

Virtual muscularity: A content analysis of male video game characters

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ABSTRACT

The 150 top-selling video games were content analyzed to study representations of male bodies. Human males in the games were captured via screenshot and body parts measured. These measurements were then compared to anthropometric data drawn from a representative sample of 1120 North American men. Characters at high levels of photorealism were larger than the average American male, but these characters did not mirror the V-shaped ideal found in mainstream media. Characters at low levels of photorealism were also larger than the average American male, but these characters were so much larger that they appeared cartoonish. Idealized male characters were more likely to be found in games for children than in games for adults. Implications for cultivation theory are discussed.

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Introduction

Much has been written about the sociocultural pressures put on women to attain unrealistic ideals of physical perfection (Botta, 1999; Grabe, Hyde, & Ward, 2008; Smolak, 2004). Research devoted to this issue has found that as many as half of normal-weight teenage girls consider themselves overweight (Krowchuk, Kreiter, Woods, Sinal, & DuRant, 1998; Strauss, 1999), and that body image dissatisfaction among girls and women is a normative component of life in Western society (Grogan, 2007). Yet there is evidence that men are becoming increasingly dissatisfied with their bodies as well (Frederick et al., 2007; Thompson & Cafri, 2007). Body dissatisfaction among males is related to a drive for muscularity, or an intense pursuit to increase muscle mass (Olivardia, Pope, Borowiecki, & Cohane, 2004). This drive for muscularity is a growing concern, given that boys as young as 11 years of age are engaging in high risk behaviors, such as steroid use, excessive exercise, and restricting carbohydrate intake, to reach a higher level of muscularity (McCabe & Ricciardelli, 2004).

What can explain the increasing trend among boys and men to desire a muscular ideal? Researchers point to the mass media for perpetuating a standard that emphasizes unrealistic strength and muscularity as attractive (Mishkind, Rodin, Silberstein, & Striegel-

Moore, 1986). This media-driven ideal highlights a lean, muscular physique and a mesomorphic (“V-shaped”) body type (Stanford & McCabe, 2002). The research in this arena demonstrates that exposure to the male body ideal results in men evaluating their bodies more negatively, which in turn, leads to an increase in muscle dissatisfaction (Agliata & Tantleff-Dunn, 2004) and drive for muscularity (Arbour & Martin Ginis, 2006; Harrison & Bond, 2007).

Prior research on media-based perceptions and norms has drawn primarily on cultivation theory—the idea that media images build up in the minds of viewers over time and shape beliefs of the real world that are consistent with media versions (Gerbner, Gross, Morgan, Signorielli, & Shanahan, 2002). However, while this body of work has found traction in research on television, it has only recently been updated in our fast-evolving modern media landscape. Noticeably missing from this line of inquiry has been a systematic examination of the body imagery present in video games, one of the most popular forms of media today. Indeed, video game sales have surpassed those of motion pictures (Bainbridge, 2007) and have been a leading cause in the general drop in television viewership. Given that the audience for games has been largely male (Entertainment Software Association, 2009), it is reasonable to investigate the systematic uses and potential effects of game content on the male audience. The present study takes the first step in addressing this gap in the literature by systematically investigating and presenting the body sizes of male video game characters. Then, as a second step, it compares those results to data from real-world men, by scaling these characters to a height of 69.55 inches based on our anthropometric sample data. This study also investigated whether male video game characters varied by levels of realism,

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and whether the processing power of video games and consoles emphasized or de-emphasized certain body proportions. Finally, differences by game rating in body proportions were examined.

Mass media and the male ideal

Taken together, the research across media types demonstrates that the standard of physical attractiveness for men presented in traditional mass media has become more muscular, leaner and socially valued. These findings are consistent with print and electronic media. The first work on this topic concerned printed publications in the 1970s. Several studies have found that the models depicted in magazines have grown more muscular over time and have been significantly more muscular than the average American male (Leit, Pope, & Gray, 2001; Spitzer, Henderson, & Zivian, 1999). For example, Leit et al. (2001) translated the heights and weights of *Playgirl* centerfold subjects from 1973 to 1997 to fat-free mass index scores (FFMI). Some of the centerfold subjects had FFMI above 25, which represented a muscular ideal that was unattainable without the use of anabolic steroids.

Studies of the male body in electronic media have also demonstrated that thinness is common and fatness is rare. Greenberg, Eastin, Hofschire, Lachlan, and Brownell (2003) analyzed the body sizes of characters in ten top-rated prime-time fictional television programs. The study showed that whereas about 2% of U.S. men are underweight, 12% of male television characters were underweight. Evidence also indicates that television reinforces the idea that being fat is bad. In a content analysis of 27 different prime-time television comedies, Fouts and Vaughan (2002) examined the body weights of 75 lead male characters for the negative references these characters made about themselves and the audience reactions (e.g., laughter) to these references. The study showed that the heavier the character, the more negative references he made about his own weight. Moreover, these negative comments were significantly associated with audience reactions. The authors concluded that television reinforces the idea that it is acceptable to put down and laugh at males who are overweight.

