



Review article

Body size estimation in anorexia nervosa: A brief review of findings from 2003 through 2013



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ABSTRACT

Body size overestimation is a fundamental feature in anorexia nervosa (AN). The extent or even existence of body size overestimation in AN is controversial. The most recent review (Farrell et al., 2005) found that only half the studies reported overestimation of body size in individuals diagnosed with AN. The remaining studies found no overestimation or in some instances underestimation. The discrepancy in these findings has been attributed to the wide variety of assessment techniques that are used, including many with questionable psychometric properties. We review all 9 contemporary studies conducted in this area since the last review in 2005. For each study we describe the number of participants, methodology, reliability/validity data, amount of whole body distortion, effect sizes, and a summary of findings. In all studies that included a healthy control group, individuals with AN overestimated their whole body size more than healthy controls did. The difference was significant in all except two studies. Based on these contemporary findings, we conclude that individuals with AN overestimate their body size and that the greater consistency of findings in the studies conducted over the last decade is attributable to the use of improved methodologies and assessment tools with documented psychometric properties.

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1. Introduction

Body image is being viewed increasingly as a multidimensional phenomenon. It extends well beyond what early investigators conceptualized "...as the picture of our own body which we form in our own mind" (Schilder, 1950). There is no universally accepted

conception of exactly what body image consists of, and today it is viewed from several wide-ranging perspectives including socio-cultural, evolutionary, genetic and neuroscientific, cognitive-behavioral, and feminist viewpoints (Cash and Smolak, 2011). Further complicating matters is the diverse way in which body image has been measured. Nowhere is this more true than in the measurement of the perceptual aspect of body image, which involves how accurately a subject estimates their body size. Gardner and Brown (2011) have reviewed these differing perceptual methodologies. Early studies sometimes used image marking techniques, wherein

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subjects were asked to draw their body on a piece of paper, while others required subjects to adjust the horizontal distance of two points of light. Other studies used distorting photographs or had subjects view themselves in an adjustable distorting mirror. More recently, technological advancements have allowed investigators to use video distortion techniques, in which subjects can adjust an image of their body size wider or thinner. These different techniques had the unfortunate consequence of yielding diverse findings, particularly when it involved the perceptual aspects of body size estimation in eating disorder subjects (Cash and Deagle, 1997). The purpose of this article is to summarize the more contemporary findings relative to how accurately individuals with anorexia nervosa (AN) judge their body size.

Anorexia nervosa is a disorder characterized by disturbances in several components of body image, including perceptual, cognitive, affective, and behavioral factors (Gardner, 1996). Body image disturbance (BID) is one factor in AN that has been extensively studied (Cash and Deagle, 1997). BID is commonly conceived of as having two components: perceptual (accuracy in estimating body size) and attitudinal or affective (concerns with body size or shape). Numerous studies have consistently documented that individuals with AN are more dissatisfied with their body size than are healthy controls without an eating disorder. As noted previously, earlier studies examining the role of accuracy in estimating body size in individuals with AN have obtained inconsistent findings (Cash and Deagle, 1997; Farrell et al., 2005).

Farrell et al. (2005) have conducted the most recent review of such studies. Their review included 52 studies published between 1973 and 2002. They describe 10 different perceptual assessment methodologies for body size estimation which they group into three broad categories including analog scale procedures (estimating one's size by adjusting the horizontal separation of two points), image marking procedures (drawing an image of one's size), and optical distortion methods (distorting an individual's image via video monitor, mirror or camera). Farrell et al. (2005) review the psychometric properties of each methodology and note that construct validity and test-retest reliability data are frequently absent in all the methodologies. They also note the considerable amount of variability in the findings regarding how accurately individuals with AN estimate their body size. Their review showed that only half the studies reported individuals diagnosed with AN overestimated body size, whereas the remaining studies found no overestimation or in some instances underestimation. In addition, some studies have used figural rating scales in which participants select their perceived size from a series of drawings representing a range of body widths from very thin to obese. Gardner and Brown (2010) have noted the lack of established psychometric properties for most of these scales. Several authors (Thompson et al., 1990; Gardner, 1996; Smeets et al., 1997; Gardner, 2011) discuss factors which are likely responsible for the heterogeneity of findings when measuring body size estimation accuracy in individuals with AN, with the variability in the quality of the assessment methods used to assess body size estimation being of primary importance.

The lack of satisfactory psychometric properties has resulted in the discontinuance of using analog scale procedures and image marking in contemporary research. Farrell et al. (2005) concluded from their review that optical distortion techniques come closest to achieving construct and ecological validity, and some variant of these techniques have been most commonly employed since their 2005 literature review. In addition, there is an increasing recognition of the importance of using established psychophysical techniques in measuring body size estimations. These include the method of adjustment in which subjects adjust the width of a digital image of their body size. In the method of constant stimuli subjects report whether a digital image of their body is larger or smaller than a comparison stimulus. More recently, signal detection theory and adaptive probit

estimation methodologies have been employed. In signal detection tasks a subject must report whether an image of their body is distorted or of normal size. In adaptive estimation subjects report whether an image of their body is distorted too wide or too thin. Gardner (2011) provides a detailed description of each of these techniques. These techniques are employed with some variant of optical distortion techniques, most commonly with video distortion methodologies.

The purpose of this paper is to review findings of body size estimation in AN as compared to healthy controls from studies conducted subsequent to those covered in the previously most current review by Farrell et al. (2005) which covered studies up through 2002.

2. Method

We searched the research literature for studies comparing body size estimation in individuals with AN and healthy controls from 2003 to the present, using the databases PsychInfo, Scopus, and PubMed. Key words used in the search included body image, body image perception, anorexia nervosa, body size estimation, and body size perception. No exclusionary criteria such as language, country of origin, or age of subjects were used. Studies using comparison groups such as mothers or fathers of individuals with AN were excluded, as information about eating disorder behaviors or tendencies for those groups was not provided.

3. Results

3.1. Study characteristics

Only nine studies were located, including one study currently submitted for publication. One additional study containing no control group data was excluded. Interestingly, all of the studies excepting one were conducted in laboratories outside of the U.S. Country origin included three from Germany, two each from France and Spain, and one each from the U.K. and Canada.

3.2. Whole body versus body part size-estimations

Studies included both body part methods that require participants to estimate the size of a series of body parts (for example the face, chest, waist, and hips) as well as whole body methods, which require participants to estimate the overall size of their bodies. Several of the studies present data for both body part and whole body estimates, with only one study presenting body part data only. Because of the small number of studies located and the variability in body parts that were measured, and to make comparisons between studies meaningful, we report the body size estimates reflecting the whole body, averaging across body parts in the one instance (Schnieder et al., 2009) where a whole body estimate was absent. Brief descriptions of differences between body parts are also included where relevant. It should be noted that an earlier meta-analysis of 33 body size estimations studies of individuals with AN reported that AN patients overestimated their body size less with whole body methods than with body part methods. Size estimates were also more variable when judging body parts (Smeets et al., 1997).

3.3. Statistical limitations

The initial goal of our review was to conduct a meta-analysis incorporating findings from each of the studies. This proved to be impossible due to the variability in the reporting of findings. In three studies no standard deviation for mean differences between AN and healthy control groups was given. In some instances, only medians or inter-quartile ranges were reported. Only six of the

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