



# Beauty in the eye of the beholder: Using facial electromyography to examine the association between eating disorder symptoms and perceptions of emaciation among undergraduate women



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## ABSTRACT

Thin-ideal internalization, drive for thinness, and over-evaluation of the importance of thinness are associated with eating disorders (EDs). However, little research has examined to what extent perceptions of emaciation are also associated with ED symptoms. In the present study, 80 undergraduate women self-reported on ED symptomatology and perceptions of emaciated, thin, and overweight female bodies. While participants viewed images of these different body types, facial electromyography was used to measure activation of facial muscles associated with disgust reactions. Emaciated and overweight bodies were rated negatively and elicited facial responses consistent with disgust. Further, ED symptomatology was associated with pronounced aversion to overweight bodies (assessed via self-report pleasantness ratings), and attenuated negative affect to emaciated bodies (assessed via facial electromyography). The latter association was significant even when controlling for self-reported perceptions of emaciation, suggesting that psychophysiological methods in ED research may provide valuable information unavailable via self-report.

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## 1. Introduction

Among women, idealization of a thin female body type is associated with body dissatisfaction and eating pathology (Stice, Gau, Rohde, & Shaw, 2017; Stice & Shaw, 2002), and drive for thinness and over-emphasis of the importance of thinness are hallmark features of eating disorders (EDs; Garner, Olmstead, & Polivy, 1983). Although the causes and consequences of idealizing thin body types have been well researched (e.g., Grabe, Ward, & Hyde, 2008), far less is known about perceptions of emaciated body types in relation to ED symptoms. These perceptions could be important to understand given their potential to impact ED behaviors. For example, cognitive theories of anorexia nervosa (AN; e.g., Cooper, 2005) would suggest that beliefs (e.g., “emaciation is beautiful”) could impact thoughts (e.g., “I’m not emaciated enough”) and behaviors (e.g., engagement in ED behaviors). In this way, favorable beliefs about emaciation could lead to initiation or maintenance of ED behaviors. The present study sought to advance the understanding of how college women perceive emaciated bodies. Specifically, we tested women’s objective (e.g., facial reactions assessed via facial

electromyography) and subjective (e.g., self-report) perceptions of three different female body types: emaciated, thin, and overweight bodies. We further examined whether those perceptions were associated with ED symptomatology.

### 1.1. Perceptions of emaciated and overweight bodies

Although previous literature has emphasized the relation between ED symptoms and preferences for thinness, perceptions of other body types could also be useful to examine as causes, correlates, or consequences of ED pathology. For example, Vartanian, Herman, and Polivy (2005) found that while most people have negative implicit attitudes toward fatness, restrained eaters also endorse *explicitly* negative beliefs about fatness. Similarly, Harvey, Troop, Treasure, and Murphy (2002) found that among women, overweight images were rated as more disgusting than slim images, and further, disgust ratings of overweight bodies were particularly elevated among women with high levels of self-reported eating pathology, compared to women with low levels of self-reported eating pathology. Thus, continuing to expand the scope of body image investigations beyond the thin-ideal, for example, to perceptions of overweight bodies, could help identify novel body image disturbances with specific relevance to body dissatisfaction and ED symptomatology.

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Despite widespread favorable attitudes toward thin bodies, thinness appears to be desirable only to a point. Bodies that are too thin (i.e., starving or emaciated) are judged as socially unacceptable (Rand, Resnick, & Seldmant, 1997), and are rated comparably to other disgust stimuli (e.g., images of bodily products, mutilated human or animal bodies; Ito, Cacioppo, & Lang, 1998). Further, psychologically healthy women demonstrate an aversive response to emaciated imagery during a startle response paradigm (Reichel et al., 2014), and a preference for normal weight versus emaciated figures, as assessed via both brain imaging and self-report methodologies (Fladung et al., 2010).

Although emaciated figures are generally considered unattractive, a subset of individuals seek out these images on pro-ED websites (i.e., websites that promote ED behavior and typically contain images of emaciated bodies for “ED inspiration” or “thin-spiration”). These websites are often visited by people with EDs (Wilson, Peebles, Hardy, & Litt, 2006) and, to a lesser extent, by adolescents generally (Custers & Van den Bulck, 2009). Moreover, pro-ED search terms (e.g., pro ana, thin-spiration, thinspo, pro mia, tips on anorexia) are entered in Google more than 13 million times annually (Lewis & Arbutnott, 2012). Initial research on the effects of viewing pro-anorexia websites suggests that viewing them is associated with a host of negative outcomes, such as negative affect and lowered social self-esteem (Bardone-Cone & Cass, 2007). However, far less is known about perceptions of emaciation and consequences of exposure to emaciated imagery than is known about perceptions of thinness and consequences of exposure to thin-ideal imagery; additional research is needed in this area.

