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Body checking behaviors in men

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Abstract

Males have been facing increasing pressure from the media to attain a lean, muscular physique, and are at risk for body dissatisfaction, disturbed eating and exercise behaviors, and abuse of appearance- and performance-enhancing drugs (APEDs). The aim of the current study was to examine the relationship between body checking and mood, symptoms of muscle dysmorphia, importance of shape and weight, and APED use in undergraduate males. Body checking in males was correlated with weight and shape concern, symptoms of muscle dysmorphia, depression, negative affect, and APED use. Body checking predicted APED use and uniquely accounted for the largest amount of variance in Muscle Dysmorphic Disorder Inventory (MDDI) scores (16%). Findings support the view that body checking is an important construct in male body image, muscle dysmorphia, and body change strategies and suggest a need for further research.

Keywords

Body checking; Muscularity; Body image; Body dissatisfaction; Muscle dysmorphia; Anabolic-androgenic steroids

Introduction

Body checking describes frequent evaluation of one's body to gain information about size, shape, or weight (American Psychiatric Association, 2000; Shafran, Fairburn, Robinson, & Lask, 2004). Examples include repeated weighing, checking specific body parts in mirrors and other reflective surfaces, asking for others' opinions about one's body, comparing oneself to others, feeling for bones, and checking the fit of certain items of clothing. Avoidance behaviors encompass a range of behaviors aimed at avoiding information about one's weight, shape, or size, such as not weighing oneself, wearing loose-fitting clothing, avoiding looking in mirrors, and avoiding situations in which revealing clothing is worn, such as the gym or the beach.

Body checking behaviors have been incorporated into descriptions of eating disorders, body dysmorphic disorder (BDD; American Psychiatric Association, 2000), and muscle dysmorphia (MD; Pope, Gruber, Choi, Olivardia, & Phillips, 1997). Leading evidence-based treatments for bulimia nervosa (Fairburn, Marcus, & Wilson, 1993), body image disturbance (Cash, 2008; Cash & Pruzinsky, 2004) and BDD (Rosen, 1995; Rosen, Reiter, & Orosan,

1995) include components designed to reduce compulsive body checking and avoidance behaviors. In addition, recent theoretical models propose that body checking and avoidance are both behavioral manifestations of core eating disorder psychopathology and maintaining factors of eating- and body-related problems (Shafran et al., 2004).

In a sample of women with eating disorders, Shafran et al. (2004) found that 92% of the females reported body checking and that 70% of participants engaged in various body checking behaviors on a regular basis. The focus of these behaviors was almost always on specific body parts that they disliked. Only 5% of their sample reported improved mood following body checking. In both clinical and non-clinical female samples, body checking and avoidance behaviors are positively associated with increased shape and weight concern (Farrell, Shafran, & Fairburn, 2004; Reas, Grilo, Masheb, & Wilson, 2005; Shafran et al.). Experimental manipulations of body checking suggest that high levels of body checking yield significant, but temporary, worsening of body image self-reports (Shafran, Lee, Payne, & Fairburn, 2007). Insights into the role of body checking in males are limited to a handful of mixed-gender studies in overweight or obese participants. Generally, these studies indicate that body checking is frequently endorsed and is significantly associated with overconcern with shape and weight, restraint, poorer weight loss outcome, greater fear of fat, body dissatisfaction, perceived struggle in weight loss treatment, and lower self-esteem (Grilo, Reas, Brody, Burke-Martindale, Rothschild, & Masheb, 2005; Latner, 2008; Reas et al., 2005). This relationship, when compared, appears to be similar in men and women. In addition, body avoidance was significantly associated with binge eating (Grilo et al.). In a small sample of treatmentseeking binge eating disorder patients ($N = 73$, including 22 men), Reas, White, and Grilo (2006) found significant relationships between body checking and age, body mass index (BMI), body image dissatisfaction, and overevaluation of shape and weight only in women, although this may be due to the limited sample of men.

