



Breakfast food health and acute exercise: Effects on state body image

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ABSTRACT

Food intake and exercise have been shown to alter body satisfaction in a state-dependent manner. One-time consumption of food perceived as unhealthy can be detrimental to body satisfaction, whereas an acute bout of moderate-intensity aerobic exercise can be beneficial. The current study examined the effect of exercise on state body image and appearance-related self-esteem following consumption of isocaloric foods perceived as healthy or unhealthy in 36 female college students (18–30 years old) in the Northeastern United States. Using a randomized-controlled design, participants attended six study sessions with breakfast conditions (healthy, unhealthy, no food) and activity (exercise, quiet rest) as within-participants factors. Body image questionnaires were completed prior to breakfast condition, between breakfast and activity conditions, and following activity condition. Results showed that consumption of an unhealthy breakfast decreased appearance self-esteem and increased body size perception, whereas consumption of a healthy breakfast did not influence appearance self-esteem but increased body size perception. Exercise did not influence state body image attitudes or perceptions following meal consumption. Study findings suggest that morning meal type, but not aerobic exercise, influence body satisfaction in college-aged females.

1. Introduction

Body image is a multidimensional construct that refers to the manner in which an individual thinks, evaluates, and perceives his/her own body. Poor body image has been linked to poor self-esteem, internalizing symptoms, and disordered eating, highlighting the importance of understanding what leads to poor body image satisfaction (Johnson & Wardle, 2005; Stice & Shaw, 2002). While frequently examined as a trait characteristic, body satisfaction can fluctuate in a state-dependent manner (Fallon & Hausenblas, 2005; Fett, Lattimore, Roefs, Geschwind, & Jansen, 2009; Rudiger, Cash, Roehrig, & Thompson, 2007) and consumption of high-calorie foods has been shown to decrease state body image satisfaction, likely due to concerns of weight gain (Vocks, Legenbauer, & Heil, 2007).

Importantly, individuals tend to rely on health stereotypes of food and use these to judge a food's weight-enhancing properties (Oakes & Slotterback, 2001; Oakes & Slotterback, 2005; Provencher, Polivy, & Herman, 2009; Wansink & Chandon, 2006). For example, in a study that paired foods (one considered healthy and one considered unhealthy) of similar caloric value, participants indicated for all food pairs that the “unhealthy” food (e.g., bacon, 109 kcal) was more likely to lead to weight gain than the isocaloric “healthy” food (e.g., banana, 110 kcal) (Oakes & Slotterback, 2005). These stereotypes have been

shown to extend to impact body satisfaction as well. Hayes, D'Anci, and Kanarek (2011) demonstrated that consumption of a stereotypically unhealthy snack increased body image dissatisfaction in restrained eaters, compared to an isocaloric stereotypically healthy snack or no food at all. Lattimore, Walton, Bartlett, Hackett, and Stevenson (2010) found similar results when assessing participant weight and body satisfaction following consumption of two different isocaloric breakfasts in which one was perceived as lower in calories than the other. Thus, health stereotypes of certain foods may impact body satisfaction independent of their weight-promoting properties (i.e., kilocalories).

Exercise has also been shown to influence body image satisfaction (Campbell & Hausenblas, 2009; DiLorenzo et al., 1999; Hausenblas & Fallon, 2006; Williams & Cash, 2001). Long-term aerobic and anaerobic exercise programs can have positive effects on body image satisfaction up to one year after completion of a program (DiLorenzo et al., 1999; Williams & Cash, 2001) and may relate to both physical and perceived physical changes (Martin Ginis, Eng, Arbour, Hartman, & Phillips, 2005). Acute exercise sessions have also been shown to benefit satisfaction with physical ability, appearance, and body size perception (Salci & Martin Ginis, 2017; Vocks, Hechler, Rohrig, & Legenbauer, 2009), likely due to perceptions of physical changes (Salci & Martin Ginis, 2017). As such, an acute bout of exercise may be a useful intervention for decrements in state body image. Current empirical

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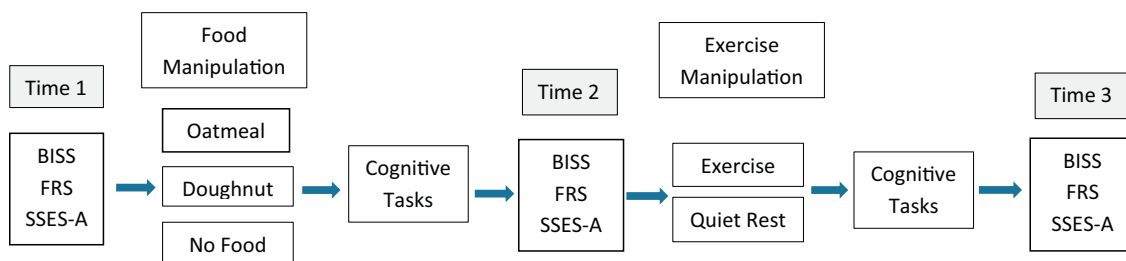