The few studies conducted on perceptions of emaciation suggest that people with EDs—specifically anorexia nervosa (AN)—have favorable perceptions of emaciation. For example, individuals with AN, especially severe and enduring AN, sometimes desire and “achieve” levels of thinness (i.e., emaciation) that are far thinner than those widely considered attractive based on thin-ideal media. To illustrate, professional models typically have bodies that are slender and low-weight, with body mass indices (BMIs) commonly in the low range of the “healthy weight” category, or the upper range of the “underweight” category (e.g., Preti, Usai, Miotto, Petretto, & Masala, 2008; Swami & Szmigielska, 2013). Yet some women seeking treatment for AN have BMIs that are much lower (e.g., Fairburn et al., 2013; Touyz et al., 2013) than those reported in samples of professional models. This seems to suggest that the body image distortion associated with EDs could, for some, go beyond a preference for thinness—significantly problematic itself—to a potentially even more dangerous preference for emaciation (i.e., being severely underweight). Indeed, women with AN show appetitive responses to emaciated images in a startle-response paradigm (Reichel et al., 2014), rate images of emaciated bodies more favorably than normal weight bodies, and show greater activation of the reward neural system in response to pictures of emaciated bodies versus normal weight bodies (Fladung et al., 2010). However, one study found that compared to healthy controls, women with AN showed stronger implicit associations of emaciated bodies with both beauty and ugliness (Smith, Joiner, & Dodd, 2014), suggesting a more complex, ambivalent attitude toward emaciation including both favorable and unfavorable perceptions.

That a subset of ED patients might desire emaciated, rather than thin, bodies seems paradoxical. Previous literature has pointed to a link between ED pathology and desire to conform to the widely held thin-ideal, but desiring emaciation requires ED patients to internalize body image messages discordant with social norms. To the extent that a society values thinness and has positive thinness expectancies, it is intuitive why one might desire thinness. However, far less is known about why individuals might desire emaciation, which is largely perceived as unattractive. Furthermore, existing studies show that women with AN hold favorable

views of emaciation, but little is known about whether a favorable perception of emaciation may be held by others as well, for example among individuals with EDs other than AN, among individuals with subclinical ED symptoms, or among individuals without EDs.

## 1.2. Disgust and facial electromyography

Disgust involves aversion to, and motivation to avoid, offensive stimuli such as visibly diseased others, contaminated food, or corrupt politicians (Curtis, de Barra, & Aunger, 2011; Rozin, Haidt, & McCauley, 2008), and is thought to have initially developed as an adaptive system for motivating disease avoidance behavior and reducing disease transmission (Curtis et al., 2011). Because disgust serves to motivate avoidance of potentially diseased or contaminated others, physical appearances that deviate too far from the morphological norm for a given group are likely to elicit disgust (e.g., Park, Faulkner, & Schaller, 2003).

Disgust is associated with a distinct facial expression (i.e., a furrowed brow, a crinkled nose, and a retracted upper lip; Levenson, 1992; Vrana, 1993) that is recognizable cross-culturally (Elfenbein & Ambady, 2002). Facial electromyography (EMG) can be used to quantify the activation of the two facial muscles most associated with expressions of disgust—the *corrugator supercilii* which furrows the brow, and the *levator labii* which wrinkles the nose and pulls back the upper lip (de Jong, Peters, & Vanderhallen, 2002; Vrana, 1993; Wolf et al., 2005). As relatively objective measures, psychophysiological measures are valuable in research and can provide information participants are otherwise unable or unwilling to report (Blascovich, Mendes, Vanman, & Dickerson, 2011). For example, previous research of perceptions of body types has shown that objective and subjective measurements sometimes yield different results (e.g., Reichel et al., 2014; Vartanian et al., 2005) and may capture different systems of responding (e.g., implicit vs. explicit; Vartanian et al., 2005). Thus, using a multi-method approach appears to be beneficial in body image research.

## 1.3. Current study design and aims

In the present study, we examined the associations between perceptions of emaciated, thin, and overweight female bodies and ED symptomatology among college women. In our manipulation check, we expected to confirm previous findings that emaciated and overweight bodies are, on average, perceived unfavorably while thin bodies are perceived favorably. In Aim 1, we predicted that ED symptomatology would moderate both subjective (i.e., self-report) and objective (i.e., psychophysiological disgust assessed via facial EMG) responses to the different body types. In line with previous research, we hypothesized that negative perceptions of overweight bodies would be associated with greater ED symptoms (e.g., Harvey et al., 2002; Vartanian et al., 2005), and further hypothesized that favorable perceptions of emaciated bodies would be associated with greater ED symptomatology.

In Aim 2, we predicted that objective (psychophysiological) reactions to the images would be uniquely associated with ED symptoms, above and beyond the subjective measures. This would support that psychophysiological methods can provide information participants are otherwise unable or unwilling to report (e.g., Blascovich et al., 2011), highlighting the need for continued incorporation of relatively objective measures in psychological research.

## 2. Method

All procedures were approved by the university’s institutional review board. Data were collected from the current sample for two distinct studies (Velkoff, Forrest, Dodd, & Smith, 2016); only proce-

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