Only in the past 10–15 years have psychologists paid adequate attention to body image disturbance and related behavioral dysfunctions in males (Cafri, Thompson, Ricciardelli, McCabe, Smolak, & Yesalis, 2005). The male body ideal portrayed in the media has become leaner and more muscular over the past few decades, often displaying males with physiques that are difficult to achieve without the use of appearance- and performance-enhancing drugs (APEDs; Hildebrandt, Langenbucher, Carr, & Sanjuan, 2007; McCreary, Hildebrandt, Heinberg, Boroughs, & Thompson, 2007). It is not surprising that body appearance is of growing concern to men and boys (Grieve, 2007). Given that men and boys are likely to value a lean, muscular physique, behavioral expressions of extreme shape and weight concern are likely to reflect aspects of appearance associated with this idealized male body type.

Currently, body checking and avoidance measures, such as the Body Checking Questionnaire (Reas, Whisenhunt, Netemeyer, & Williamson, 2002), Body Image Avoidance Questionnaire (Rosen, Srebnik, Saltzberg, & Wendt, 1991), Body Shape Questionnaire (Cooper, Taylor, Cooper, & Fairburn, 1987) and Body Checking and Avoidance Questionnaire (Shafran et al., 2004) appear to be more focused on concerns such as trying to elicit comments from others about fatness and pinching flesh on the thighs, stomach, and bottom, all of which are considered typical female “hot spots.” All of the body checking research that has included male participants used these measures and, as a result, may have overlooked key aspects of male body image dissatisfaction. As has been found in non-clinical female samples and mixed-gender overweight and obese samples, it is expected that body checking is present in normal-weight men who do not have eating disorders or extreme body image dissatisfaction. In addition, as is the case in other non-clinical samples, it is hypothesized that body checking will be positively correlated with shape and weight concern. It is not clear whether typical undergraduate males would engage in the same types

of checking and avoidance rituals that have been documented in female-only or mixed-gender obese samples. However, it seems likely that these rituals do not overlap completely given that men and boys are much more likely to report a desire to increase muscle mass and decrease body fat (Cafri et al., 2005), and that current weight and shape likely affects whether fat reduction or muscle gain is of more importance to men (Hildebrandt, Schlundt, Langenbucher, & Chung, 2006). When internalized, the difficult-to-achieve male body ideal will affect males' body esteem and self-worth, (Grieve, 2007), and this internalization increases boys' and men's vulnerability to psychopathology such as MD and to the use of unhealthy body change strategies, such as APED use.

The purpose of the current study was to determine whether and to what extent body checking behaviors exist in the average male and to determine whether these behaviors are correlated with shape and weight concern. Additionally, it was hypothesized that some behaviors are common among non-clinical males, whereas other behaviors will be largely peculiar to males with greater body-related psychopathology. Body checking behaviors were hypothesized to correlate with negative affect, depression, symptoms of MD, and APED use in undergraduate men. Thus far, no data have been published regarding body checking behavior in normal-weight males, so this study adds an important contribution to our understanding of body-related psychopathology and associated behaviors in men. The current study assessed APED use in a typical sample of undergraduate males, so an additional purpose of the study was to compare these results to previous research, such as work done by Olivardia, Pope, Borowiecki, and Cohane (2004), who found rather high rates (27%) of APED use among college males. Replication of these data would suggest that health professionals and universities should target APED reduction in this population.

Method

Participants

A sample of 550 men was recruited from the psychology subject pool at the University at Albany and received course credit for participation. Ages ranged from 16 to 30 years with average age being 18.98 ($SD = 1.59$) years. The majority ($N = 378$, 68.9%) of participants were Caucasian, with 48 (8.7%) identifying themselves as African American, 42 (7.7%) as Asian, 32 (5.8%) as Hispanic, 1 (0.2%) as Native American, 1 (0.2%) as Pacific Islander, 22 (4.0%) as unknown/other, and 25 (4.6%) identified with more than one race.

Measures

Measures were selected to assess body checking behaviors and their hypothesized behavioral, cognitive, physical, and emotional correlates.