This standard has found its way into the toys that are popular with boys. In their classic study, Pope, Olivardia, Gruber, and Borowiecki (1999) measured the waist, chest, and bicep circumference of popular male action figures (e.g., GI Joe) manufactured from 1964 to 1998. The study showed that GI Joe grew exceedingly more muscular over time, and contemporary GI Joe action figures had physiques that were more muscular than humanly possible. The authors concluded that today's GI Joe is just as unattainable to boys as Barbie is to girls. It is no surprise, then, that these trends in cultural ideas for body image have been linked to body dissatisfaction. Barlett, Vowels, and Saucier (2008) conducted a meta-analysis of experimental and survey research measuring the effect of exposure to media depictions of the male ideal on male body image. The study revealed small to moderate effect sizes in the relationship between exposure to the male ideal and body satisfaction, for both experimental ($d = -.22$) and correlational ($d = -.19$) research. This is to be expected among audience members whose bodies do not match the depicted ideal, and as Pope et al. (1999) pointed out, may not be attainable without drugs such as anabolic steroids. Pope et al.'s analysis of the dimensions of male action figures is informative and includes a comparison of these figures to those of real men. We adopt a similar approach in the work summarized below, by comparing video game men's proportions to those in an American sample.

Cultivation theory and video games

Given that body dissatisfaction is related to exposure of idealized media images, what are some theoretical explanations for this

relationship? One possible mechanism is cultivation theory, which contends that the media's perpetual depiction of certain values, themes and ideals molds people's view of social reality (Gerbner et al., 2002). This theoretical model assumes that people's beliefs, attitudes, and expectations about the real world are shaped by what they see in the mass media, and that this influence is strongest among the mass media's heaviest users. These beliefs, attitudes, and expectations, in turn, are used to make decisions in real-world settings and situations. Applied here, cultivation theory assumes media messages that emphasize unrealistic strength and muscularity as attractive serve as socializing agents to instruct viewers about how to think about the male body. Cultivation theory would predict, therefore, that the cumulative effect of exposure to the male ideal perpetuated by the mass media will result in the use of steroids, pills, and powders in order to gain muscle and be "normal." Alternatively, it might lead any male not resorting to those steps to feel emasculated and socially and sexually unworthy. Research has shown that cultivation effects can occur with game play, as Williams (2006b) found specific cultivation effects related to real-world perceptions of danger in a long-term game play experiment. In support of model and game-related body effects, Harrison and Bond (2007) found cultivation effects among readers of video game magazines, but not sports, fashion, or fitness magazines in their sample of grade-school boys. Specifically, heavier video game magazine reading predicted an increased drive for muscularity one year later, independent of initial drive for muscularity. Although this study did not examine exposure to male video game characters during game play, the results suggest that body-related cultivation is possible with this medium.

To date, only one study has specifically examined the affect of video game play on male body image. Barlett and Harris (2008) found that college-aged males who played a video game that featured hypermuscular characters for 15 min had significantly lower body esteem than did males who did not play a body-emphasizing game. Although this study makes an important contribution in examining the impact of video game play on body image, there is still much left to discover, including a more basic study of how frequent hypermuscular characters actually occur in the games that people play. Given that video game play may influence players' body image (Barlett & Harris, 2008), and mold players' views of social reality (Gerbner et al., 2002), establishing sound baseline measures of male body imagery are necessary in order to test theories of influence. In accord, the first research question asked:

RQ1: Do the body proportions of male video game characters reflect the proportions of the average American male?

Realism and processing power

Early studies of video games and their effects often presumed that the medium was uniform in its platforms and presentations. The assumption here is that games are a vast universe of different machines and game types, and that this variation might have predictive power. In short, nuance matters. The most obvious example of this variation is computing speed. Contemporary game systems provide users with faster processors and increased bandwidth, resulting in a heightened realistic and immersive experience (Frauenfelder, 2001). However, there is wide fluctuation in the processing power from gaming system to system, and these differences can produce great variation in the level of photorealism and detail afforded to the characters. These differences in processing power explain why there are crisp, sharp and highly detailed characters in games for the Xbox 360, and relatively dull and cartoonish characters in games for the original Playstation. Realism is an important variable to consider, because recent evidence indicates that realistic characters are more idealized in body shape than less realistic

characters are. Martins, Williams, Ratan, and Harrison (2009) conducted a content analysis of female body imagery in video games, and found that female characters at the highest level of photorealism conformed to the thin-ideal whereas female characters at low levels of photorealism appeared larger and cartoonish in nature. Applied here, realistic male video game characters could approach the lean and muscular ideal more closely than less realistic characters. Yet given the minimal data on photorealism in relation to the male ideal, the following research question was posed:

RQ₂: Will the body proportions of male video game characters vary by level of realism?

