

The interference effect of men's handling of muscular action figures on a lexical decision task

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Abstract

It has been shown in previous work [Action figures and men. *Sex Roles* 53, 877–885] that male participants who handled extremely muscular action figures had lower body esteem than those who did not handle action figures or a Ken doll. However, the internal mechanisms that dictated this effect are unclear. Therefore, the current study extended this previous work by having male participants handle action figures of varying muscularity and completing a lexical decision task with target words that consisted of both positive and negative body words and feeling words in order to determine if males would be primed to think negatively about their bodies and self or if positive thoughts about their bodies and self would be interfered with. The results show that those participants who handled the extremely muscular action figures responded significantly more slowly to feeling positive words (e.g., content, confident) and marginally more slowly to body positive words (e.g., muscle, bicep) than those who did not handle any action figures. Overall, this suggests that the interference of positive words, not the priming of negative words, is the internal mechanism that produces the decreased body image satisfaction after exposure to muscular stimuli. Implications and future research are discussed.

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Introduction

The effects that the mass media have on body image concerns are becoming more pronounced. Adding to the wealth of research that has looked at the effects of the mass media on women, an increasing body of literature has begun to study the effects that muscular male images have on body images of males. Research in this area has found that men who view stimuli consisting of muscular male images have significantly lower levels of self-esteem (Muris, Meesters, van de Blom, & Mayer,

2005), body esteem (Duggan & McCreary, 2004), and body satisfaction (Agliata & Tantleff-Dunn, 2004). These findings have been found for a variety of media including magazines (Murnen, Smolak, Mills, & Good, 2003) and television commercials (Agliata & Tantleff-Dunn, 2004).

The Biopsychosocial Model

Due to the vast amount of research on the effects that exposure to a stimulus has on the body image of men (and women), the Biopsychosocial Model (Ricciardelli & McCabe, 2004) has been implemented to such findings. As applied to adolescent boys and young men, this model predicts that biological (e.g., time of puberty, body mass index), sociocultural (e.g., pressure from the

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mass media, playing sports that emphasize muscularity, popularity in school), and psychological (e.g., negative affect, perfectionism, body image concerns) factors all independently, and when coalesced together, lead to the formulation of behavioral outcomes that are consistent with having a negative body image (e.g., steroid usage). The research on males and body image has justified the specific links between body image concerns created by each aforementioned factor to the behavioral outcomes (Ricciardelli & McCabe, 2004).

There are various strengths within this model. The first strength of this model is that there are multiple variables included in each factor. This is advantageous because this suggests that many factors, besides just the mass media, can influence the self-image of males. Another advantage is research suggesting that each of the variables in these factors can predict self-image outcomes. Research since the mid-1960s has examined body image concerns in males (Staffieri, 1967). Since then, an abundance of literature has shown that males will feel worse about their bodies as a result of playing certain sports, peer and parent pressure, media pressure, and their body mass index, all of which can be linked to behavioral outcomes, as the Biopsychosocial Model predicts (Ricciardelli & McCabe, 2004). A final advantage to this model is that it is testable, by varying or observing variables within a specific factor and examining how they relate to the pursuit of muscularity or to the other factors. The disadvantage to the Biopsychosocial Model is that it is a product model, which suggests that the internal mechanisms that produce this model are still unknown.

Similarly, Cafri et al. (2005) posited a model which predicts that biological, social, and psychological factors all influence health risk behaviors (e.g., steroids, dieting to increase muscularity) through internal processes, which include social body comparison and body image dissatisfaction. The advantage to this model, over the Biopsychosocial Model, is that processes (either external or internal) are specified. However, the exact psychological processing that occur when presented with the “ideal” image is still unknown.

Focusing on the mass media, the Biopsychosocial Model and the model posited by Cafri et al. (2005) predicts that exposure to muscular stimuli would lead to the behavioral outcomes of a negative self-image. As stated previously, research has shown that males are affected by the muscular stimuli in television commercials and magazine advertisements. Effects that certain toys (especially muscular action figures) can have on negative body images can be predicted by the socio-cultural portion of both models.