The Muscle Dysmorphic Disorder Inventory (MDDI; Hildebrandt, Langenbucher, & Schlundt, 2004) is a 13-item self-report questionnaire that uses a 5-point Likert scale ranging from 0 (*never*) to 4 (*always*), which was derived from the diagnostic criteria for muscle dysmorphia proposed by Pope et al. (1997). The MDDI is comprised of three subscales, Drive For Size (DFS), which assesses desire to increase size and strength and belief that overall size, strength, and muscle size are less than desired (e.g., "I think my chest is too small," "I wish I could get bigger"), Appearance Intolerance (AI), which assesses negative beliefs regarding appearance and resultant avoidance and anxiety (e.g., "I wear loose clothing so that people cannot see my body," "I hate my body") and Functional Impairment (FI), which assesses the degree to which thoughts and feelings regarding the body interfere with daily functioning (e.g., "I pass up social activities because of my workout schedule," "I feel depressed when I miss one or more workout days"). The MDDI has good convergent validity, test-retest reliability ($r = .87$; Hildebrandt et al., 2004), and

internal consistency (in the current study, Cronbach's $\alpha = .80$ for the full scale and .87, .81, and .81 for the DFS, AI, and FI subscales, respectively).

The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-report measure designed to assess depressive symptoms. Items are scored on a 0–3 scale, for example, the question assessing sadness has the following options: 0 (*I do not feel sad*), 1 (*I feel sad much of the time*), 2 (*I am sad all the time*), and 3 (*I am so sad or unhappy that I can't stand it*). Items are summed for a total score, with a higher total score indicating more depressive symptomatology. The BDI-II has good test–retest reliability, as well as good convergent and discriminant validity (Beck et al.) and showed good internal consistency in the current study (Cronbach's $\alpha = .91$).

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), a 20-item self-report measure of positive and negative affect, was used to assess how participants were feeling over the past month. The PANAS lists 10 adjectives associated with positive affect and 10 associated with negative affect using a 5-point Likert scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). The positively valenced items are summed to make up a positive affect (PA) scale and the remaining items assess negative affect (NA), with higher scores indicating greater positive and negative affect, respectively. Watson et al. found that the scale has good internal consistency (Cronbach's $\alpha = .84$ –.90 for different time periods), test–retest reliability, and a distinct two-factor structure. The internal consistency in this study was good (PA Cronbach's $\alpha = .85$; NA Cronbach's $\alpha = .83$).

The Male Body Checking Questionnaire (MBCQ; Hildebrandt, Walker, Alfano, Delinsky, & Bannon, in press) is a 19-item questionnaire developed to assess body checking behaviors that occur in men. The scale consists of four subscales: Global Muscle Checking (GMC), which measures global aspects of muscle checking that involve both leanness/decreased body fat and increased muscle size, Chest and Shoulder Checking (CSC) which measures checking behaviors directed to the chest and shoulder areas, Other-Comparative Checking (OCC), which assesses how often participants compare themselves to others and seek reassurance, and Body Testing (BT), which assesses how often participants manipulate parts of their body to assess size and shape. Participants were asked to rate the frequency of each behavior on a 5-point Likert-type scale from 1 (*never*) to 5 (*very often*). The MBCQ has a possible range of scores from 19 to 95, with higher scores reflecting greater frequency of body checking behavior. The MBCQ has excellent internal consistency (Cronbach's $\alpha = .94$ in the current study). Items were developed and validated in a unique sample of male and female undergraduates from a large university in the Northeast; item development and factor structure is described in detail in Hildebrandt et al. (in press). MBCQ items are available upon request from the third author.

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a widely used 36-item measure of eating disordered behavior that uses a 7-point forced-choice rating scale (0–6) with scores of four or higher considered to be in the clinical range. Of the four EDE-Q subscales, only items from the Shape Concern and Weight Concern subscales were included in this study. Peterson et al. (2007) reported good internal consistency for the Weight Concern (Cronbach's $\alpha = .72$) and Shape Concern (Cronbach's $\alpha = .83$) subscales. In the current study, Cronbach's α was .80 for Weight Concern and .79 for Shape Concern subscales. Test–retest reliability is very high with a 2-week interval for the Weight Concern ($r = .92$) and Shape Concern ($r = .92$) subscales (Luce & Crowther, 1999) and is somewhat lower with a longer interval: a median interval of 315 days yielded Pearson's r of .73 for the Weight Concern subscale and .75 for the Shape Concern subscale (Mond, Hay, Rodgers, Owen, & Beaumont, 2004). The EDEQ also has good concurrent, predictive, convergent, and discriminant validity (Anderson, De Young, & Walker, in press).

