

Measuring Male Body Image: A Review of the Current Methodology

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Much body image research has been directed toward the study of males (H. G. Pope, K. A. Phillips, & R. Olivardia, 2000). However, little attention has been devoted to consideration of which methods yield the most accurate measurement of this population. Based on numerous social psychological studies indicating the salience of a muscular appearance (e.g., H. G. Pope, R. Olivardia, A. Gruber, & J. Borowiecki, 1999), 3 guidelines were derived for assessing male body image. Existing methods of male body image assessment were evaluated based on their adherence to these guidelines and avoidance of methodological shortcomings. The most effective measures of male body image were the Drive for Muscularity Scale (D. R. McCreary & D. K. Sasse, 2000), somatomorphic matrix (A. J. Gruber, H. G. Pope, J. Borowiecki, & G. Cohane, 1999), and a modification to the somatomorphic matrix introduced here.

A thin appearance has historically been the focus of body image research because of its central role in the development of eating disorders and the body image orientation of non-eating-disordered females (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). The exact nature of male body image concerns appears to have been neglected by the paradigm of research emphasizing thinness because males are more concerned with a muscular appearance (McCreary & Sasse, 2000). A lack of past attentiveness to male body image issues is one reason why assessment of muscularity has become a topic of interest. Another more pragmatic reason is the noticeable increase in valuation of the muscular male body in the visual media of Western cultures (Pope, Phillips, & Olivardia, 2000). Arguably, this media influence has caused a rise in the number of males experiencing muscle dissatisfaction (Leit, Gray, & Pope, 2002; Garner, 1997) and, in turn, an increased incidence of clinically significant body image disturbance (viz., muscle dysmorphia; Pope, Gruber, Choi, Olivardia, & Phillips, 1997). Given these concerns, it is imperative to determine which methods are appropriate in assessing how males perceive, think, and behave with respect to their bodies. Our intent is to provide a theoretical review of male body image research that will propose an acceptable standard of assessing a muscular appearance.

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The arguments in this review hinge on the assumption that the concept of muscularity is an essential feature of how males think about their bodies. Although few would refute the centrality of muscularity concerns for males, a brief consideration of research on the cultural antecedents of male body image will augment the significance of the claims made hereafter. A considerable amount of research conducted primarily by Lerner and colleagues in the 1960s and 1970s supports the notion that a muscular appearance is idealized. In these studies, a muscular male body type is overwhelmingly assigned personality traits with positive connotations (e.g., attractive, strong, happy), whereas skinny and obese body types are ascribed personality traits with negative connotations (e.g., lazy, cheats, sneaky). The prevalence of these body type stereotypes were found irrespective of participant: class (Wells & Siegel, 1961), race, sex (e.g., Kirkpatrick & Sanders, 1978), body build (Lerner & Korn, 1972), weight (Dibiase & Hejelle, 1968), age (Kirkpatrick & Sanders, 1978; Lerner & Korn, 1972), and nationality (e.g., Iwawaki & Lerner, 1976; Lerner & Pool, 1972). A muscular body type was also found to be the figure that males most desired to have (e.g., Dibiase & Hejelle, 1968; Lerner & Korn, 1972; Tucker, 1982). Moreover, Guy, Rankin, and Norvell (1980) found that such a body type was overwhelmingly sex-typed masculine. Taken together, these findings strongly suggest that the ideal body type is a muscular one. In fact, Kearney-Cooke and Steichen-Asch (1990) found that when nonclinical males were asked about the ideal shape for their sex, the most common response was “muscular, strong and broad shouldered” (p. 58).

Although a muscular body has been idealized for a

number of years, the importance of attaining this ideal has become stronger. This is reflected in part through an increase in the degree of muscularity of male bodies displayed in the media. Pope, Olivardia, Gruber, and Borowiecki (1999) assessed the physiques of male action toys and found that the figures have grown significantly more muscular over the last 20 to 35 years. Another study assessed the body compositions of *Playgirl* centerfold models over the last 25 years and found that the average model gained 27 pounds of muscle and lost 12 pounds of fat (Leit, Pope, & Gray, 2001). Given the increasing importance of muscularity, many of the guidelines, criticisms, and recommendations related to assessment are based on the necessity of examining this facet of male body image.

Body Image Assessment

This review covers methods of body image assessment that have received the most use with male populations. To judge the effectiveness of particular measures, it is necessary to establish general guidelines for which attributes would, in theory, be most advantageous. The first and most important feature of a male body image measure is that it evaluates a muscular appearance. A second key characteristic is that if it contains items that assess features indirectly associated with the body's appearance (e.g., eating behaviors, and/or exercise), those features must be related to muscularity. If a scale focuses on specific body parts or regions, a third required attribute is that the upper torso be included because evidence suggests that this is an area of particular concern for males (Garner, 1997; Thompson & Tantleff, 1992).

The review of measures is divided into two groups that have traditionally been used in body image research: perceptual and subjective/attitudinal (Thompson, 1990). Although in the last several years there has been strong evidence that there may not be a clear division between subjective and perceptual body image (for a review, see Thompson & Gardner, 2002), we retain this distinction to better organize the review.

Perceptual Assessment

Measurement of Size Accuracy

Most perceptual measures assess a person's ability to accurately estimate his or her own body size. Two types of measures for assessing size accuracy have traditionally been used: whole-image and body-site

adjustment methods. In whole-image adjustment methods, an image of one's body is distorted (by, e.g., photograph and video), and size accuracy is determined on the basis of one's ability to choose the body that most closely resembles his or her own among the distorted images. Body-site adjustment procedures ask participants to determine the size of specific body parts, with accuracy assessed based on the degree to which one overestimates a group of body sites. Body-site adjustment procedures have traditionally been used more frequently than whole-image techniques because they do not induce distress among participants and are more cost-effective (Thompson, 1996).