Effects of toys on body image concerns

Given the in particular characteristics, it is appropriate to predict that certain toys will produce negative body image concerns in those who handle them. Perhaps the most infamous toy that can produce these effects, Barbie, has been shown to have an unattainable body shape if extrapolated to the size of an average woman. When such measurements are made, it has been reported that Barbie would lack the 10% body fat necessary for menstruation and would have measurements that could only be obtained through cosmetic surgery (Turkel, 1998). Norton, Olds, Olive, and Dank (1996) found that the probability of a woman having the exact same body proportions as Barbie is 1–100,000. Research has shown that when girls are shown pictures of Barbie, they have a decrease in their body satisfaction, compared to those who viewed pictures of a more proportionate doll (Ditmar, Halliwell, & Ive, 2006). These results are not surprising given that research has shown that women will feel significantly worse about their body after exposure to thin stimuli (Groesz, Levine, & Murnen, 2002).

The effects that certain toys have are not specific only to women or girls. Like the extrapolation procedures on Barbie, similar research has shown that the muscles of certain action figures marketed to boys are enlarging over time (Pope, Olivardia, Gruber, & Borowiecki, 1999). Using this as an empirical basis for research, Barlett, Harris, Smith, and Bonds-Raacke (2005) had young adult male participants handle extremely muscular action figures, moderately muscular action figures, or no action figures and complete various body image scales. The results showed that those who handled the extremely muscular action figures later had lower levels of body esteem than those who had not handled any action figures, suggesting that the most unrealistically muscular action figures produced certain body image concerns in males. Due to the muscularity of these action figures, it is not surprising that such findings have been found, as research has shown that males will feel worse about their bodies after exposure to muscular stimuli (see Cohane & Pope, 2001).

Overview of the current research

Despite the results from the Barlett et al. (2005) study, the internal mechanisms driving these results remain unclear. Therefore, the goal of the current study was to determine if participants would be primed to

think negatively about and evaluate their bodies and feelings while handling action figures, or if participants would be hindered in thinking and processing positively about their body and feelings. In other words, the current study was a test to determine the internal processing that occurs when males handle muscular stimuli. Specifically, it was hypothesized that participants who handle extremely muscular action figures will have significantly different reaction times on body and feeling words than those who do not handle any action figures. Based on the past research the following hypotheses were derived:

H1. Men who handle the extremely muscular action figures will respond more slowly to positive words about their body and feelings than men who handle the less muscular action figures.

Specifically, this hypothesis is a test to determine if handling muscular action figures, while being forced to feel the muscles of these figures, will cause interference in the processing of words that are indicative of positive feelings and positive body image. In other words, while feeling the unrealistically muscular action figure's body, one will not be able to process positive words because the focus will be on the muscles.

H2. Men who handle the extremely muscular action figures will respond faster to negative words about their body and feelings than men who handle the less muscular action figure.

Specifically, this hypothesis is a test to determine if handling muscular action figures will cause the participants to be primed to think and focus on their own body relative to the body of these unrealistically muscular action figures. Therefore, it is predicted that after handling the extremely muscular action figures, the participants will respond to words that emphasize negative feelings and negative body image, as a result of the priming that is predicted to occur.

If both of these hypotheses are supported, this would support a dual process of encoding and interpreting information about a muscular stimulus. One such process will be the priming of negative thoughts about one's feelings and body, while the other process will be the inhibition of positive thoughts about one's feelings and body. Theoretically, this will provide evidence for which internal mechanisms are being processed when men are presented with a muscular stimulus.

Method

Participants

Seventy-seven men from a large Midwestern University participated in the current study. The mean age for these participants was 19.62 (2.65) years and the majority of participants (83%) were freshman and sophomore undergraduates. They were sampled from a relatively homogeneous population, as the majority (71.3%) were Caucasian, 4.3% were African-American, 2.1% were Asian, 1.1% was Hispanic, and 21.3% were either classified as "Other" or did not report ethnicity. Participants worked out an average of 3.22 (2.01) h per week and weighed themselves an average of 1.99 (2.33) times per week. All participants received partial course credit for their General Psychology class.