Participants were asked demographic information such as age, height, weight, and race/ethnicity. Questions regarding APED use, exercise typically engaged in, and reasons for exercise were developed by Hildebrandt et al. (2007).¹ Participants rated the importance of a number of reasons for exercise, such as improving physical health, physical appearance, endurance, and strength, on a scale from 1 (*least important*) to 10 (*most important*). In addition, participants were asked how many days per week they typically exercise, and for how many minutes they typically engage in cardiovascular and strength training when they exercise. Questions about APED use were divided into four sections assessing prohormone use, anabolic steroid use, and licit and illicit thermogenic use and examples of drugs and common nicknames in each category were included for participants who needed additional clarification. Each section included questions about whether the participant had ever used the substance, age of first use, most recent use, reasons for use, and negative side effects and positive effects experienced when using the substance. Appearance investment questions (e.g., “Do you typically shave or wax your body hair?” “How many different hair products do you typically use in a day?”) and open-ended questions regarding body checking and avoidance behaviors were also included in the survey and can be obtained from the first author upon request.

Procedure

All participants provided their informed consent prior to participating in the online survey. The procedures and study design were approved by the University at Albany's Institutional Review Board. Participants were administered a series of questionnaires assessing satisfaction with shape and weight, mood, exercise, APED use, and body checking behaviors. Two questions asking whether participants used nonexistent drugs with believable names were added to detect any false responses. One participant's data was excluded for endorsing these items, yielding a final sample size of 549.

Statistical analyses

Hierarchical regression predicting MDDI scores and logistic regression analyses predicting APED use were conducted using SPSS16 software. Tests with p values less than .05 were considered significant.

Results

Participant characteristics

Participants' mean weight was 174.9 lb ($SD = 35.2$) and they averaged 70.5 in. ($SD = 2.9$), yielding an average BMI of 24.7 kg/m² ($SD = 4.4$). Men reported an ideal height, weight, and BMI of 73 in. ($SD = 2.5$), 175.5 lb ($SD = 26.7$), and 23.1 kg/m² ($SD = 2.9$), respectively. Of those who wished to increase their size ($N = 187$, 34%), they desired an average increase of 15.3 lb ($SD = 10.2$), whereas those who wanted to decrease their size ($N = 346$, 63%) desired an average decrease of 18.7 lb ($SD = 16.0$), with only 9.5% of the sample wishing to maintain their current weight and 3% wishing to maintain their current BMI. Desired weight decrease was highly positively correlated with current BMI ($r = .72$, $p < .001$), meaning that those who weighed more for their size wanted to reduce their weight. Desired weight increase was negatively correlated with current BMI ($r = -.16$, $p < .001$), meaning that those who weighed less for their height wanted to increase their weight, however this relationship was weaker than that between desired weight loss and current BMI.

¹Survey questions can be found at: <http://websurvey.rutgers.edu/steroids>.

Typical exercise

Participants exercised an average of 2.8 ($SD = 2.0$) days per week, averaging 30.5 min ($SD = 39.4$) of cardiovascular exercise and 41.5 min ($SD = 31.7$) of weight training in a typical workout. The goals of exercise/training that were rated as most important (scale range: 1–10), on average, were improving strength (7.7, $SD = 2.4$), improving appearance (7.7, $SD = 2.3$), improving endurance (7.5, $SD = 2.3$), improving health (7.5, $SD = 2.2$), and improving self-esteem (7.3, $SD = 2.4$). The least important reason for exercise was making friends or maintaining relationships (5.7, $SD = 2.9$).