The first body-site adjustment procedure was the movable caliper technique (Slade & Russell, 1973). The movable caliper technique consists of a horizontal bar with two lights mounted on a track and requires participants to modify the lights so that they reflect the perceived size of the body part. Another body-site adjustment technique is the image marking procedure, which asks participants to mark their estimated body widths on a sheet of paper attached to a wall (Askevold, 1975). An important advancement in body-site assessment is a group of measures known as projected light beam apparatuses. Ruff and Barrios (1986) were the first to develop such a measure: the body image detection device (BIDD). The BIDD consists of an overhead projector projecting a horizontal band of light onto a wall in a darkened room. Participants are asked to estimate the width of varying body sites by adjusting the width of the projected light band. Thompson and Thompson (1986) altered the BIDD so that it simultaneously projected four light beams, each corresponding to a particular body part (cheeks, waist, hips, and thighs). This variation is the adjustable light beam apparatus (ALBA; Thompson & Spana, 1988).

The few studies that have used body-site adjustment methods with males have used projected light beam apparatuses. Generally, males have been found to overestimate, but do so significantly less than non-clinical women (Keeton, Cash, & Brown, 1990; Thompson & Thompson, 1986). Using a modification of the ALBA, Gendebien and Smith (1992) found equivalent levels of misperception for men and women when sites on the upper torso were grouped (chest and shoulders) and compared with a group of sites in the mid/lower torso (waist, hips, and thighs). Interpreting the result of body size overestimation among women is simple given that they want thinner bodies, they overestimate because they are dissatisfied, and they believe that they are larger than they actually are. With males, interpretation is more dif-

ficult because body composition is more salient than body size, and it is not known what aspect of body composition is driving the misperception: muscles or body fat.

As may have become apparent from the prior discussion, there is a conceptual problem with using perceptual measures to assess size accuracy in male populations. Although body size accuracy is a relevant concept for females because they tend to want thinner bodies, it is awkward to suggest that size is as important to males because their body ideal is probably not as unilateral. Given that the socialized male body ideal is composed of high degrees of muscularity and low degrees of body fat (Leit et al., 2001; Pope et al., 1999), the polar effects of these two facets of appearance lead to the nonexistence of a particular body size that is necessarily associated with the male body ideal. Perception of body size accuracy in males would seem to be highly variable based on individual factors, one's own body type, and body ideal.

For most male populations, it seems that perceptual assessment based on size accuracy would not tap the true nature of their misperception. Specifically, the measures of perceptual accuracy reviewed here do not fully consider both aspects of male appearance and, as such, are not consistent with the first guideline: evaluation of a muscular appearance. The kind of measure that would be needed to assess perception would have to be one that examined body composition rather than body size.

It should be noted that measures of size accuracy may still be useful in populations of males who idealize particular body sizes. For example, eating-disordered males (i.e., anorexic and bulimic) tend to have small or thin body ideals (Kearney-Cooke & Steichen-Asch, 1990), whereas serious and competitive bodybuilders probably have large body ideals. If body size assessment is to continue to be used in the future with male populations, specifically those that idealize particular body sizes, three recommendations should be considered. First, researchers should adhere to the third guideline of this review: the inclusion of body sites located on the upper torso. This is a concern because past studies assessing size accuracy have normally focused on sites of the lower torso. Second, researchers should be attentive to the directionality of misperception for particular body sites because they might differ based on the population being studied. For instance, eating-disordered persons should be expected to overestimate all body sites, whereas bodybuilders would be expected to overestimate some sites (e.g., cheeks, waist, hips) and underestimate others (e.g., chest, back, arms). Third,

researchers should be aware of the potential influence of situational and experimental factors (Thompson et al., 1999). For example, a situational factor to consider is whether participants eat before taking the perceptual measure, whereas an experimental factor is the influence of ambient illumination in the place where the measure is being administered.

Perceptual Measurement With Weight Categories

A number of studies using male samples have measured perceptual accuracy by taking the discrepancy between one's own perception of belonging to a weight category (under-, over-, or normal weight) versus their actual belonging to that category based on their body mass index. Studies using this methodology have found that about half of the men misperceive their body weight (Conner-Greene, 1988; McCauley, Mintz, & Glenn, 1988). Among those who misperceived, one study found the misperception to be evenly split between overweight and underweight (Conner-Greene, 1988), whereas the other found that a fifth misperceived toward overweight and the rest toward underweight (McCauley et al., 1988). More recently, a national study of a Canadian sample found that almost 50% of overweight men (based on self-reported heights and weights) thought they were normal weight (McCreary, 2002).

A slightly more complex measure of perceptual accuracy based on weight is the Body Image Distortion Questionnaire (BIDQ; Mable, Balance, & Galgan, 1986). The BIDQ asks participants to indicate the point that represents their body size on a continuum ranging from 50% *underweight* to 50% *overweight* (the halfway point was designated as *just right*). Percentage of misperception is then determined by the following formula: $[(\text{perceived weight deviation}/\text{deviation of reported weight}) - 1] \times 100 = \% \text{ distortion}$.

No significant distortion has been found with non-clinical males, but male bodybuilders did have significant misperception in the direction of underestimating weight (Loosemore & Moriarity, 1990; Mable et al., 1986). The percentage of misperception was comparable to the overestimation of nonclinical women (Loosemore & Moriarity, 1990).

Several criticisms can be raised of perceptual measurement based on weight. These measures are inconsistent with the first guideline because they do not effectively assess a muscular appearance. Body weight does not suggest anything about the appearance of males because a weight value cannot discern

one's distribution of body fat and muscularity. Moreover, Martin (1995) has raised several methodological criticisms of perceptual measurements based on weight categories: (a) A participant's previous exposure or lack of exposure to height-weight tables may influence their response; (b) responses may be based on stereotype biases and not personal assessment; and (c) the height-weight tables do not account for body composition, which forces a heterogeneous classification of different subgroups of males that are expected to differ with respect to body image. Based on the shortcomings of perceptual measurement with weight categories, it is not recommended that they continue to be used as measures of perceptual accuracy.

Subjective Assessment

Subjective body image assessments are premised on evaluating the feelings or thoughts produced by internalized images of bodies. Research in this field has traditionally focused on a person's satisfaction with appearance (Thompson, 1990). In the 1990s, studies began looking at other facets of appearance: concern, anxiety, orientation (i.e., investment in appearance), and evaluation (i.e. attitudinal judgments of appearance; Cash & Pruzinsky, 1990; Thompson, 1990). Researchers have also attempted to assess alternative somatic domains to appearance, fitness, and health/illness (Brown, Cash, & Milkulka, 1990). Moreover, some studies have assessed two distinct domains of satisfaction—cognitive and affective (e.g., Thompson & Altabe, 1991)—a distinction evaluated among perceptual measures as well (e.g., Thompson & Dolce, 1989).

