, 2006). Furthermore, in the unattainable condition, females reported higher levels of dissatisfaction specifically with breast size. Specifically, those in the unattainable condition desired larger breasts and rated their own breasts as smaller than those in the attainable condition.

General Discussion

The central focus of the current research was to investigate how attainable and unattainable body image representations in video games affect users. In sum, we found that the different body types games feature do affect people's implicit and explicit body disturbance. For males, we found that social comparison occurred more strongly after being exposed to attainable, rather than unattainble characters. This finding concurs with previous research outside of video games (Arbour & Ginis, 2006) and is predicted by SCT. Given that the media milieu of male representations contains a wide array of body shapes and sizes (Sohn, 2009), the image of an ideal male is nebulous. As a result, when unattainable imagery confronts males, their tendency to

compare diminishes. Rather, physically possible, achievable, and realistic characters elicit social comparison due to their commonality fueling their perceived normativity.

The converse was the case for females. Women socially compared themselves to unattainable characters more strongly than attainable characters. This finding is once again consistent with existent research (e.g., Bissell, 2006) and extends this body of work to interactive contexts. Compared to the ambiguous ideal male figure, media more sharply defines a specific female ideal skewed toward the unattainable (Sohn, 2009). As a result, females are more likely to compare to these impossible representations of beauty.

Interestingly, the males exposed to attainable bodies reported greater body disturbances along two dimensions: muscularity and weight. Females reported body disturbance issues regarding their breast size, but were not significantly concerned with their weight. Although it is unclear why this occurred, it is possible video games acted as a bit of a leveling agent with SCT because of the medium's relatively higher salience with males. Alternatively, breast size could have simply been more salient as the weights of the characters were very similar between conditions.

Reflecting on other patterns, we observed that the manipulation had no effect on explicit measures of body disturbance for males. Rather than reporting no desire for their weight and musculature to change, both conditions changed nearly identically. We believe that this occurred because males' body image ideals may be less malleable. As a result, only implicit were able to capture the effects at hand.

Limitations and Conclusions

Even though these studies outline important differences between the sexes and provide insight into how video games may differentiate from more traditional, non-interactive media;

some limitations deserve addressing. First, each study utilized a single message. This design makes generalization precarious. In an attempt to mitigate this issue, we employed a pretest of a wide array of stimuli. Second, the body image salience between the two included male video games was not equal. However, because the findings indicated more body disturbance with the less body salient stimuli, *Alan Wake*, choosing an equivalently salient stimulus may have produced stronger effects. Third, for the female participants, there was also a potential issue with the stimuli. Despite scoring well in the pretest, *Beijing Olympics 2008* was not a critically acclaimed or engrossing game. Consequently, there is potential that participants may have paid less attention to the game, which may have muted the effect on body image disturbance.

Overall, body image representations in video games displayed a pattern of results similar to non-interactive media. Furthermore, the results of this study indicate that SCT provides a cogent framework for body image research examining interactive media. Males tended to socially compare more toward attainable characters and females compared more toward unattainable characters. Additionally, we found that reaction time measures provided an insightful methodological tool in implicitly assessing body attitude. Body image researchers may benefit from continuing to investigate the applicability of reaction time tasks to body image measurement especially considering the personal sensitivity individuals may experience when questioned about body esteem. Finally, future research should expand this investigation of game content to other games and genres and further delineate how additional variables influence the presented outcomes.

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