Materials

Action figures

The action figures that were used were identical to the ones used in Study 1 of Barlett et al. (2005). These were the highly muscular action figures (WWE Flex'ems) and the moderately muscular action figures (WWE Tag-Teamers). The highly muscular action figures had muscles that were greater than the average male's muscles when extrapolated to the height of 70 in. (as suggested by Pope et al., 1999). Specifically, the waist measured 27 in., the biceps measured 25 in., and the chest measured 64 in. The moderate action figures would have a waist that measured 30 in., biceps that measured 20 in., and a chest that measured 48 in. These action figures were carefully selected in such a way that they were similar in height and appearance, differing from one another only in muscularity levels. None of the wrestlers had their shirts on, hence not covering their muscles, but did wear traditional wrestling attire (e.g., boots, pants/shorts). Barlett et al. (2005) had participants rate the perceived muscularity of these action figures on a 1 (*not muscular*) to 5 (*extremely muscular*) Likert scale and found that participants did view these two groups of action figures significantly different in terms of their perceived muscularity.

Questionnaires

The current study employed four questionnaires that were to be used as possible control variables. Three of these scales measured self-esteem, body-esteem, and body satisfaction, which are the three constructs that have been shown to be related to one's body image. A fourth scale was utilized which measured attitudes toward

muscularity, which contains two subscales: positive attitudes toward muscularity and drive for muscularity. All of these scales will be discussed in depth.

The first questionnaire was the Rosenberg Self-Esteem Scale (RSE), which measures trait self-esteem (Rosenberg, 1965). This scale asks participants to respond to 10 items on a 1 (*strongly disagree*) to 4 (*strongly agree*) Likert Scale, with higher scores being indicative of higher self-esteem. A sample item includes: “I often feel that I am better than most people.” The total possible range of this scale is 10–40, and is scored such that higher scores indicate a higher level of self-esteem. The reliability for this scale for this study was $\alpha = .70$.

The second questionnaire was a modified version of the Body Shape Questionnaire (BSQ), which measures body satisfaction (Cooper, Taylor, Cooper, & Fairburn, 1987). Because this scale was developed for women, it had to be modified to make the wording applicable to men. For instance, an item on the original Body Shape Questionnaire included: “Have you become afraid that you might become fat or fatter?” This question (and similar questions) was modified to emphasize muscularity instead of body fat (“Have you become afraid that you might become non-muscular?”) This modified scale asked participants to respond to 24 items on a 1 (*never*) to 6 (*always*) Likert Scale, with higher scores being indicative of lower body satisfaction. The reliability for this scale for this study was $\alpha = .93$.

To measure body esteem, the Male Body Image Esteem Scale (MBIES; Markunas, Christopher, Nelson, & Miller, 2003) was utilized. This scale asks participants to respond to 20 items on a 1 (*not a characteristic*) to 7 (*extremely characteristic*) Likert Scale, with higher scores being indicative of higher body esteem. A sample item from this scale includes: “I like to have my picture taken.” The reliability for this scale for this study was $\alpha = .90$.

Finally, the Swansea Muscularity Attitudes Questionnaire (SMAQ; Edwards & Launder, 2000) was utilized. This scale has two subscales which measures positive attitudes toward muscularity (PAM) and drive for muscularity (DFM). These two subscales were included in the current study because they both ask questions that are specific to muscularity. In its entirety the SMAQ includes 20 items which asks participants to respond on a 1 (*not at all*) to 7 (*extremely*) Likert Scale. Each subscale has 10 items with higher scores being indicative of a higher drive for muscularity and a higher positive attitude toward muscularity. A sample item includes: “I aim to develop and further my physique.” The reliability for this scale for this study was $\alpha = .95$.

Task

Reaction times to a lexical decision task were used as the dependent variable. A lexical decision task is often used in experiments that investigate priming, such that if reaction times are quicker to one set of words compared to another set, then priming is assumed to have occurred for those words (Sanchez, Ferre, Garcia-Albea, & Guasch, 2006). Also, if reaction times are slower to certain words, then that is indicative of some sort of interference for that word set (Davis & Taft, 2005).

For the current study, there were three broad classes of words (see Table 1). The first were the non-words ($n = 80$), which were strings of letters that were mostly pronounceable (with the exceptions of “Lrest” and “Esantr”), but did not make a word in the English lexicon (i.e., heem, lof, cettlart). The second class was the filler words ($n = 60$), which consisted of real words in the lexicon that were not related to feelings about the self or body (i.e., extra, towns, percent). Finally, the third class of words were target words ($n = 20$). Within this category there were five negative words that focused on the body (i.e., ugly, puny, weak, steroid, fat), five positive words that focused on the body (i.e., bicep, attractive, handsome, strength, muscle), five negative words that focused on feelings (i.e., ashamed, distressed, lame, afraid, frail), and five positive words that focused on feelings (i.e., proud, happy, confident, content, manly). There was a three to one ratio of filler words to target words, and there were equal numbers of non-words and words. All words were controlled for length and frequency based on norms of the English language of Kucera and Francis (1967). Specifically, this procedure called for the primary researcher selecting the target words, and then finding three filler words that had the same word length and were used as frequently in the English language. For instance, the target word “proud” (which has five letters) had “chain”, “extra”, and “towns” as the corresponding filler words because they each had five letters and were written in the English language as frequently.