As mentioned above, the processing power of a given game explains why characters on an advanced system like the Xbox 360 look markedly different from the characters on handheld systems like the Nintendo DS. Games with less processing power may over-compensate for lack of detail by creating characters with large heads so that players can see facial expressions, which Martins et al. (2009) also found in studying female characters. Games with more processing power do not have to emphasize facial expressions because faster processors and increased bandwidth make these characters easy to see. Given that games made for consoles, PC, and handheld systems were examined in this study, we asked:

RQ₃: Will artifacts of processing power emphasize or de-emphasize certain body proportions of male video game characters?

Ratings

The final research question addresses how video game characters' body types vary across game ratings. Created in 1994, the Entertainment Software Rating Board (ESRB) assigns age and content ratings to video games. Games rated "E" (for everyone) have been deemed suitable for players six years of age and older. In contrast, games rated "AO" are suitable for "adults only." Studies of the ESRB ratings system suggest that games with different rating levels do have different kinds of content. Smith, Lachlan, and Tamborini (2003) found significant differences both in the amount and context of violent portrayals among games rated for "E" (i.e., for everyone), "T" (i.e., for teens), and "M" (i.e., for mature audiences). In their content analysis of male and female sexuality of video game characters, Downs and Smith (2010) found that characters were more likely to appear nude in games rated "T" and "M" than in games rated "E." Yet, we should expect that games rated "T" and "M" have more violence or nudity in them given that these variables are ratings criterion. What is still unknown is whether there will be differences in body proportions of male video game characters—a criteria currently not assessed by the ESRB. Given the differences in game content by game rating reported here, it seems reasonable to expect that game rating may be a source of variation for other types of content such as body sizes of male video game characters. Thus, the final research question asked:

RQ₄: Are there differences by game rating in the body proportions of male video game characters?

Method

The game sample

Sales data were obtained from the research firm The NPD Group for a calendar year stretching from March 2005 to February 2006 for the 9 major game systems sold in the United States in that time

span: Xbox 360, Xbox, PlayStation 2 (PS2), PlayStation (PS), Nintendo Gamecube, PlayStation Portable (PSP), Nintendo Gameboy Advance (GBA), Nintendo Dual Screen (DS), and PC. Of these, the PSP, GBA and DS are portable systems, PCs are standard computer systems, and the rest are TV-based console systems. The sampling frame included the top 150 games across all platforms, with a minimum of 15 titles per system. Twenty-two games were available on multiple systems. In these duplicate system cases, the system with the most advanced graphical processor was used. The titles on the slower systems were not examined so as to avoid duplicate characters in the analysis. An exception was made for Nintendo DS games, however, which were substantively different from the rest of the sample due to the unique dual screen. The DS games were all measured; thus, if a particular game was available on the DS and another platform, that game was coded twice. This sampling procedure resulted in a total of 133 games available for analysis (see Appendix A). The sample constituted a highly representative frame for the universe of commercial games by accounting for a majority of all game sales within the sampling period, and included all of the most successful and high-profile titles in the hit-driven games business.

An expert game player, who was not one of the coders, played each game for the first 30 min on the default difficulty setting, typically "low" or "easy." These 30-min segments were recorded digitally and stored on a high-end desktop computer for later coding.

Within-game coding

Every character in the sample was recorded as an individual unit and coded, for a total of 8572 characters. Of these characters, only adult male human characters were retained for analysis ($n = 3122$). Of these, only the characters close enough to the foreground to be visually captured and measured with accuracy ($n = 1074$) were retained for analysis.¹ Detailed screen shots of these adult male human characters were imported into Adobe Photoshop. The height, head width, chest width, waist width and hip width were measured in inches. For chest and waist widths, measurements were taken at the widest part of the chest but at the narrowest part of the waist. The measurements were then converted to circumferences and scaled using classical allometry (Norton, Olds, Olive, & Dank, 1996) to a height of 69.55 inches based on our anthropometric sample data from a 1998 nationally representative sample of adult men living in the U.S. (see below).

Training and reliability

Two trained undergraduate students measured the aforementioned body proportions of the 1074 characters in the sample. Coding rates were assessed at regular intervals throughout the study. Cohen's kappas (Cohen, 1960) were .98 for height, .93 for head breadth, .97 for chest breadth, .84 for waist width and .86 for hip width.

Realism

To assess realism, coders were instructed to code each character for how much detail and pixilation was present using four categories: *little to no detail* (1), *some detail* (2), *moderately detailed* (3), and *very detailed* (4). Characters that were coded as minimally

¹ There were three titles that contributed appreciably more to the sample than others. In particular, *Age of Empires*, *50 Cent Bulletproof* and *Major League Baseball 2005* contributed 13%, 5%, and 5% respectively to the entire sample. The remaining games in the sample contributed .5% to 4% of the sample. The characters from these titles, however, were not significantly different from the characters in the rest of the sample.

Table 1
Measurements of highly and minimally rendered adult male video game characters extrapolated to a height of 69.55 inches.