Body checking and muscle dissatisfaction

Body checking behaviors were highly correlated with the sum of Weight Concern and Shape Concern EDE-Q subscales ($r = .44$, $p < .001$), the BDI-II ($r = .32$, $p < .001$), and with the MDDI ($r = .55$, $p < .001$), and were significantly correlated with each of the MDDI subscales: DFS ($r = .40$, $p < .001$), FI ($r = .53$, $p < .001$), and AI ($r = .21$, $p < .001$). Although the MBCQ was not significantly correlated with participants' desired BMI decrease, it was significantly correlated with desired BMI increase ($r = .20$, $p < .01$) among participants who wanted to increase their size. The MBCQ was unrelated to positive affect, but had a significant positive correlation with negative affect ($r = .34$, $p < .001$). Similarly, the MDDI was significantly correlated with negative affect ($r = .32$, $p < .001$), but was not significantly related to positive affect.

A hierarchical regression analysis was run to predict the MDDI total score, with variables entered in the following order based on the degree to which they were hypothesized to predict muscle dysmorphia symptoms: MBCQ, EDE Shape and Weight Concern, BDI, and desired BMI increase. The final solution, which was chosen to maximize variance accounted for using the most parsimonious model, explained 49% of the variance in MDDI scores (see Table 1). The MBCQ and EDE-Q Shape and Weight Concern uniquely explained similar proportions of the variance in MDDI scores (16.2%, $p < .001$ and 16.7%, $p < .001$, respectively). When MDDI subscales were examined independently, MBCQ was the only significant predictor of FI (28.6%, $p < .001$), the EDE-Q Shape and Weight Concern uniquely predicted the most unique variance in DFS (14.4%, $p < .001$) followed by the MBCQ (9.8%, $p < .001$), but the MBCQ was not a significant predictor of AI, which was best predicted by EDE-Q Shape and Weight Concern (30.0% of the total variance, $p < .001$) and desired BMI decrease (4.3%, $p < .001$). As hypothesized, based on skewness statistics and visual inspection of histograms with normal curves, some more “typical” body checking behaviors were normally distributed among participants whereas other positively skewed behaviors were less common. The percentage of participants reporting engaging in each behavior *often* or *very often* and items which significantly predicted scores on the EDEQ Shape and Weight Concern subscales, MDDI, and BDI are reported in Table 2. Response frequencies for each item are presented in Table 3.

APED use

The majority of participants did not endorse using APEDs ($N = 471$, 85.8%). Overall, 78 men (14.2%) reported having ever used any APED: 2.9% reported using anabolic steroids, 3.6% used illicit fat burners, 3.8% reported using prohormones, and 10% reported using over the counter fat burners. There are different subtypes of APED users that have unique patterns of drug use associated with different levels of risk (Hildebrandt et al., 2007), so the degree of polypharmacy (use of multiple drugs) was assessed to determine the frequency of high-risk behavior in this sample. Of men who reported APED use, 54 (69%) reported having used one type of substance, 15 (19%) had used two, 8 (10%) had used three, and only one participant (1%) reported having used all four APED categories.

A logistic regression was performed with APED use as the dependent variable. Of the variables examined only one independent variable, the MBCQ total score, was a significant predictor of APED use ($\beta = 0.02, p < .05$). The odds ratio for the MBCQ was 1.02, meaning that for each increase of 10 points on the MBCQ total score (which ranges from 19 to 95), a participant was 1.2 times more likely to use APEDs (see Table 1). The mean MBCQ score for APED users was 71.6 ($SD = 2.6$) compared to 59.4 ($SD = 0.9$) among non-users. An independent samples *t* test confirmed that the observed difference in MBCQ scores of APED users and non-users was significant ($t = 4.25, p < .001; d = 0.50$).