As pervasive as the conceptual domains of body image attitudes are, distinctions can further be made based on the traits of the measures. For the purposes of this review, body image measures will be distinguished based on two different kinds of rating protocols. One kind of protocol asks participants to respond to an item based on a Likert scale rating. In this class of assessment are a variety of body image measures, ranging from those that only assess one domain of body image to those that assess multiple domains. The other kind of protocol asks participants to respond to an item based on scaled contour drawn silhouettes of bodies. The silhouette drawings used in these measures have traditionally assessed satisfaction based on figures that vary only in their degree of adiposity, but a few scales have used figures that vary in their degree of muscularity.

Likert Ratings of Body Image

The Body-Cathexis Scale (BCS) was the first widely used and standardized measure of body image (Secord & Jourard, 1953). The BCS is a 12-item index of general satisfaction, asking participants to rate their body parts (e.g., "waist") on a 5-point Likert scale (1 = *have strong feelings and wish change could somehow be made*; 5 = *consider myself fortunate*). Using this scale or slight modifications thereof resulted in the initial finding that men and women were dissatisfied with their bodies to the same degree (Secord & Jourard, 1953). More recent studies have found greater dissatisfaction among women than men (McCauley et al., 1988; Mintz & Betz, 1986).

The Body Esteem Scale (BES) is a heavily revised version of the BCS (Franzoi & Shields, 1984). The BES is a 35-item measure with a 5-point response and scoring format that assesses body satisfaction for males according to three domains: physical attractiveness (e.g., buttocks), upper body strength (e.g., biceps), and physical condition (e.g., physical stamina). For women, the scale can also be divided into three domains: sexual attractiveness, weight concern, and physical condition. There is cross-gender overlap of items; some items are asked exclusively of one gender. No gender differences were found when men's and women's overall BES scores were compared (Silberstein, Striegel-Moore, Timko, & Rodin, 1988).

The Body Dissatisfaction (BD) subscale of the Eating Disorder Inventory (EDI) is frequently used as a body image measure (Garner, Olmstead, & Polivy, 1983). The EDI-BD is a nine-item measure (e.g., "I think my stomach is too big") with a 6-point response format. The measure contains items that are primarily geared toward assessment of dissatisfaction relative to a thin body ideal. Typically, females score higher than males on the EDI-BD. For example, one study found that EDI-BD scores were significantly higher among adolescent girls than boys (Paxton et al., 1991). Other studies comparing different athletic groups of males have found that bodybuilders (i.e., aesthetically oriented weight lifters) are significantly more dissatisfied than other athletes and nonathletes. For instance, Loosemore and Moriarity (1990) reported significantly greater body dissatisfaction in male bodybuilders than in both athletic (hockey players) and nonathletic comparison groups.

The Multidimensional Body-Self Relations Questionnaire (MBSRQ) is a 69-item measure with a 5-point response format that consists of eight subscales (Brown et al., 1990). Six of the subscales as-

sess evaluation and orientation separately for three somatic domains: appearance, health, and fitness. Of the remaining two subscales, one is a six-item measure related to weight loss concerns. The other is the Body Areas Satisfaction Scale (BASS), a very popular nine-item measure (e.g., items such as “overall appearance”) dealing with satisfaction of body parts/features. On the BASS men have been found to be progressively increasing in their degree of dissatisfaction over a recent 25-year period (cf. Berscheid et al., 1973; Cash, Winstead, & Janada, 1986; Garner, 1997). Although women have consistently been found to be more dissatisfied than men on the BASS, that margin appears to be narrowing.

The Drive for Muscularity Scale (DMS) assesses attitudes and behaviors related to satisfaction with a muscular appearance (McCreary & Sasse, 2000). The DMS is a 15-item measure with a 6-point response format. High school boys (mean age = 18 years) were found to have a greater drive for muscularity than girls; the scores of boys were significantly related to poor self-esteem and high levels of depression (McCreary & Sasse, 2000).

With the exception of the DMS, a shortcoming of the reviewed Likert scales is their inability to tap the specific nature of male body image concerns. The scales do not assess muscularity concerns in any great depth, making them inconsistent with the first guideline of the review: evaluation of a muscular appearance. This inadequacy is most apparent on the EDI-BD and the BCS (including its modifications). The appearance of body parts is assessed without looking at the specific nature of the dissatisfaction, which make these measures very general satisfaction indexes. The BES can be considered a general index of satisfaction like the EDI-BD and the BCS; however, it contains one item, muscular strength, which seems to tap a fitness domain of muscle-related satisfaction. Similarly, the MBSRQ has one item, muscle tone, which deals with muscle-related appearance satisfaction. In contrast, the DMS has numerous items that assess attitudes and behaviors associated with a muscular appearance.

Additional problems with a few of the measures are related to their discrepancy with the second guideline, assessment of behaviors related to a muscular appearance, and third guideline, assessment of the upper torso. For instance, the EDI-BD contains items focused exclusively on the mid and lower torsos. The absence of items assessing the upper torso is related to the EDI-BD being a measure of body dissatisfaction for eating-disordered persons (i.e., anorexia and bulimia nervosa), a purpose that makes the

measure difficult to implement in male populations that have a muscular body ideal.

A concern with the MBSRQ is the inclusion of weight-related items geared toward assessing a thin appearance. As noted in the second guideline, measures that include features associated with the body should have items related to the dimension of muscularity, which the MBSRQ does not. In contrast, the DMS is consistent with the second and third guidelines of this review by having items related to the upper torso and addressing behaviors related to development of a muscular appearance. Of the reviewed Likert scales, the DMS is the only measure that appears to assess relevant body image attitudes and behaviors associated with a muscular appearance. Additionally, the DMS has good validity, internal consistency (coefficient alpha for males = .83; McCreary & Sasse, 2000), and test-retest reliability ($r = .93$; Cafri, Thompson, & Roehrig, 2002). Therefore, it is the only Likert measure to date that is recommended in future assessments of male body image.