The lexical decision task involved presenting participants with letter strings and having the participants respond by pressing the “a” key for a word or the “l” key for a non-word as quickly as possible, if the letter string presented was a word in the English lexicon. All letter strings were presented in random order for each participant using the E-prime computer program, and after each response the participants were given computer-based feedback as to whether their answer was correct or incorrect, and their overall accuracy percentage.

Table 1
Letter strings for each category in the Lexical Decision Task

BP	BN	FP	FN	Filler	Non-words					
Biceps	Ugly	Proud	Ashamed	Chain	Commands	District	Juper	Lings	Dalp	Cellart
Attractive	Puny	Confident	Distress	Extra	Bait	Remember	Esantr	Noder	Brol	Hodushes
Muscle	Weak	Content	Lame	Towns	Naps	Appeared	Weverton	Krooderes	Lomsil	Dilpions
Handsome	Steroid	Happy	Afraid	Share	Pens	Bold	Quap	Histirton	Tredim	Esde
Strength	Fat	Manly	Frail	Claim	Sample	Neat	Veeble	Sabilseo	Coipeb	Culf
				Style	Double	Rent	Cooda	Kolps	Zimop	Woog
				Allowance	Remove	Bats	Strobo	Otbee	Denla	Heem
				Northeast	Choir	Mast	Shustling	Bivoal	Enple	Poig
				Translate	Lakes	Clip	Imdere	Creawhy	Yerbap	Trea
				Remarks	Belts	Kids	Poobicle	Thukeds	Unsops	Tnol
				Percent	Aliens	Coal	Alseshod	Hufle	Hinferes	Kuji
				Payment	Clinic	Beef	Himp	Lrest	Klimpto	Frib
				Bonus	Napkin	Turnips	Ikle	Klort	Ilgars	Joplack
				Sniff	Objectives	Peddled	Flum	Niotion	Tunnderous	Strimpe
				Limbo	Legislature	Bagpipes	Tummim	Graxil	Resnaberes	Dreelmoy
				Buffalo	Communists	Lie	Deo	Aiperts	Joidington	Nof
				Lecture	Prison	Eat	Zoiny	Noyguls	Gunpol	Laz
				Channel	Discover		Roplo	Frubbinn	Gackprod	
				Daylight	Combined		Edere	Gruppock	Kullford	
				Marching	Studying		Heone	Kobo	Plashall	

Note: BP, body positive; BN, body negative; FP, feeling positive; FN, feeling negative.

Procedure

Prior to conducting the study, IRB approval was granted for the current study through the Kansas State University Internal-Review-Board, who deemed the methods and procedures for this study as “less than minimum risk.” Firstly, participants were randomly assigned to one of three groups. The first group ($n = 26$) did not handle any action figures and was referred to as the control group. The second group ($n = 26$) handled the WWE Flex’ems, and was termed the muscular group. The third group ($n = 25$) handled the WWE Tag Teamers and was referred to as the moderate group.

Participants entered into the experimental laboratory where the same male researcher was always present to conduct the experiment. This male experimenter was 21 years old, Caucasian, and had an average body frame at the time the data was collected. Firstly, all participants completed the MBIES, BSQ, RSE, and SMAQ prior to the 10 practice trials of the lexical decision task, which was needed to ensure that the participants understood the goals of the task. After that, those in the experimental conditions were given three of their respective action figures to place into 13 various positions. These positions instructed the participants to place their action figures into a number of different stances and positions (e.g., Figure 1 is facing Figure 2, while Figure 3 is lying down). After the participants completed the first position on the list, they were

instructed to place the arms and legs of each action figure straight down and move onto the second position. This method ensured that the participants would feel the muscles and body of their respective action figures. After handling the action figures for 15 min, participants completed the lexical decision task and a demographic questionnaire (which assessed age, ethnicity, number of hours working out, and number of hours weighing oneself). Participants in the control condition completed the lexical decision task and demographic questionnaire as soon as they entered the laboratory. After the demographic questionnaire was completed, all participants were then thanked and fully debriefed.

