



The effects of aerobic- versus strength-training on body image among young women with pre-existing body image concerns



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ABSTRACT

This experiment compared the effects of aerobic-training (AT) versus strength-training (ST) on body image among young women with pre-existing body image concerns. Theory-based correlates of body image change were also examined. Participants were 46 women (M age = 21.5 years), randomly assigned to an 8-week AT or ST intervention consisting of supervised exercise 3 days/week. Multidimensional measures of body image were administered pre- and post-intervention, along with measures of physical fitness, perceived fitness, and exercise self-efficacy. Women in the AT condition reported greater reductions in social physique anxiety ($p = .001$) and tended to report greater improvements in appearance evaluation ($p = .06$) than women in the ST condition. Changes in perceived fatness, perceived aerobic endurance and aerobic self-efficacy were significantly correlated with body image change ($ps < .003$). Results provide direction for prescribing exercise to improve body image and advancing theory to account for the effects of exercise.

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Introduction

Rates of body dissatisfaction are high among women living in westernized societies (Cash, 2011). For example, an online survey (Frederick, Peplau, & Lever, 2006) of nearly 27,000 women revealed that only 41% felt “good” or “great” about their bodies, while the majority felt that their bodies were “just okay” or even unattractive. These statistics are cause for concern; poor body image is associated with low self-esteem, is believed to be a cause of anxiety and depression, and plays a significant role in eating disorder etiology (Polivy & Herman, 2002; Stice & Whitenton, 2002). Given the importance of body image to health and well-being, there is a need for evidence-based treatments to improve how women think and feel about their bodies.

Considerable research, including three meta-analyses (Campbell & Hausenblas, 2009; Hausenblas & Fallon, 2006; Reel et al., 2007), indicates that exercise-training programs are effective for improving women’s body image. These meta-analyses, however, have produced conflicting results regarding the *type* of

exercise – strength training (e.g., lifting weights, calisthenics) or aerobic training (e.g., walking, cycling) – that is most effective. In two of the meta-analyses (Hausenblas & Fallon, 2006; Reel et al., 2007), strength-training interventions were grouped with other anaerobic activity interventions (e.g., stretching, sprinting, playing sports such as baseball or volleyball). One of these meta-analyses (Hausenblas & Fallon, 2006) reported no differences in experimental studies of the effects of anaerobic (Cohen’s $d = 0.27$) versus aerobic ($d = 0.25$) exercise interventions on body image. Another, which collapsed body image measures along with measures of body esteem and physical self-concept (Reel et al., 2007), found larger effects for anaerobic ($d = 0.64$) than aerobic exercise ($d = 0.40$). A third, more recent meta-analysis found no difference in body image improvements for exercise interventions that employed strength training and other forms of resistance exercise ($d = 0.37$) versus interventions involving aerobic exercise ($d = 0.30$; Campbell & Hausenblas, 2009). In addition, one study (Tucker & Mortell, 1993) directly compared the effects of strength versus aerobic training on body image.¹ Using an experimental design, women between the ages of 35 and 49 were randomly assigned

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¹ We acknowledge that other studies have compared the effects of interventions that *combine* exercise modalities such as Henry, Anshel, and Michael’s (2006) study that compared an aerobic intervention with a combined aerobic +

to an unsupervised, home-based 12-week exercise program consisting of 3 days/week of either strength training or walking. Although body image improved in both conditions, improvements were significantly greater in the strength-training condition. Taken together, given contradictory findings, it is impossible to conclude from the existing literature if there are differential effects of aerobic versus strength-training exercise on women's body image.

On the one hand, strength training may be more effective than aerobic exercise because each strength-training session has the potential to provide exercisers with immediate positive feedback about their capabilities (Martin Ginis, Eng, Arbour, Hartman, & Phillips, 2005). Unlike typical aerobic workouts (e.g., group fitness classes), a single strength-training session can provide the exerciser with immediate feedback on her progress and level of function (i.e., by virtue of knowing the amount of weight she can lift). Strength-training may also help women become more aware of their body's functional capabilities, which could lead to a de-emphasis on physical appearance (Martin Ginis et al., 2005). On the other hand, aerobic exercise may have stronger effects on body image given that women's body dissatisfaction is primarily driven by concerns about being overweight. Because women typically perceive aerobic exercise as being more conducive to weight loss than other types of exercise (Prichard & Tiggemann, 2008) they may become more satisfied with their bodies by virtue of engaging in a behavior that could allay concerns about being overweight.