	1998 CAESAR sample, <i>n</i> = 1120	Highly rendered games		Mean difference	% Change	Minimally rendered video game		Mean difference	% Change
	Mean	Mean	<i>SD</i>			Mean	<i>SD</i>		
Height	69.55	69.55				69.55			
Head	22.72	31.31	11.59	8.59***	38	43.05	35.07	20.33***	89
Chest	40.30	40.36	9.33	0.06	0	45.71	10.90	5.41***	14
Waist	35.23	37.15	10.13	1.92***	7	43.71	12.57	8.48***	24
Hips	40.63	43.58	11.18	2.95***	6	51.25	13.32	10.62***	26

Note: For highly rendered video game characters, the endpoints for each measurement are as follows: head = 16.06–171.56; chest = 8.66–62.54; waist = 7.43–123.62; and hips = 20.73–125.53. For minimally rendered video game characters, the endpoints for each measurement are as follows: head = 16.54–205.52; chest = 18.43–143.96; waist = 19.38–158.67; and hips = 18.79–146.82. Statistically significant differences versus the CAESAR data are noted.

*** $p < .001$.

detailed (7%) or very detailed (20%) were in the minority. Therefore, response options were collapsed into *detailed* ($n = 594$) and *not detailed* ($n = 480$).

Rating

Coders checked each game title on the ESRB website and noted whether the game was rated “E” for everyone, “E + 10” for children ten years of age and older, “T” for teens, or “M” for mature audiences. There were no games rated “AO” (for adults only) in the sample because there were no popular AO games in the time window. In order to test whether games rated for children would contain different body imagery than games rated for an older audience, the categories were collapsed into two groups: characters in games appropriate for children, which collapsed the categories “E” and “E + 10” ($n = 291$), and characters in games appropriate for an older audience, which collapsed the categories “T” and “M” ($n = 783$).

We also explored differences by game genre, but did not find any meaningful differences; thus they are not reported.

Anthropometric comparison sample

The anthropometric comparison sample was taken from the Civilian American and European Surface Anthropometry Resource (CAESAR) study (Harrison & Robinette, 1998). Anthropometric data (e.g., height, head, chest, waist, hip measures) of North American citizens (ages 18–65) were collected in 1998 for the purpose of comparing the North American population to similar populations in Italy and The Netherlands. The CAESAR sampling strategy was a stratified sample with gender, ethnicity, and age all equally sampled. The sample was chosen as the comparison group because the 1998 data set represents a comprehensive sample of average North American men, and provides over 100 different measurements of the human body. To be more specific, this sample includes 1120 men who were underweight, normal weight, and overweight at the time this study was conducted. In fact, the Centers for Disease Control estimates that 18% of U.S. males were clinically obese in 1998 (Mokad, Serdula, Dietz, Bowman, Marks, & Koplan, 2000). Thus, this data set allows us to compare male video game characters to the entire spectrum of male body sizes found in the American population.

3-D modeling

A professional computer graphics artist was hired to create the 3-dimensional (3D) models of the male bodies from both the CAESAR data and the video game data (e.g., see Appendix B). Each model was constructed with mean anthropometric data (for the CAESAR composite) or mean game-supplied data (for each of the game subgroups) for the figure’s head, arms, chest, waist, hip, and legs. Two

models were thus created for visual comparison, with tables supplying the means. For direct comparison, all of the game characters were extrapolated up or down to a fixed height of 69.55 inches, which was the mean value in the CAESAR sample. Comparing media attributes to real-world attributes is a common approach in mass media research (see Dixon & Linz, 2000).

Results

Statistical analyses

To statistically compare the pairs of figures, one-sample *t*-tests were conducted to compare the video game proportions to a fixed mean (supplied by the CAESAR data for each body part). A Bonferroni correction was used to control for increased experimental error rate due to repeated *t*-tests. Thus, the *p* value for significance was $< .0125$.

The first research question asked if the body sizes of male video game characters reflected the body sizes of the average American male. Video game characters were significantly different on every dimension measured as compared to the real-world sample. Specifically, male video game characters had larger heads ($M = 36.06$, $SD = 24.70$, $t(927) = 16.44$, $p < .001$, $d = 0.76$), chests ($M = 42.75$, $SD = 10.71$, $t(1047) = 7.20$, $p < .001$, $d = 0.30$), waists ($M = 39.99$, $SD = 11.70$, $t(1029) = 10.06$, $p < .001$, $d = 0.52$) and hips ($M = 46.99$, $SD = 12.75$, $t(1070) = 16.04$, $p < .001$, $d = 0.67$) as compared to the CAESAR sample (see Table 1 for CAESAR means).²

The second research question asked whether game characters’ proportions would differ by level of realism. The results revealed that the highly detailed video game characters were significantly different from the minimally detailed characters on every dimension assessed. Highly rendered video game characters had significantly smaller heads ($t(552) = -23.73$, $p < .001$, $d = -0.44$), chests ($t(581) = -11.62$, $p < .001$, $d = 0.51$), waists ($t(584) = -13.64$, $p < .001$, $d = -0.57$), and hips ($t(596) = -15.61$, $p < .001$, $d = -0.62$) as compared to the minimally detailed characters.