Results

Prior to the main analyses, transformations were conducted on the lexical decision reaction times in order to trim the data and make the distributions of these word groupings more normal, and allow for the use of more powerful statistical tests. Specifically, if the participants responded to any letter string before 200 ms, then that number was substituted with the mean for that letter string. Additionally, if the participants incorrectly identified a non-word letter string as word, then that letter string was not included in the overall analyses. Finally, if the participants responded to a letter string over two standard deviations from the mean of that word, then the mean for that letter string was

substituted. This procedure of trimming the data for two standard deviations above and below the mean is typically done in lexical decision experiments in order to control for the highly positively skewed data. The assumption is that responses under 200 ms must have pre-attentively pressed the computer key, and responses over two standard deviations from the mean took too long to process that word (Ratcliff, 1993).

The current analysis was conducted to determine if the three groups differed from one another on the amount of time working out and weighing oneself by using two one-way analyses of variances (ANOVAs) with the dependent variables being the total time spent working out and the number of times one weighs himself. The results show that both of these variables did significantly differ between groups, $F(2, 60) = 5.70$, $p < .01$, partial $\eta^2 = .16$, power = .85 for working out, and $F(2, 60) = 7.38$, $p < .0001$, partial $\eta^2 = .20$, power = .93 for number of times weighing oneself. This analysis suggests that the participants in the moderate group worked out and weighed themselves more than those in other two groups, which means these two variables were not randomly distributed. Therefore, these two variables need to be controlled for were covaried for the main analyses.

To further determine if there were significant differences between participants on their body esteem, body satisfaction, self-esteem, drive for muscularity, and positive attitudes toward muscularity, several analyses of covariance (ANCOVAs) were conducted, with the amount of time working out and weighing oneself as covariates. If the results from these analyses show a significant main effect for condition, then these variables would also need to be controlled for in future analyses. The results from these ANCOVAs show that there were no significant main effects for muscularity condition on any of the aforementioned scales (all $F_s < 2.00$, all $p_s > .05$). This suggests that participants in the three conditions had similar body images prior to the lexical decision task.

The first main analysis was to answer the question: does handling muscular action figures prime or interfere with men's responses to selected target words? Reaction times to the target words for each of the four categories were summed to get the total time for each word type. Prior to the main analyses, the accuracy data on the lexical decision task was computed for each word category and then for the entire set of words. The results show that all participants correctly answered 92.82% of the non-words, 95.22% of the filler words, and 94.93% of the target words (results show that the word "puny" was the most frequently missed, with 27.27% of

participants incorrectly classifying this word). Overall, the participants' accuracy rate for all of the letter strings in the lexical decision task was 94.21%, which suggests that the participants incorrectly identified only a small portion of the words. Analyses of variance showed a non-significant main effect for condition on the accuracy of any word category or the overall accuracy, suggesting that no one condition outperformed another condition (all $F_s < 1.7$, all $p_s > .10$).

The first hypothesis stated that those in the extremely muscular condition would respond more slowly to feeling and body positive words. Therefore, two ANCOVAs were conducted to test this prediction with how much one works out and weighs themselves as covariates, for each word grouping. The results from the first ANCOVA show that there was a significant difference on this reaction time between the groups on the feeling positive words, $F(2, 55) = 3.64$, $p < .05$, partial $\eta^2 = .12$, power = .65. Pairwise comparisons were conducted to determine differences between the three groups. This analysis revealed that the muscular group ($M = 596.65$) responded significantly more slowly, $p < .02$, to the feeling positive words (proud, happy, confident, content, manly) than the control group ($M = 551.61$) and the moderate group ($M = 552.83$), thus supporting the first hypothesis. There were non-significant differences between the moderate and the control groups for this word grouping¹. See Table 2 for mean reaction times for each group.