Most participants who had used APEDs reported past-use rather than current use. Therefore, when asked how long, in years, participants planned to use anabolic or ergogenic (fat-burning) drugs, even if only on occasion, 98% reported that they have not or do not plan to. The remaining 11 participants planned to use for another 3.5 years ($SD = 3.4$). More than a quarter of those who had ever used APEDs ($N = 12, 28.4\%$) reported that they would continue to use APEDs even if there were absolute proof that they caused severe health problems. Approximately one-fourth of participants ($N = 145, 26.4\%$) reported that if they could meet all of their physical training goals very soon through the use of APEDs, they would be willing to decrease their life span by an average of 4.8 years ($SD = 4.4$; median = 4).

Discussion

Body checking scores were significantly higher in APED users than in non-users with a medium effect size (Cohen, 1988). Because body checking behaviors may maintain eating- and body-related psychopathology (Shafran et al., 2004), addressing body checking behaviors in therapy may reduce body image dissatisfaction in men, and consequently reduce the desire to use APEDs. Body checking behaviors were significantly correlated with depression, desired BMI increase, negative affect, and symptoms of MD, as well as weight and shape concern, as has been reported in previous literature (Grilo et al., 2005; Latner, 2008; Reas et al., 2005). As hypothesized, some body checking behaviors were normally distributed amongst participants, whereas others were less common in the non-clinical male sample. In addition, particular items appear to be significant predictors of MD, depression, and shape and weight concern.

Because MD is partly defined by extreme concern with shape and weight and is associated with a great deal of distress and impairment, these factors likely explain a significant proportion of the variance in MDDI scores. Even when partialing out variance accounted for by depression and concern with shape and weight, body checking uniquely explained the greatest proportion of variance in MD. When MDDI subscales were considered separately, body checking uniquely explained a significant proportion of the variance in drive for size and was the only significant predictor of functional impairment. However, body checking was not a significant predictor of appearance intolerance. Appearance intolerance was best predicted by concern with shape and weight, which accounted for a third of the total variance.

Although body checking and avoidance behaviors are included as targets of change in the leading evidence-supported treatments for eating disorders, BDD, and body image dissatisfaction, the relationship between these behaviors and psychopathology is largely unknown. While some work has investigated these behaviors in females, very little research on this topic has included males, and the males in these studies were obese binge eaters, behavioral weight loss participants, and bariatric surgery patients (Grilo et al., 2005; Latner, 2008; Reas et al., 2005). The nature of checking and avoidance behaviors in normal-weight, non-clinical males had not been previously examined. This study found that, in a sample of

undergraduate males, body checking behavior was the best predictor of APED use when depression, weight and shape concern, MD, positive affect, and negative affect were included in the logistic regression analysis.

It was not until recent years that male eating and body image concerns were adequately addressed in the eating disorders and body image literature (Cafri, van den Berg, & Thompson, 2006). Although a great wealth of information has accumulated in a short period of time, many questions remain unanswered. The male body ideal has become increasingly lean and muscular, such that media-portrayed ideals are often almost impossible to attain without the use of steroids. Our appearance-obsessed culture supports the development of body image dissatisfaction, eating disorders, exercise addiction, and overconcern with shape and weight; yet, our culture also stigmatizes males for expressing emotions and seeking treatment for mental health-related concerns (Courtenay, 2003; Golberstein, Eisenberg, & Gollust, 2008). Weight satisfaction and muscle satisfaction appear to be distinct constructs associated with distinct body change strategies, such as decreasing calories consumed and increasing calories burned to decrease body fat, and increasing calories and/or protein consumed, taking APEDs, and lifting weights to increase muscle mass (Stanford & McCabe, 2005). When taken to extremes, any of these body change strategies can be deleterious to an individual's physical and mental health.

This study provides important information about body checking in normal-weight, non-clinical young men that had not been assessed before, which adds important information to the field regarding male body image dissatisfaction and its emotional (e.g., depression, concern with shape and weight, negative affect) and behavioral (e.g., body checking, APED use) correlates. In addition, this study suggests that APED use may not be as rampant a problem in university populations as had previously been reported (Olivardia et al., 2004). In contrast to Olivardia and colleagues' data suggesting that 27% of participants had used APEDs, the proportion of participants endorsing having ever used APEDs in the current study was approximately half as much as had previously been reported.