T-tests also show that the highly rendered characters were significantly different from the CAESAR sample on every measurement except chest size (see Table 1). Highly rendered video game characters had significantly larger heads ($t(551) = 17.40$, $p < .001$, $d = 1.0$), waists ($t(583) = 4.48$, $p < .001$, $d = 0.24$), and hips ($t(594) = 6.35$, $p < .001$, $d = 0.35$) than the real-world sample.

Analysis of the minimally detailed video game characters revealed that these characters were also significantly larger than

² In *t*-tests comparing head size, there are some tests where the degrees of freedom is appreciably smaller than the degrees of freedom for the other body size comparisons. These missing data are because some of the characters wearing helmets (e.g., Madden 2006); thus, obtaining an accurate head measurement for these characters was not possible.

Table 2

Measurements of male video game characters in games rated for children and games rated for adults extrapolated to a height of 69.55 inches.

	1998 CAESAR sample, <i>n</i> = 1120	Games rated for children		Mean difference	% Change	Games rated for adults		Mean difference	% Change
	Mean	Mean	<i>SD</i>			Mean	<i>SD</i>		
Height	69.55	69.55				69.55			
Head	22.72	35.05	14.61	12.33***	54	36.47	27.83	13.75***	61
Chest	40.30	45.89	12.66	5.59***	14	41.55	9.60	1.25***	3
Waist	35.23	39.85	14.10	4.62***	13	40.04	10.68	4.81***	14
Hips	40.63	44.52	28.31	3.89***	9	47.90	11.81	7.27***	18

Note: For games rated for children, the endpoints for each measurement are as follows: head = 16.95–125.53; chest = 21.60–127.09; waist = 17.82–158.67; and hips = 24.23–132.46. For games rated for adults, the endpoints for each measurement are as follows: head = 16.06–205.52; chest = 16.19–143.96; waist = 7.43–146.82; and hips = 19.38–158.67. Statistically significant differences versus the CAESAR data are noted.

*** $p < .001$.

the real world sample on every measurement including chest size (see Table 1). Minimally rendered video game characters had significantly larger heads ($t(436) = 12.11$, $p < .001$, $d = 0.81$), chests ($t(478) = -9.96$, $p < .001$, $d = -0.65$), waists ($t(445) = 14.08$, $p < .001$, $d = 0.88$), and hips ($t(475) = 17.26$, $p < .001$, $d = 0.99$) than the CAESAR sample.

The 3-D models afforded the ability to answer Research Question 3, which asked if artifacts of processing power would emphasize or deemphasize certain body proportions. Appendix B demonstrates that all of the video game variations feature larger heads than the CAESAR sample. The high-detail video game characters' shoulders, waist, and hip sizes are significantly larger than the real-world sample, resulting in an overall larger, but not hypermuscular, figure. While bigger, these characters do not exhibit the "V" ideal. The minimally detailed characters have the largest body measurements of all the video game variations, resulting in a 3-D model that appears cartoonish in nature, and also not V-shaped.

Differences in body size by game rating

The final research question concerned whether games rated for children would contain different body imagery than games rated for an older audience. As can be seen in Table 2, characters in games rated for children had significantly larger chests ($t(289) = 5.51$, $p < .001$, $d = 0.38$) than did characters in games rated "T" and "M." However, characters in games rated for children had significantly smaller hips ($t(289) = -3.78$, $p < .001$, $d = -0.25$) than characters in games rated for adults.

Games rated for children were significantly different from the real-world sample on every dimension measured. Video game characters in games rated for children had significantly larger heads ($t(281) = 14.15$, $p < .001$, $d = 1.00$), chests ($t(289) = 7.48$, $p < .001$, $d = 0.58$), waists ($t(279) = 5.45$, $p < .001$, $d = 0.43$) and hips ($t(289) = 4.47$, $p < .001$, $d = 0.36$) as compared to the CAESAR sample.

Games rated for an adult audience also contained characters were significantly larger on every dimension assessed as compared to the CAESAR sample. Video game characters in games rated for adults had significantly larger heads ($t(654) = 12.64$, $p < .001$, $d = 0.69$), chests ($t(757) = 3.49$, $p < .001$, $d = 0.17$), waists ($t(749) = 12.02$, $p < .001$, $d = 0.57$), and hips ($t(780) = 16.96$, $p < .001$, $d = 0.82$) as compared to the real-world sample.

Discussion

This study sought to quantify the body sizes of male video game characters and determine whether these images reflect the actual bodies found in the male U.S. population. Overall, we found marked differences in the ways males are portrayed in video games in terms of photorealism and game rating. We found that characters at high levels of photorealism were larger than the average American male, but these characters did not mirror the V-shaped ideal found in

mainstream media. Characters at low levels of photorealism were also larger than the average American male, but the dimensions of these characters were so much larger that they appeared cartoonish in nature. When game rating was taken into account, the results revealed that hypermuscular male characters were more likely to be found in games rated for children than in games rated for adults. The implications of these findings for the game player, as well as for cultivation theory, are discussed below.