The second ANCOVA was conducted on the mean reaction time for the body positive words, which found a marginal difference between the mean reaction times for the body positive words (bicep, attractive, handsome, strength, muscle), $F(2, 55) = 2.61$, $p = .08$, partial $\eta^2 = .09$, power = .50. Pairwise comparison analyses between each group reveal that the muscular group had significantly, $p < .03$, higher mean reaction times ($M = 610.14$) than the control group ($M = 554.18$), thus

¹ A post-experimental review of the words used in the lexical decision task revealed a potential confound: the word "bold" may be associated with a feeling positive word, instead of a distractor word. In order to determine if that word would influence the overall results, the mean reaction times were computed and included in the calculation for the feeling positive words. Two ANCOVAs were conducted. The first with the mean reaction time for the word "bold" as the dependent variable, and the other with the mean reaction times with the feeling positive words (including "bold") as the dependent variable. The results show a non-significant main effect for condition on the reaction time for the word "bold." The second ANCOVA revealed a significant main effect for condition on the feeling positive words, in the same direction as the main ANCOVA. Therefore, the word "bold" did not significantly influence the overall relationship.

Table 2
Mean reaction times (ms) for each condition and word groupings

Condition	<i>n</i>	Body positive [†]	Body negative	Feeling positive [*]	Feeling negative
Control	26	554.52 (69.70) a	543.09 (75.37) a	551.61 (54.88) a	584.35 (81.46) a
Moderate	25	589.00 (66.79) ab	552.00 (59.64) a	552.83 (53.15) a	618.28 (68.52) a
Muscular	26	603.60 (95.03) b	577.45 (55.46) a	596.65 (73.52) b	618.65 (75.65) a

Means with differing letters indicate a significant, $p < .05$, difference.

^{*} An overall difference in that word grouping category, $p < .05$.

[†] A marginally significant difference, $p < .10$.

partially supporting the first hypothesis. There were non-significant differences between the mean reaction times for the moderate group ($M = 586.73$) and the other two groups.

The second hypothesis stated that those who handled the extremely muscular action figures would respond significantly faster to negative body and feeling words due to priming. Therefore, the first ANCOVA was conducted with the feeling negative words as the dependent variable, which found a non-significant main effect for group, $F(2, 56) = 1.13$, $p = .33$, partial $\eta^2 = .04$, power = .24. Examination of the means and standard deviations show that participants responded similarly independent of which group they were randomly assigned to, thus not supporting the second hypothesis (see Table 2).

A second ANCOVA was conducted with the body negative words as the dependent variable. The results of this analysis show that there was a non-significant main effect for group, $F(2, 56) = 1.70$, $p = .19$, partial $\eta^2 = .06$, power = .34. Examination of the means and standard deviations show that participants responded similarly independent of which group they were randomly assigned to, thus not supporting the second hypothesis² (see Table 2).

² Society as a whole, or individuals who do have body image concerns may not perceive the use of steroids as negative. Therefore, two separate ANCOVAs were conducted in order to test to see if the word “steroid” significantly affected the results. The first ANCOVA was conducted with the average time of the body negative words without the word “steroid” in the computation with the average time working and weighing oneself as covariates. The results show a non-significant main effect for condition ($F < .10$, $p > .10$), such that the three conditions responded similarly to the updated body negative words. The second ANCOVA was conducted with the reaction time for the word “steroid” as the main dependent variable. The results show a non-significant main effect for condition on the mean reaction times for the word “steroid” ($F < .10$, $p > .10$). These analyses suggest that the processing of the word steroid did not differ by condition. Therefore, even if participants viewed steroids as positive, rather than negative, that word did not significantly affect the overall results.

Discussion

The current study was designed in order to determine the effect that handling action figures of different muscularity levels would have on the processing of thoughts about men’s bodies. It was hypothesized that those handling the extremely muscular action figures would respond more slowly to positive words related to their body and their feelings (due to interference) and respond more quickly to negatively valence words related to their body and their feelings (due to priming). Overall, the results of the current study supported the interference hypothesis, by showing that handling the extremely muscular action figures produced slower reaction times for the feeling positive and marginally slower times on the body positive word groupings compared to those who did not handle any action figures. One possible explanation for these findings is that the extremely muscular action figures produced interference in these target word groupings. Therefore, thinking about being confident or proud (feeling positive words) takes longer after handling the muscular action figures, which is predicted in the literature on body image concerns produced by viewing muscular male stimuli.