Research that directly compares the effects of aerobic versus strength-training exercise on body image is important for both clinical and theoretical reasons. From a clinical perspective, if scientists can determine the type of exercise that is most conducive to improving women's body image, then interventionists can develop maximally effective exercise treatments. From a theoretical perspective, if there are differences in the extent to which different types of exercise improve body image, such knowledge could lead to a better understanding of the mechanisms that account for exercise-induced body image change. For instance, if strength training yields greater effects than aerobic exercise, then this might suggest that a mechanism associated with muscularity or strength gains contributes to exercise-induced body image change. If aerobic exercise is more effective, this finding might indicate that changes in body fat or aerobic fitness explain the effects of exercise.

Given the need for greater knowledge regarding the body image benefits of each type of exercise (Prichard & Tiggemann, 2008), the primary purpose of the present study was to compare the effects of an 8-week supervised program of aerobic exercise versus strength training on changes in body image among young women. In order to maximize the clinical relevance of this study, we recruited women with pre-existing body image concerns. It was predicted that both types of exercise would have significant effects on body image. In the absence of a strong empirical, conceptual, or theoretical rationale, an a priori hypothesis could not be formulated regarding the superiority of one type of exercise over the other.

A secondary study purpose was to examine the relationship between changes in body image and changes in variables that might account for the effects of exercise on body image. Research that advances an understanding of mechanisms and the development of theories to explain the effects of exercise on body image has been sorely lacking. In fact, there is currently no explicit model or theory to guide exercise and body image research (Martin Ginis, Bassett-Gunter, & Conlin, 2012). As such, some researchers (e.g., Lindwall & Lindgren, 2005; Martin Ginis, McEwan, Josse, & Phillips, 2012) have turned to the Exercise and Self-Esteem Model (EXSEM; Sonstroem

& Morgan, 1989) as a framework for designing studies and testing hypotheses pertaining to exercise and body image.

The EXSEM is a model designed to explain the effects of exercise on global self-esteem. It consists of hierarchically organized constructs that lead from changes in measures of physical performance and fitness to changes in self-esteem. According to the EXSEM, exercise-related changes in *actual physical fitness and/or performance* provide information that affects one's physical self-efficacy (i.e., self-efficacy to perform specific physical tasks such as running or lifting). *Physical self-efficacy* in turn, informs more generalized evaluations of one's *physical competence*, which are operationalized as perceptions of one's own strength, fitness, fatness and other aspects of the physical self (Sonstroem, Speliotis, & Fava, 1992). Physical self-perceptions can then influence self-esteem directly, or indirectly through *physical acceptance*, a construct that is operationalized as scores on measures of body image (Sonstroem et al., 1992). This latter operationalization facilitates the application of the EXSEM to studies examining the effects of exercise on body image. In such studies, the model has been used to generate hypotheses pertaining to the effects of changes in actual physical fitness/performance, physical self-efficacy, and physical self-perceptions (e.g., perceived physical fitness) on body image. Given the hierarchical ordering of the constructs, actual changes in physical fitness should have the most distal influence on body image, and changes in physical self-perceptions should have the most proximal influence. These relationships are depicted in Fig. 1, below the dotted line.

To date, only one published study has examined the role that the full set of EXSEM variables plays in accounting for changes in body image (Martin Ginis, McEwan et al., 2012). In that study, overweight women participated in a 16-week diet and exercise (combined aerobic and strength training) intervention. Of the three EXSEM constructs purported to influence body image, changes in perceived fitness (i.e., physical competence) – particularly changes in perceived body fat and perceived physical strength – accounted for most of the explained variance in body image change. When all of the variables were entered into a regression model to predict body image change, changes in aerobic self-efficacy, perceived body fat, and perceived strength were the only significant predictors at Week 8; changes in perceived body fat and perceived strength were the only significant predictors at Week 16. Actual physical fitness changes did not predict body image change at either time point.

These findings suggest that how an exerciser *perceives* changes to her body is a stronger determinant of body image change than the actual magnitude of those changes. A limitation of the study however, is that it is impossible to separate the effects of the exercise from the effects of the dietary intervention. Nevertheless, the results are consistent with a systematic review of exercise training studies which concluded that actual changes in physical fitness are only weakly related to body image change, whereas perceived changes in physical fitness and self-efficacy are consistently positive predictors of body image change (Martin Ginis, Bassett-Gunter et al., 2012). As such, we predicted that following an 8-week exercise intervention, body image change would be positively, significantly correlated with changes in perceived fitness and exercise self-efficacy, and unrelated to actual physical fitness changes.

Method

Participants

Based on meta-analytic findings (Hausenblas & Fallon, 2006) that women's exercise interventions incorporating strength or aerobic training have a large effect on body image ($d = 0.45$), $N = 46$ (23 participants/condition) was required to have 80% power to detect

strength-training + anaerobic exercise intervention. Combined interventions are not the focus of this study.

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