The first research question asked whether the body proportions of male video game characters reflect the proportions of the average American male. The answer to this question is no. On every dimension measured, male video game characters were systematically larger than the average American male. Game players, on average, encounter characters that have chest sizes that are 6% larger than the average male, and characters with waists and hips that are 14% and 16% larger than the average male respectively.

One curious finding about the video game sample's dimensions is the unusual distribution of muscle and fat. If video game characters, on average, mirror the V-shaped ideal present in mainstream media, we would expect that video game characters' chests would be much larger whereas their waists and hips should be comparatively smaller. In fact, research demonstrates that the male ideal represents a man with a chest-to-waist ratio of 1.4 (Pope et al., 1999). The real world sample we used has a chest-to-waist ratio of 1.14. If the video game characters were to represent the stereotypical male ideal, we would expect a ratio larger than the real-world sample and closer to 1.40. Yet we do not see this. The video game characters are larger on average, but have a *smaller* ratio of 1.07. In other words, they are not more ideal, but simply blockier.

A possible explanation for these larger, "block-like" characters could be due to the differing levels of photorealism present in the sample (Research Question 2). The males in the highly realistic group were larger on every dimension as compared to the real-world sample, and the chest-to-waist ratio for these characters was 1.10. Thus, the highly realistic characters seem to approach the male ideal more closely than the male characters at low levels of photorealism. Yet, in comparison to the findings in previous research, the measurements of the highly realistic characters are not unattainable to young boys and men. For example, Pope et al. (1999) found that contemporary action figures had chest sizes larger than 57 inches in circumference. The authors concluded that the average male would not be able to achieve this chest size naturally. In contrast, the chest size of the highly realistic characters in this study is roughly 41 inches, and only 3% larger than the average American male. Thus, it is conceivable that the average male could achieve this chest size without the use of anabolic steroids or excessive weightlifting. These findings have several implications.

First, the disparity between the video game sample's dimensions and real world sample is less dramatic when we consider obesity rates within the U.S. At the time this sample was collected, 18% of the U.S. male population was clinically obese, resulting in a signif-

icant proportion of real-world men who were unhealthy (Mokad et al., 2000). Thus, the disparity between the real world sample and the video game sample may not be due to video game characters becoming more idealistic; rather, it may be due to American men becoming more *un-ideal*. In other words, video game characters are representing bodies that real, healthy men should have in the first place. Indeed, the highly realistic video game characters in this sample have bodies that are relatively achievable without the use of drugs or excessive weightlifting.

Second, it is unlikely that the characters in highly photorealistic games will negatively affect male video game players' body satisfaction. Gamers who encounter these characters would view a male who is roughly 5' 10" tall, with a 40" chest and 36" waist. Since many men can achieve these proportions naturally, it is unlikely that the majority of male game players will deviate too markedly from this ideal. Yet this idea contradicts previous research that has found a positive correlation between exposure to video game magazines and boys' drive for muscularity. For example, Harrison and Bond (2007) found readers of video game magazines, but not sports, fashion, or fitness magazines predicted drive for muscularity in their sample of grade-school boys. The authors concluded that it was the hypermuscular bodies typically featured in the magazines that caused the children to take notice of the male form. The models in the other magazines were not drastically different from the males that the boys may have encountered in their everyday lives, and hence, did not affect their drive for muscularity. Applied here, it could be that on average, exposure to video game characters – especially those in highly realistic games – look too much like the average male to produce any impact on body image. However, exposure to close-up depictions of hypermuscular characters that are outside the norm such as those shown in magazines, could result in a drive for muscularity because these depictions become more salient in the minds of young readers. Of course, this is all speculative, and future research should take into account game realism when measuring the affect of exposure to these images on male body dissatisfaction.

Finally, highly realistic male characters did represent an unrealistic male ideal found in mainstream media. This finding is perplexing when compared to previous research. Martins et al. (2009) found that female video game characters at high levels of photorealism approached the thin-ideal more closely than did characters at low levels of photorealism. In our study, we found that highly realistic characters were larger, but not necessarily more muscular. This begs the question: why are video game designers creating idealized female characters but attainable male characters at high levels of photorealism? Williams (2006a) has suggested that gender and games work as a cycle: games feature more males which attract more males to play. Those males grow up and are more likely to be game makers than women, perpetuating the role of males in game creation, and so on. Are game designers creating thinner women at high levels of photorealism to emulate what gamers are accustomed to seeing in other media? Or are game designers creating idealized women because they represent objects of male fantasy? Are game designers creating male characters that are "just slightly better" than the average male to give game players a realistic model to which they can aspire? Perhaps a difference in sexual objectification is at play due to the preferences of designers, of their perceptions of their audience: the largely male game designers make female characters with exaggerated sexual appeal, but not male characters with exaggerated appeal. Alternatively, perhaps these differences are due to gender swapping. Although this is a content analysis and cannot speak directly to effects or identification issues, it is worth noting that gender swapping is possible in video games. However, a recent unobtrusive study of player data suggested that this was a fairly uncommon activity, and that a large portion of swapping was for aesthetic or strategic rea-

sons, rather than identification (Huh & Williams, 2009). Many male players preferred to look at female characters, and many female players preferred to play as males when in multiplayer games to avoid harassment.