The results, however, did not support the priming hypothesis for the negative words, as participants in all conditions responded similarly to feeling negative and body negative words. Therefore, these results suggest that those who handled action figures with an unnatural level of muscularity were not primed by touching and feeling the muscles of that particular action figure for the negative words. It could be suggested that the group who handled the muscular action figures were not primed because the muscles on these action figures were unrealistically large. However, there were non-significant differences between the control group and the moderate groups, suggesting that even with handling the moderately muscular action figures the participants were not primed to think negatively about their body.

Overall, this study suggests that there is one processing mechanism operating while being exposed

and handling these action figures: interference with positive words. This is an interesting finding, because if both hypotheses were supported, such that the participants in the muscular condition were primed to think negatively about their body and showed interference with positive words, that would be indicative of two mechanisms (priming of negative thoughts and interference with positive thoughts) involved in processing after exposure to muscular stimuli.

These results have strong implications for the Biopsychosocial Model to explain the effects that muscular stimuli (e.g., action figures) have on those who handled them. Specifically, the internal processing in either the Biopsychosocial Model or the model suggested by Cafri et al. (2005) may have a single route, rather than a dual route. Future research should begin to focus on the conditions under which these results are applicable. Perhaps using different stimuli than action figures produces the dual route.

One potential limitation to the current study was that the height and weight of the participants was never assessed. These variables are important to measure, as they are related to body-mass-index, which has been shown to significantly contribute to the body image of males (Ricciardelli & McCabe, 2004). For the purposes of the current study, since the participants were randomly assigned to conditions, it was assumed that those who have a high, medium, or low BMI would be distributed evenly throughout the conditions. However, this assumption cannot be validated, and if those participants who had a high, medium, or low BMI were not evenly distributed throughout the four conditions, then future research should treat these variables as potential covariates. However, the three groups did not differ on the four attitudinal scales suggests that this potential limitation is not a major concern.

Another potential limitation to the current study was the age of the sample that was used. Since the task instructed participants to handle action figures, the ecological validity of this study is limited. Future research should attempt to replicate these results (using age-appropriate words for the lexical decision task) with boys who frequently play with action figures on a regular basis. Conversely, future research could sample from the same population of the current study, but use a different stimulus such as a wrestling video game that puts emphasis on the body shape of the characters.

The aforementioned criticism of the current research is warranted. However, prior to using the same methodology and stimuli on elementary-aged boys, it is important to understand the effects that muscular action figures have on a handy sample. Only when such

effects are understood, can theoretical hypotheses be applied to children. The current study does add to the theoretical contributions of body image research by testing the internal processing that occurs when handling action figures of varying muscularity. Therefore, this study coupled with previous work (Barlett et al., 2005) are steps to provide future researchers with the necessary empirical research to test the effects that action figures have on the body image of boys.

The current study shows the value in using a lexical decision task to study body image concerns (especially in men). Typically, experiments conducted that study the body image of men (and women) typically involve the use of questionnaire methods of data collection, and based on those results conclusions and generalizations (e.g., Ridgeway & Tylka, 2005). However, as stated earlier, the internal processes that drive these effects remain unclear. A lexical decision task can assess these internal processes, which explains the value in using such a task.

Lexical decision tasks have been used in past research investigating body image concerns in women. Meijboom, Jansen, Kampman, and Schouten (1999) found that females who were high restrained eaters demonstrated priming to body shape and weight words after being primed to think of their self-esteem; however, this effect dissipated when the presentation of the body shape and weight words were slower and consciously processed by the participants. Obviously, this study differed from the current study in a number of ways, including using highly restrained eaters, using different words, using females, and the participants had low self-esteem. This gives credence to the fact that the results from the aforementioned study did not replicate with the results of the current study. But, this past study and the current one demonstrate the automatic processing that occurs when presented with the ideal body image, or primed to think negatively about one's self.

The results of the current study have implications (a) for those who study the effects of body image in men, (b) for clinical psychologists who see male patients who have body image concerns, and (c) for those men who are constantly exposed to image of the "ideal" male body. Specifically, these results showed that positive words are inhibited, while negative words are not, suggesting that a single process (interference of positive thoughts) may be driving the reasons why men will feel worse about their bodies after viewing muscular stimuli. Future research is needed to replicate this finding, but to different stimuli, such as television commercials and magazine pictures in order to begin incorporating the internal mechanisms into theory.

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