Contour-Drawn Silhouette Scales

Contour-drawn silhouette scales are the most popular method of assessing the subjective dimension of body satisfaction. Typically, the silhouettes are ordered in terms of increasing adiposity on a numbered scale. Participants are asked to select a number rating how they think they look and how they would like to look. The difference between the two ratings is then used as an index of dissatisfaction. Historically, the most frequently used silhouette scales for males were adapted from figures ranging from thin to obese provided by Stunkard, Sorensen, and Schulsinger (1983). Although use of scales with figures provided by Stunkard et al. has subsided because of a number of appearance flaws corrected in newer silhouette drawings (e.g., Contour Drawn Rating Scale; Thompson & Gray, 1995), the scales have retained the same structure by having their figures vary exclusively along the dimension of body fat. Only in the last couple of years have male silhouette drawings that include muscularity become a part of mainstream body image assessment (e.g., Lynch & Zellner, 1999).

A number of studies using figures adapted from Stunkard et al. (1983) found that men were not dissatisfied with their bodies (Fallon & Rozin, 1985; Zellner, Harner, & Adler, 1989; Tiggemann & Pennington, 1990). A few studies that implemented different statistical analyses with use of absolute values to assess dissatisfaction found that body dissatisfac-

tion is split between wanting to be more adipose/larger and wanting to be thinner/smaller (Cohn & Adler, 1992; Raudenbush & Zellner, 1997; Silberstein et al., 1988). Raudenbush and Zellner (1997) found that if a man is overweight, he will desire to have a thinner/smaller figure. If he is normal weight or underweight, he will desire to have a more adipose/larger figure. Similarly, studies of body weight satisfaction without silhouettes have found that about half of the men want heavier figures and half want lighter figures (Cohn & Adler, 1992; Conner-Greene, 1988; Drewnowski & Yee, 1987).

A few studies have used silhouettes that incorporate muscularity into the appearance of their figures. The first of such scales was the Perceived Somatotype Scale (PSS), which has seven contour-drawn male figures ranging from thin to muscular to obese (Tucker, 1982). The manner in which the scale is constructed prevents it from being a continuous measure of satisfaction. The only data that can be derived from the scale itself are categorical in nature. Using the PSS with a version of the BCS, Tucker (1982) found that as one's self-perceived body deviates from a muscular to a thin figure, and more so to an obese figure, body satisfaction declines. The Chest Rating Scale (CRS) is a silhouette scale of five male figures that only increase in muscularity in the upper and mid-torso regions of the body (Thompson & Tantleff, 1992). Using this scale, Thompson and Tantleff found significant dissatisfaction among college males, in the direction of wanting a more muscular appearance. Lynch and Zellner (1999) constructed a numbered silhouette scale of 10 male figures that progressively increase in muscularity throughout the whole body. Using this scale, dissatisfaction in the direction of favoring a more muscular body was found for college-age men but not for an older cohort ($M = 47.8$ years). Because scales containing muscular figures have found that men are significantly dissatisfied with their appearance, inclusion of the muscularity variable appears to be important in the assessment of appearance satisfaction.

The limitation of silhouette scales that have figures that vary exclusively in their degree of adiposity is evident. By excluding the dimension of muscularity, there is no way to tap the central appearance concerns of males. Such forms of assessment prevent even an indirect assessment of male body image because providing figures that vary only with respect to body fat systematically excludes assessment based on muscularity. Given this limitation alone, it is not recommended that scales that vary exclusively with respect to adiposity receive use in male populations.

The reviewed silhouette scales that vary in their

degree of muscularity have a shortcoming as well. Such scales lack the ability to methodically record whether body fat or muscularity is determining a muscular appearance. This is an important feature because data obtained with the somatomorphic matrix, a silhouette measure that can differentiate between the two variables, suggest that muscle dissatisfaction has a significantly greater relationship to well-being than body fat dissatisfaction (Cafri, Strauss, & Thompson, 2002).

The application of silhouette scales to the measurement of body image can be criticized on a number of methodological grounds. These criticisms can be applied to all the just-mentioned silhouette scales. Gardner, Friedman, and Jackson (1998) have reviewed these methodological concerns; they include such issues as scale coarseness and method of presentation. Scale coarseness refers to the measurement of a continuous variable using discrete response options. Because body image is a continuous variable and silhouette scales are discrete methods of measuring body image, such scales can be considered a coarse method of assessment. The relevance of scale coarseness is the information loss that is produced. For instance, it has been demonstrated that scale coarseness can produce false increases or decreases in moderated regression effect size (i.e., proportion of variance accounted for when the interaction between two predictors is evaluated; Russell, Pinto, & Bobko, 1991). Another consideration is the manner in which silhouettes are presented. Most silhouettes are arranged in ascending size, which may produce spuriously high test-retest reliability because participants are able to easily recall the figures they first rated. The relevance of these methodological concerns is that they should deter use of the kinds of silhouette measures previously described.

The Somatomorphic Matrix

The somatomorphic matrix is a bidimensional computerized body image test that can assess body image satisfaction and perceptual accuracy with respect to muscularity and body fat (Gruber et al., 1999). The male version of the test consists of a computerized library of 100 images of men, arranged in a 10×10 matrix, representing 10 degrees of body fat and 10 degrees of muscularity. On the body fat axis, the figures begin at 4% body fat and increase in increments of 4%. On the muscularity axis, the images begin at a fat-free mass index (FFMI; Kouri, Pope, Katz, & Oliva, 1995) of 16.5 kg/m^2 and increase in increments of 1.5 kg/m^2 . For a frame of reference, a male with an FFMI of 18 would be below

average, an FFMI of 20 would be average, an FFMI of 22 would be distinctly muscular, and an FFMI of 25 would be the upper limit of muscularity achieved without the use of steroids (Gruber et al., 1999). While running this test on a computer, participants are presented with a figure from the middle of its library of images (i.e., the figure has a body fat percentage [BF%] of 20% and an FFMI of 22.5 kg/m²). Participants are instructed to answer questions related to their body image attitudes (e.g., “choose the image that best represents your own body”). Buttons on the screen allow participants to choose figures that answer the questions by scrolling through the image library. Each figure selected has a corresponding numerical value for muscularity and body fat, enabling it to be a perceptual index if rating of self on the measure is compared with a person’s actual body composition values and a subjective index if ratings of self and ideal are compared.