This study did replicate previous research in that characters at low levels of photorealism were found to be the most "cartoonish." In this study, minimally realistic male characters were systematically larger than both the CAESAR sample and the highly realistic characters. In fact, the male characters in this group had a chest-to-waist ratio of .88. This ratio suggests that these characters' chests and waists are relatively the same size, resulting in a character with the shape of a square as opposed to the idealized V-shape. Similarly, Martins et al. (2009) found that female video game characters at low levels of photorealism were systematically larger and more cartoonish than characters at high levels of photorealism.

The finding for photorealism raises the question as to why less realistic characters have such disproportioned bodies. One explanation is the uncanny valley. The "uncanny valley" effect contends that low-resolution images are perceived as intentionally fake and consequently not processed as real (Mori, 1970). The uncanny valley explains why *Family Guy's* Peter Griffin is endearing to audiences. The simple shapes and colors help the audience focus on relating to Peter instead of focusing on all the ways that he appears different from a real human. Given that video game makers are aware of this effect, they may make characters in these games purposefully cartoonish in order to avoid inviting comparisons to humans. Alternatively, game makers may make these characters purposefully cartoonish because it is a stylistic choice.

Our final research question asked if the nature of male body imagery varied across game ratings. Interestingly, male characters in games rated for children not only conform to the muscular ideal found in other media, but the chest circumferences of these characters approach the hypermuscular proportions documented in previous research (Pope et al., 1999). The chest sizes of these characters approach 48 inches in circumference, 14% larger than the average American male. In addition, these characters have a chest-to-waist ratio of 1.3, which means that male characters in games rated for children come the closest to the male ideal ratio of 1.4. This finding replicates previous research in that characters in games rated for children approach the ideal more closely than characters in games rated for adults (Martins et al., 2009). However, this finding should be interpreted with caution given that roughly 27% of the male characters in our video game sample were found in games rated for children whereas 72% of the male characters were found in games rated for adults. Although children may see characters that approach this body-type, they are unlikely to encounter these types of characters as often as they would in games rated for an older audience.

These findings have theoretical implications as well. One of the assumptions of cultivation theory is that mass media present a similar and consistent stream of messages (Gerbner et al., 2002). Yet the results of this study support critics who challenge cultivation for not taking significant content differences into account (Hawkins & Pingree, 1981). This study demonstrates that the necessary conditions needed to activate feelings of body-dissatisfaction (e.g., hypermasculine characters) are not typical across games. Given the content differences by game resolution and game rating found in this study, future work must account for which type of game and which type of image the player is viewing when trying to establish cultivation effects.

Limitations

As with any study, there are limitations to acknowledge. This study was limited in that screen shots were not available for all the male characters. There are two reasons for this. First, charac-

ters in handheld games were simply too small to be captured and imported into Adobe Photoshop. Second there were some characters in the background of games that were also too small to see and be imported. Thus, the findings of this study may not be generalizable to all male video game characters, particularly characters found in hand-held systems.

Another limitation is that our anthropometric data set is from 1998. The weight landscape in the United States has changed dramatically since then. However, this is the largest publicly available data set, and thus, provides the best (and only) comprehensive point of comparison.

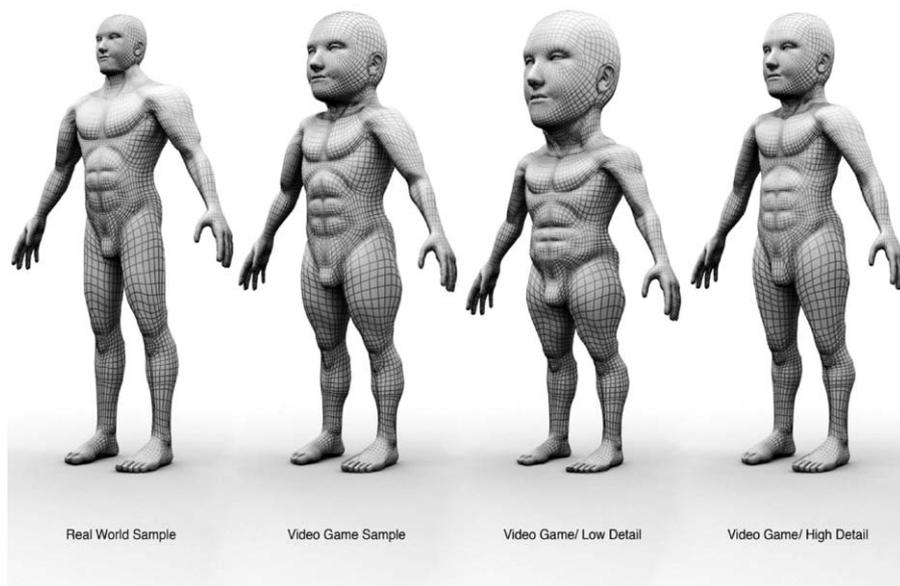
Finally, content analyses are particularly useful in quantifying or assessing characteristics of mass media. However, we cannot make claims about what types of effects exposure to these portrayals may have on game players. The next step is to ascertain whether exposure to these types of body portrayals is associated with decreases in male self-esteem and body satisfaction and an increase in drive for muscularity. Taken together, the results of this study coupled with follow-up experimental work will help understand how players respond to and are affected by idealized body imagery in video games.