One limitation of the current study is the homogeneity of the sample. The sample consisted of undergraduate students in the Northeast, the majority of whom reported that they were Caucasian, limiting the ability to generalize findings to populations from different regions of the country, different countries, different levels of education, different age groups, and to minority populations. In addition, this study was exploratory in nature: all findings are correlational so no causality can be inferred. Responses were self-report, so participants may not have felt comfortable reporting their true feelings and behaviors on questions involving sensitive topics; however, participants completed the online questionnaire in the location of their choice and the anonymity of their responses was strongly emphasized to increase willingness to disclose sensitive information. Also, all participants whose data were included in the analyses gave reasonable responses for demographic information questions like height and weight and responded "No" to the screening questions included in the APED use section. Although the sample was homogeneous, young men may be particularly at risk for body image dissatisfaction and potentially dangerous body change strategies. Determining correlates of APED use and MD may inform prevention and treatment in this at-risk group.

This study is the first to report body checking behaviors in normal-weight males. It adds valuable information to the literature about the nature of body checking behavior and its correlates in undergraduate males, about which little has been reported thus far. In addition, the study had a large sample size, which improves the power of the statistical analyses, enabling tentative conclusions to be drawn regarding behaviors (e.g., steroid use) and psychopathology (e.g., MD) that have relatively low base rates. Future research should examine body checking and avoidance in more diverse populations. In addition, longitudinal

and experimental studies of body checking and avoidance would help determine causality among variables of interest. Studies that assess the contingencies that maintain these behaviors may help determine their function. Finally, studies that manipulate whether or not body checking and avoidance behavior are addressed in treatment would answer questions regarding the clinical significance of these behaviors in the maintenance of eating- and body-related psychopathology and would elucidate the utility of addressing body checking and avoidance in treatment.

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Table 1

Regression analyses of MDDI total and subscales and APED use ($N = 549$).

Dependent variable	Independent variable	B	S.E.B	Adj. R^2	Part r^2	t	p
Hierarchical linear regression							
MDDI total				.49			
	MBCQ	0.26	0.03	.43	.162	7.66	<.001
MDDI FI	EDE-Q weight/shape	0.46	0.06	.43	.167	7.79	<.001
				.28			
MDDI DFS	MBCQ	0.11	0.01	.54	.286	8.61	<.001
				.35			
MDDI AI	EDE-Q weight/shape	-0.25	0.04	.40	.144	6.46	<.001
	MBCQ	0.12	0.02	.33	.098	5.32	<.001
Dependent variable				.47			
	EDE-Q weight/shape	0.25	0.02	.58	.300	13.93	<.001
Independent variable	Desired BMI decrease	0.32	0.06	.22	.043	5.28	<.001
		S.E.	Wald	df	p	Exp()	95% CI for Exp()
						Lower	Upper
Logistic regression							
APED use	MBCQ	0.02	.01	6.47	1	.01	1.02 1.00 1.03
	BDI	0.03	.02	3.84	1	.05	1.03 1.00 1.06
	MDDI total	0.03	.02	2.40	1	.12	1.03 0.99 1.07
	EDE-Q weight/shape	0.00	.02	0.01	1	.91	0.10 0.97 1.03

Note: MDDI = Muscle Dysmorphic Disorder Inventory; MBCQ = Male Body Checking Questionnaire; FI = Functional Impairment; DFS = Drive for Size; AI = Appearance Intolerance; APED = appearance- and performance-enhancing substance.

Table 2

Normally and non-normally distributed body checking behaviors.