In terms of psychometric properties, the somatomorphic matrix has good construct validity but less than adequate reliability. The measure can be considered a valid measure because the figures used correspond to particular FFMI and BF% (Gruber et al., 1999). This was done by photographing people with known FFMI and BF% determined by skinfold measurements with calipers and then having a graphic artist develop these into drawings (Gruber et al., 1999). Further validation was achieved by having experienced kinanthropists (i.e., experts at body composition assessment) review the images produced by the graphic artist, which resulted in an extensive process of revision until it was possible to reliably assign the correct FFMI and BF% to each image in the matrix (A. Gruber, personal communication, January 30, 2001). With regard to the reliability of the somatomorphic matrix, research suggests that there is a lack of image rating consistency over time (Cafri, Thompson, & Roehrig, in press). For instance, the correlations for the dissatisfaction indexes of males were .57 for body fat and .34 for muscularity. Clearly, these values are well below the .70 cutoff regarded as adequate for test-retest reliability. This shortcoming may in part be resolved by modifying the measure to improve its reliability (Cafri et al., in press).

Empirical Findings

In using the somatomorphic matrix with males, significant muscle dissatisfaction has consistently been found, but findings for body fat dissatisfaction have been inconclusive. One study found statistically significant muscle dissatisfaction but not body fat for

three groups of random males: Austrian, French, and American (Pope, Gruber, et al., 2000). The degree of dissatisfaction was 3.4 FFMI, equivalent to wanting 27 more pounds of muscle. In another study, statistically significant muscle and body fat dissatisfaction were found for American gym users (both weight trainers and cardiovascular exercisers were included in the study; Gruber et al., 1999). The degree of muscle dissatisfaction in the study by Gruber et al. was 1.7 FFMI, equivalent to 15 more pounds of muscle. Body fat dissatisfaction was 4.1%, in the direction of wanting less. In a study of college males, muscle dissatisfaction of 2.0 FFMI was found, with body fat dissatisfaction split: Half wanted less (8% less), 33% wanted more (5.33% more), and the remainder wanted neither less nor more (Cafri, Strauss, & Thompson, 2002). In the same study, muscle dissatisfaction was significantly associated with poor well-being: higher levels of depression and lower self-esteem and satisfaction with life. No relationship between body fat dissatisfaction and well-being was found.

The somatomorphic matrix has yielded somewhat inconsistent findings when used as a perceptual measure with males. Gruber et al. (1999) found that gym users did not significantly misperceive their muscularity but overestimated their body fat by 2.8%. In the study by Pope, Gruber, et al. (2000), significant misperception of body fat—an overestimation of 3.6%—was found only for French men. In the same study, significant muscle misperception was found for all three groups, but the direction of misperception was unexpected: overestimation of 1.2%.

Benefits and Limitations

The somatomorphic matrix represents an important advancement in body image assessment. The significance of this measure is most apparent when considered in the context of past male silhouette scales. By having the figures organized along the axes of muscularity and body fat, dissatisfaction with respect to each facet of appearance can be determined. This enables a precise kind of assessment that was not possible in any preceding measure of body image. Moreover, the somatomorphic matrix is not as limited as other silhouette measures with respect to the methodological shortcomings described by Gardner Friedman, and Jackson (1998). The structure of the test appears to provide a finer form of measurement because participants only see one rating option at a time and have as many as 100 figures from which to select. Moreover, by not seeing the entire matrix of options or recording the numerical values associated

with particular figures, spuriously high test–retest reliability should not result.

As effective as the somatomorphic matrix appears in theory to assess male body image, it does possess some limitations. Certainly, the reliability of the measure presents an important limitation. Another limitation is the degree of accuracy that can be achieved when the somatomorphic matrix is used as a perceptual measure. It is not the matrix that is limited per se; rather, it is the method of body composition assessment that is used conjointly. For instance, skinfold measures have been criticized as having a number of potential sources of error, including degree of experimenter expertise, width of caliper jaws, caliper type, and validity of prediction equations (McArdle, Katch, & Katch, 1996). Yet another limitation is that the somatomorphic matrix may have limited application in samples that are not able to make ratings because the measure is not sufficiently extreme in the figures it provides, such as self-ratings among the morbidly obese (Stewart, Williamson, Smeets, & Greenway, 2001). In the case of assessment among the morbidly obese, the result is likely to be a dissatisfaction level that is underestimated.

Somatomorphic Matrix Modification

In view of the somatomorphic matrix having less than adequate reliability, we developed a modification designed with the same intent as the original as a measure of satisfaction and perceptual accuracy. The modification consists of 34 images transposed from the original somatomorphic matrix (using Adobe Photoshop 5.5), organized in a 10×10 matrix and presented on a 2×3 foot poster board (Figure 1). To fit the images onto the modification, a reduction of image size from the original was necessary, but the images were not reduced to the extent that it compromised the detail of the drawings. This precaution was taken because the original images correspond to particular BF%s and FFMI's and removing detail would invalidate these values.

Although the modification has only 34 images, it was constructed in such a way that would allow for responses to cover the same domain as the 100 figures found in the original somatomorphic matrix. This was accomplished by having every third figure in the image library of the somatomorphic matrix appear on the modification, starting from the one with the least body fat and most muscularity. Then, when participants are asked to respond to an item, they are not limited to selecting numerical values corresponding to images appearing on the scale, they

can select intermediate values for which there are no representative images but only intersecting lines.

Benefits and Limitations

The benefits and limitations of assessing male body image using the somatomorphic matrix modification are the same as those described for the original. Although it was anticipated that the modification would subvert the limitation of low reliability, data indicate test–retest reliability that is slightly better than the original somatomorphic matrix, but still inadequate by conventional standards (Cafri et al., in press). In view of these findings, attempts are currently underway to revise the measure to improve its reliability. Another set of limitations is related to its paper-and-pencil protocol, which was described as being limited methodologically. It should be noted, however, that the modification is not as limited as previous paper-and-pencil measures. For instance, rating figures on the modification can be considered as less coarse than past protocols because participants are allowed to select intermediate values between existing figures.