Appendix A.

1. 50 Cent Bulletproof
2. Advance Wars Dual Strike^a
3. Advance Wars Dual Strike (DS)^a
4. Age of Empires
5. Age of Empires (DS)
6. Animal Crossing^a
7. Animal Crossing (DS)^a
8. ATV Off Road
9. Battlefield 2
10. Blitz: The League
11. Bratz: Rock Angels^a
12. Burnout 3: Takedown
13. Burnout Legends
14. Call of Duty 2
15. Call of Duty: Big Red One
16. Castlevania Dawn of Sorrow
17. Chronicles of Narnia^a
18. Civilization 4
19. Coded Arms^a
20. Condemned: Criminal Origins
21. Crash Bandicoot 2
22. Crash Bash
23. Crash Team Racing
24. Dead or Alive 4
25. Disney's Chicken Little^a
26. Disney Princess^a
27. Donkey Kong Country 3^a
28. Doom 3
29. Dragon Ball GT Final
30. Dragon Ball Z: Budokai
31. Dragon Ball Z: Ultimate Battle
32. Fable
33. Fight Night Round 2
34. Fight Night Round 3
35. Final Fantasy VII
36. Final Fantasy VIII
37. Final Fantasy IX
38. Final Fantasy Tactics
39. Fire Emblem: Sacred Stone
40. Forza Motorsport
41. God of War
42. Gran Turismo
43. Grand Theft Auto: San Andreas
44. GTA: Liberty Stories
45. Guild Wars
46. Gun
47. Halo 2
48. Halo: Combat Evolved
49. Harry Potter Goblet of Fire
50. Kameo: Elements of Power^a
51. King Kong
52. Kirby Airride^a
53. Kirby Canvas Curse^a
54. Lego Star Wars
55. Luigi's Mansion
56. Lumines
57. Madagascar
58. Madden'06
59. Major League Baseball 2K5
60. Mario and Luigi Partners in Time
61. Mario Golf^a
62. Mario Kart
63. Mario Kart Double Dash
64. Mario Party 7
65. Mario Party Advance
66. Mario Superstar Baseball
67. Medal of Honor: European Assault
68. Metal Gear Acid
69. Midnight Club Dub
70. MVP Baseball 2005
71. Namco Museum^a
72. NBA 2k6
73. NBA Live'06
74. NCAA Football 2006
75. Need for Speed: Most Wanted
76. Need for Speed: Underground
77. NFL Gameday 2005
78. NFL Street Unleashed
79. Nintendogs: Chihuahua^a
80. Nintendogs: Dachschund^a
81. Perfect Dark Zero
82. Pokemon Coliseum
83. Pokemon Dash
84. Pokemon Emerald^a
85. Pokemon Firered
86. Pokemon Leafgreen
87. Pokemon XD: Gale of Darkness
88. Project Gotham Racing
89. Quake 4
90. Ratchet Deadlocked
91. Resident Evil 4
92. Ridge Racer
93. Rollercoaster Tycoon 3
94. Shadow of the Hedgehog
95. Simpsons Road Rage
96. Sims 2
97. Sims Deluxe
98. Sims 2 Double Deluxe
99. Sims Nightlife
100. Sims University
101. SOCOM 3 US Navy Seals
102. SOCOM US Navy Seals: Fireteam Bravo
103. Sonic Heroes^a
104. Sonic Mega Collection^a
105. Sonic Rush^a
106. Soul Calibur 3
107. Splinter Cell Chaos Theory
108. Spongebob Supersponge^a
109. Spyro: Year of the Dragon^a
110. Star Wars Battlefront 2
111. Star Wars Battlefront
112. Star Wars III: Sith
113. Star Wars: Republic Commando
114. Super Mario 3
115. Super Mario 64
116. Super Mario Strikers
117. Super Mario Sunshine
118. Super Smash
119. Tiger Woods
120. Tony Hawk's American Wasteland
121. Tony Hawk: Underground 2 Remix
122. Twisted Metal: Head On
123. Untold Legends
124. Warioear Touched
125. Wipe Out Pure
126. World of Warcraft
127. WWE Smackdown
128. Yoshi Touch and Go^a
129. Zelda
130. Zelda Windwalker
131. Zoo Tycoon
132. Zoo Tycoon (DS)
133. Zoo Tycoon: The Complete Collection

^a Video game did not contain adult male character.

Appendix B.



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