Item	(N, %) of participants reporting engaging in behavior 'often' or 'very often'
Normally distributed behaviors	
Q1	I check the hardness of my biceps to ensure I have not lost any muscle (122, 22.2%) ^{*,†}
Q2	I look at my abdominal muscles in the mirror (193, 35.2%)
Q4	I compare the size of my muscles to others (124, 22.6%)
Q11	I compare the leanness or definition of my chest muscles with others (74, 13.5%) [°]
Q12	I compare the size of my chest muscles with others (77, 14%)
Positively skewed behaviors	
Q3	I flex my biceps when looking in the mirror to ensure symmetry of my muscles (102, 18.6%)
Q5	I compare my overall leanness or muscle definition to others (121, 22.1%)
Q6	I compare my overall muscle mass to athletes or celebrities (86, 15.6%) ^{*, †}
Q7	I compare my leanness or muscle definition to athletes or celebrities (75, 13.6%) ^{*, †}
Q8	I ask others to feel my muscles to ensure their size or density (41, 7.5%)
Q9	I ask others to comment on my muscle definition or size (27, 4.9%)
Q10	I pinch the fat around my abdomen and back (e.g., love handles) to determine my leanness (69, 12.6%) [*]
Q16	I take measurements of my muscles with a tape measure (16, 2.9%)
Q17	I push my fat around or pull my skin back to accentuate the muscle underneath (28, 5.1%) ^{*, †}
Q18	I will check the size and shape of my muscles in most reflective surfaces (e.g., car windows, shopping store windows, mirrors, etc.) (71, 12.9%) [†]
Q19	I pinch or grab my muscles to check their size and density (103, 18.7%)

^{*} Indicates items which were significant predictors of EDE shape and weight concern subscale scores.

Indicates items which were significant predictors of BDI scores.

[†] Indicates items which were significant predictors of MDDI scores. Items were considered significant predictors at the $p < .05$ level.

Table 3

Male Body Checking Questionnaire response frequency.

MBCQ item	N(%)				
	Never	Rarely	Some-times	Often	Very often
1. Bicep hardness	108 (19.7)	135 (24.6)	184 (33.5)	94 (17.1)	28 (5.1)
2. I look at my abdominal muscles in the mirror	80 (14.6)	99 (18.0)	177 (32.2)	125 (22.8)	68 (12.4)
3. Bicep symmetry	147 (26.8)	147 (26.8)	153 (27.9)	73 (13.3)	29 (5.3)
4. Muscle size comparison (others)	125 (22.8)	140 (25.5)	160 (29.1)	81 (14.8)	43 (7.8)
5. Leanness/definition comparison (others)	125 (22.8)	137 (25.0)	166 (30.2)	85 (15.5)	36 (6.6)
6. Muscle mass comparison (athletes/celebrities)	209 (38.1)	138 (25.1)	116 (21.1)	66 (12.0)	20 (3.6)
7. Leanness/definition comparison (athletes/celebrities)	209 (38.1)	144 (26.2)	121 (22.0)	54 (9.8)	21 (3.8)
8. Ask others to check muscle size/density	320 (58.3)	115 (20.9)	73 (13.3)	29 (5.3)	12 (2.2)
9. Ask others to comment on definition/muscle size	325 (59.2)	126 (23.0)	71 (12.9)	21 (3.8)	6 (1.1)
10. Pinch abdominal fat	255 (46.4)	136 (24.8)	88 (16.0)	51 (9.3)	18 (3.3)
11. Chest definition comparison (others)	206 (37.5)	133 (24.2)	136 (24.2)	49 (8.9)	25 (4.6)
12. Chest size comparison (others)	219 (39.9)	140 (25.5)	113 (20.6)	57 (10.4)	20 (3.6)
13. Shoulder broadness comparison (others)	221 (40.3)	138 (25.1)	122 (22.2)	55 (10.0)	13 (2.4)
14. Chest symmetry	206 (37.5)	115 (20.9)	129 (23.5)	76 (13.8)	23 (4.2)
15. Muscle striation	210 (38.3)	139 (25.3)	114 (20.8)	62 (11.3)	24 (4.4)
16. Measure muscles	427 (77.8)	76 (13.8)	30 (5.5)	11 (2.0)	5 (.9)
17. Fat/skin manipulation	378 (68.9)	85 (15.5)	58 (10.6)	19 (3.5)	9 (1.6)
18. Muscle check in most reflective surfaces	219 (39.9)	140 (25.5)	119 (21.7)	37 (6.7)	34 (6.2)
19. Pinch/grab muscles	163 (29.7)	144 (26.2)	139 (25.3)	72 (13.1)	31 (5.6)