Conclusion

We proposed a standard of assessing male body image that is centered on a muscular appearance. Existing measures of attitudes and perception were reviewed based on the degree to which they conformed to general guidelines of assessing a muscular appearance as well as their avoidance of methodological shortcomings. In this context, it was argued that the DMS, the somatomorphic matrix, and a modification of the somatomorphic matrix were the most effective measures of assessing male body image. Increasing use of these measures should lead to more accurate measurement of male body image.

The practical relevance of effectively measuring male body image cannot be overstated. Most obviously, this is because body image disturbance may lead to adverse psychological functioning (Cafri et al., 2002; McCreary & Sasse, 2000). Other concerns are behaviors that are associated with muscle-related body image disturbance, which can result in adverse physical and psychological health effects. Such behaviors include but are not limited to use of steroids, β -receptor agonists, and rigidly structured diets (Pope, Phillips, & Olivardia, 2000). For example, anabolic-androgenic steroids have been known to cause depressed levels of high-density lipoproteins, elevated levels of low-density lipoproteins, addiction, increased aggression, manic symptoms/episodes, and

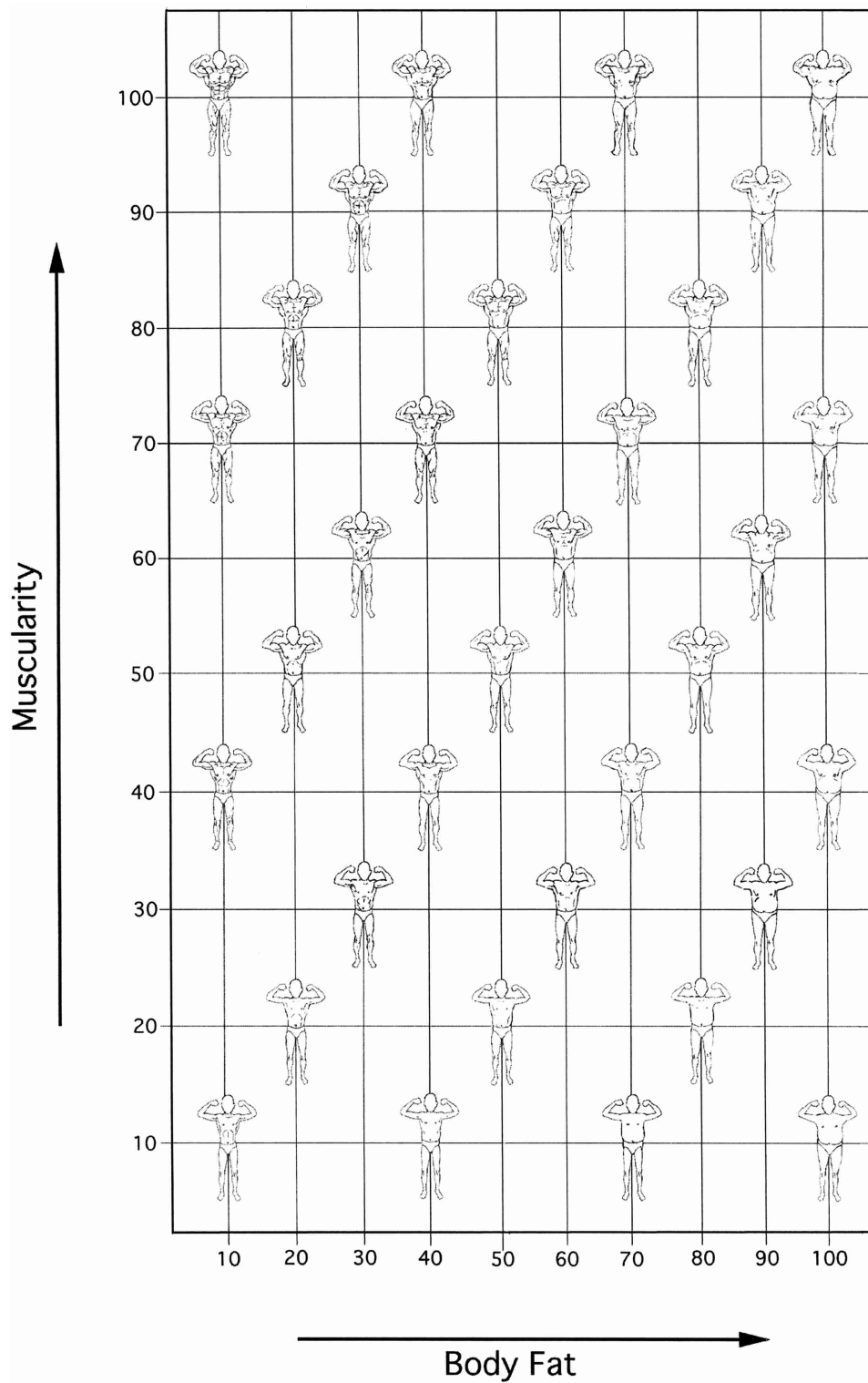


Figure 1. The somatomorphic matrix modification (actual size 2 × 3 feet).

occasional homicidal tendencies (Pope, Phillips, & Olivardia, 2000). Use of steroids is just one manifestation of the kind of maladaptive behavior that may be produced by body image disturbance related to a muscular appearance.

Given the potentially wide array of harmful effects that can occur in males as a result of the way they perceive and think about their bodies, it is clear why accurate research of male body image is necessary. Moreover, assessment is particularly important among adolescent males because of their susceptibility to internalization of masculine gender norms (Pollack, 1998) as well as the dearth of accurate past measurement in this population (Cohane & Pope, 2001). Future research should strive to accurately measure the body image of all males because this facet of psychology forms the basis of a multitude of disordered thoughts and behaviors.

References

- Askevold, F. (1975). Measuring body image: Preliminary report on a new method. *Psychotherapy and Psychosomatics*, *26*, 71–77.
- Berscheid, E., Walster, E., & Bohrnstedt, G. (1973). The happy American body: A survey report. *Psychology Today*, November, 119–131.
- Brown, T. A., Cash, T. F., & Milkulka, P. J. (1990). Attitudinal body-image assessment: Factor analysis of the body self-relations questionnaire. *Journal of Personality Assessment*, *55*, 135–144.
- Cafri, G., Strauss, J., & Thompson, J. K. (2002). Male body image: Satisfaction and its relationship to psychological functioning using the somatomorphic matrix. *International Journal of Men's Health*, *1*, 215–231.
- Cafri, G., Thompson, J. K., & Roehrig, M. (2002, November). *Reliability assessment of muscle-based attitudinal measures of body image*. Poster presented at the Association for Advancement of Behavior Therapy conference, Reno, NV.
- Cafri, G., Thompson, J. K., & Roehrig, M. (in press). Reliability assessment of the somatomorphic matrix. *International Journal of Eating Disorders*.
- Cash, T. F., & Pruzinsky, T. (1990). *Body image: Development, deviance and change*. New York: Guilford Press.
- Cash, T. F., Winstead, B., & Janada, L. (1986). The great American shape-up. *Psychology Today*, *20*(4), 30–37.
- Cohane, G. H., & Pope, H. G. (2001). Body image in boys: A review of the literature. *International Journal of Eating Disorders*, *29*, 373–379.
- Cohn, L. D., & Adler, N. E. (1992). Female and male perceptions of ideal body shapes: Distorted views among Caucasian college students. *Psychology of Women Quarterly*, *16*, 69–79.
- Conner-Greene, P. A. (1988). Gender differences in body weight perception and weight loss strategies of college students. *Women and Health*, *14*, 27–42.
- Dibiase, W. J., & Hejelle, L. A. (1968). Body-image stereotypes and body-type preferences among male college students. *Perceptual and Motor Skills*, *27*, 1143–1146.
- Drewnowski, A., & Yee, D. (1987). Men and body image: Are males satisfied with their body weight? *Psychosomatic Medicine*, *48*, 626–634.
- Fallon, A., & Rozin, P. (1985). Sex differences in perceptions of desirable body shape. *Journal of Abnormal Psychology*, *94*, 102–105.
- Franzoi, S. L., & Shields, S. A. (1984). The body esteem scale: Multidimensional structure and sex differences in college populations. *Journal of Personality Assessment*, *48*, 173–178.
- Gardner, R. M., Friedman, B. N., & Jackson, N. A. (1998). Methodological concerns when using silhouettes to measure body image. *Perceptual and Motor Skills*, *86*, 387–395.
- Garner, D. M. (1997). The 1997 body image survey results. *Psychology Today*, *30*, 75–84.
- Garner, D. M., Olmstead, M. A., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders*, *2*, 15–34.
- Gendebien, M. L., & Smith, M. O. (1992). Field dependence and perceptual, cognitive, and affective measures of body image in asymptomatic college students. *Personality and Individual Differences*, *13*, 937–943.
- Gruber, A. J., Pope, H. G., Borowiecki, J., & Cohane, G. (1999). The development of the somatomorphic matrix: A bi-axial instrument for measuring body image in men and women. In T. S. Olds, J. Dollman, & K. I. Norton (Eds.), *Kinanthropometry VI*. Sydney: International Society for the Advancement of Kinanthropometry.
- Guy, R. F., Rankin, B. A., & Norvell, M. J. (1980). The relation of sex role stereotyping to body image. *The Journal of Psychology*, *105*, 167–173.
- Iwawaki, S., & Lerner, R. M. (1976). Cross-cultural analyses of body-behavior relations: III. Developmental intra- and inter-cultural factor congruence in the body build stereotypes of Japanese and American males and females. *Psychologia*, *19*, 67–76.
- Kearney-Cooke, A., & Steichen-Asch, P. (1990). Men, body image, and eating disorders. In A. E. Andersen (Ed.), *Males with eating disorders* (pp. 54–74). New York: Brunner/Mazel.
- Keeton, W. P., Cash, T. F., & Brown, T. A. (1990). Body image or body images: Comparative multidimensional assessment among college students. *Journal of Personality Assessment*, *54*, 213–230.
- Kirkpatrick, S. W., & Sanders, D. M. (1978). Body image stereotypes: A developmental comparison. *The Journal of Genetic Psychology*, *132*, 87–95.
- Kouri, E. M., Pope, H. G., Jr., Katz, D. L., & Oliva, P. (1995). Fat-free mass index in users and nonusers of anabolic-androgenic steroids. *Clinical Journal of Sports Medicine*, *5*, 223–228.
- Leit, R. A., Gray, J. J., & Pope, H. G. (2002). The media's representation of the ideal male body: A cause for muscle

- dysmorphia? *International Journal of Eating Disorders*, 31, 334–338.
- Leit, R. A., Pope, H. G., & Gray, J. J. (2001). Cultural expectations of masculinity in men: The evolution of playgirl centerfolds. *International Journal of Eating Disorders*, 29, 90–93.
- Lerner, R. M., & Korn, S. J. (1972). The development of body-build stereotypes in males. *Child Development*, 43, 908–920.
- Lerner, R. M., & Pool, K. B. (1972). Body-build stereotypes: A cross cultural comparison. *Psychological Reports*, 31, 527–532.
- Loosemore, D. J., & Moriarity, D. (1990). Body dissatisfaction and body image distortion in selected groups of males. *Canadian Association for Health, Physical Education and Recreation*, 11, 11–15.
- Lynch, S. M., & Zellner, D. A. (1999). Figure preferences in two generations of men: The use of figure drawings illustrating differences in muscle mass. *Sex Roles*, 40, 833–843.
- Mable, H. M., Balance, W. D. G., & Galgan, R. J. (1986). Body image distortion and dissatisfaction in university students. *Perceptual and Motor Skills*, 63, 907–911.
- Martin, E. D. (1995). *Male body image reconsidered: A study of resistance trainers, runners, and sedentary men*. Unpublished doctoral dissertation, University of Missouri.
- McArdle, W. D., Katch, F. I., & Katch, V. L. (1996). *Exercise physiology: Energy, nutrition, and human performance*. Philadelphia: Lippincott, Williams & Wilkins.
- McCauley, M., Mintz, L., & Glenn, A. A. (1988). Body image, self-esteem, and depression-proneness: Closing the gender gap. *Sex Roles*, 18, 381–391.
- McCreary, D. R. (2002). Gender and age differences in the relationship between body mass index and perceived weight: Exploring the paradox. *International Journal of Men's Health*, 1, 31–42.
- McCreary, D. R., & Sasse, D. K. (2000). An exploration of the drive for muscularity in adolescent boys and girls. *Journal of American College Health*, 48, 297–304.
- Mintz, L. B., & Betz, N. B. (1986). Sex differences in the nature, realism, and correlates of body image. *Sex Roles*, 15, 185–195.
- Paxton, S. J., Wertheim, E. H., Gibbons, K., Szmukler, G. I., Hiller, L., & Petrovich, J. L. (1991). Body image satisfaction, dieting beliefs, and weight loss behaviors in adolescent girls and boys. *Journal of Youth and Adolescence*, 20, 361–379.
- Pollack, W. (1998). *Real boys*. New York: Owl Books.
- Pope, H. G., Gruber, A., Choi, P., Olivardia, R., & Phillips, K. (1997). An underrecognized form of body dysmorphic disorder. *Psychosomatics*, 38, 548–557.
- Pope, H. G., Gruber, A., Magweth B., Bureau, B., deCol, C., Jovent, R., & Hudson, J. I. (2000). Body image perception among men in three countries. *American Journal of Psychiatry*, 157, 1297–1301.
- Pope, H. G., Olivardia, R., Gruber, A., & Borowiecki, J. (1999). Evolving ideals of male body image as seen through action toys. *International Journal of Eating Disorders*, 26, 65–72.
- Pope, H. G., Phillips, K. A., & Olivardia, R. (2000). *The Adonis complex: The secret crisis of male body obsession*. New York: Free Press.
- Raudenbush, B., & Zellner, D. (1997). Nobody's satisfied: Effects of abnormal eating behaviors and actual and perceived weight status on body image satisfaction in males and females. *Journal of Social Psychology and Clinical Counseling*, 16, 95–110.
- Ruff, G. A., & Barrios, B. A. (1986). Realistic assessment of body image. *Behavioral Assessment*, 8, 237–251.
- Russell, C. J., Pinto, J. K., & Bobko, P. (1991). Appropriate moderated regression and inappropriate research strategy: A demonstration of information loss due to scale coarseness. *Applied Psychological Measurement*, 15, 257–266.
- Secord, P. F., & Jourard, S. M. (1953). The appraisal of body cathexis: Body cathexis and the self. *Journal of Consulting Psychology*, 17, 343–347.
- Silberstein, L. R., Striegel-Moore, R. H., Timko, C., & Rodin, J. (1988). Behavioral and psychological implications of body dissatisfaction: Do men and women differ? *Sex Roles*, 19, 219–231.
- Slade, P. D., & Russell, G. F. M. (1973). Awareness of body dimensions in anorexia nervosa: Cross sectional and longitudinal studies. *Psychological Medicine*, 3, 188–199.
- Stewart, T. M., Williamson, D. A., Smeets, M. A. M., & Greenway, F. L. (2001). Body morph assessment: Preliminary report on the development of a computerized measure of body image. *Obesity Research*, 9, 43–50.
- Stunkard, A. J., Sorensen, T., & Schulsinger, F. (1983). Use of the Danish adoption registrar for the study of obesity and thinness. In S. S. Kety, L. P. Rowland, R. L. Sidman, & S. W. Matthysse (Eds.), *The genetics of neurological and psychiatric disorder* (pp. 115–120). New York: Raven Press.
- Thompson, J. K. (1990). *Body image disturbance assessment and treatment*. New York: Pergamon Press.
- Thompson, J. K. (1996). Assessing body image disturbance: Measures, methodology, and implementation. In J. K. Thompson (Ed.), *Body image, eating disorders, and obesity: An integrative guide for assessment and treatment* (pp. 49–81). Washington, DC: American Psychological Association.
- Thompson, J. K., & Altabe, M. N. (1991). Psychometric qualities of the figure rating scale. *International Journal of Eating Disorders*, 10, 615–619.
- Thompson, J. K., & Dolce, J. J. (1989). The discrepancy between emotional vs. rational estimates of body size, actual size, and ideal body ratings: Theoretical and clinical implications. *Journal of Clinical Psychology*, 45, 473–483.
- Thompson, J. K., & Gardner, D. M. (2002). Measuring perceptual body image among adolescents and adults. In T. F. Cash & T. Pruzinsky (Eds.), *Handbook of body images*. New York: Guilford Press.
- Thompson, J. K., Heinberg, L., Altabe, M., & Tantleff-Dunn, S. (1999). *Exacting beauty*. Washington, DC: American Psychological Association.

- Thompson, J. K., & Spana, R. E. (1988). The adjustable light beam method for the assessment of size estimation accuracy: Description, psychometrics, and normative data. *International Journal of Eating Disorders*, 7, 521–526.
- Thompson, J. K., & Tantleff, S. (1992). Female and male ratings of upper torso: actual, ideal, and stereotypical conceptions. *Journal of Social Behavior and Personality*, 7, 345–354.
- Thompson, J. K., & Thompson, C. M. (1986). Body size distortion in asymptomatic, normal weight males and females. *International Journal of Eating Disorders*, 5, 1061–1068.
- Thompson, M. A., & Gray, J. J. (1995). Development and validation of a new body image assessment scale. *Journal of Personality Assessment*, 64, 258–269.
- Tiggeman, M., & Pennington, B. (1990). The development of gender differences in body-size dissatisfaction. *Australian Psychologist*, 25, 306–313.
- Tucker, L. A. (1982). Relationship between perceived somatotype and body cathexis of college males. *Psychological Reports*, 50, 983–989.
- Wells, W. D., & Siegel, B. (1961). Stereotyped somatotypes. *Psychological Reports*, 8, 77–78.
- Zellner, D., Harner, D., & Adler, R. (1989). Effects of eating abnormalities and gender on perceptions of desirable body shape. *Journal of Abnormal Psychology*, 98, 93–96.

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