Fig. 1. Flow of study sessions. BISS: Body Image States Scale; FRS: Figure Rating Scale; SSES-A: State Self-Esteem Scale – Appearance.

evidence utilizing an exercise intervention to change body satisfaction has been mixed and focuses on body image decreases related to viewing media images in which the female body is “idealized”. Specifically, one study demonstrates that exercise prior to viewing idealized media images did not mitigate decreases in body satisfaction following picture viewing (Fallon & Hausenblas, 2005), whereas another study shows that individuals who watched idealized media images had higher body satisfaction if these were viewed while exercising compared to resting (Prichard & Tiggemann, 2012). While divergences in study design may contribute to discrepant findings (e.g., media image viewing during versus after exercise), no study to date has assessed the role of exercise in reducing negative body image states following an induced body satisfaction decrement.

The current study explored the relationship between exercise and body image, both attitudinal and perceptual, in college-aged women after consuming stereotypically healthy or unhealthy breakfasts. Young adults transitioning into this age range begin to consume more unhealthy foods and decrease their physical activity (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008) and college-aged women in particular experience particularly low rates of body satisfaction (Neighbors & Sobal, 2007). As such, understanding how consuming increased amounts of calorically-dense foods affects college-aged women and identifying methods of intervention to counteract detrimental decreases in body satisfaction is relevant. In line with Hayes et al. (2011) finding that body image satisfaction decreased following consumption of an unhealthy snack but did not change following consumption of a healthy snack or no food at all, we hypothesized body image satisfaction would decrease following consumption of the unhealthy breakfast but not following consumption of a healthy breakfast or no breakfast (Hypothesis 1). Additionally, based on existing research (Salci & Martin Ginis, 2017; Vocks et al., 2009), we hypothesized that exercise would improve body image satisfaction compared to quiet rest (Hypothesis 2). Finally, we hypothesized that exercise would mitigate decrements in body image satisfaction after an unhealthy meal (Hypothesis 3).

2. Material and methods

2.1. Participants

Thirty-six female college students between the ages of 18–30 ($M \pm SD = 20.39 \pm 1.61$) with a mean BMI of 22.68 ± 4.01 participated. Sample size estimation was based on effect sizes from Salci and Martin Ginis (2017) who found that body image was higher following exercise than no exercise ($\eta_p^2 = 0.11$) as well as from Lattimore et al. (2010) who found body satisfaction to be higher in a healthy breakfast condition than in an unhealthy breakfast condition ($\eta_p^2 = 0.05$). Using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), with an alpha level of 0.05, a power of 0.08, and an estimated correlation among repeated measures 0.7, the sample size necessary for the first and second hypotheses were 21 and 12, respectively. Effect size for the third hypothesis was estimated at $\eta_p^2 = 0.03$, which indicated a sample size of 36 was appropriate.

Participants were recruited via flyers and web-based advertisements on the university campus at which the study took place and received monetary compensation upon completion of the study. Exclusion criteria included individuals taking prescription drugs/medications (other than oral contraceptives), who were pregnant or nursing, or had a history of asthma, diabetes, eating disorders, cardiac diseases, or relevant food allergies. Participants were also required to have no physical barriers to exercise.

2.2. Procedure

A repeated measures design with breakfast (healthy, unhealthy, no food) and exercise (exercise, quiet rest) as within-participants factors was chosen to account for variability in participants' food preferences, dietary restraint, and physical fitness (See Fig. 1). Breakfast and exercise conditions were counterbalanced using a Partial Latin Square. Participants arrived at the laboratory between 0730 h and 0930 h each day following an overnight fast. Start times were kept consistent within participants. Participants were blind to breakfast and exercise condition until initiation of the consumption and activity period, respectively. Upon arrival, participants completed questionnaires regarding hunger and body image (Time 1), consumed the entirety of the breakfast food (or continued on to next task in no food condition), and completed a cognitive battery. The cognitive battery included an attention and executive function task and was used to mask the true purpose of the study, which was advertised as a study investigating the effects of breakfast and exercise on motivation. The cognitive battery also gave participants time (approximately 25 min) to begin digestion of the breakfast food. Following the cognitive tasks, participants completed questionnaires as above (Time 2) and then engaged in either 30 min of moderate-intensity exercise or 30 min of quiet rest. They then completed the cognitive tasks and the questionnaires (Time 3) once more. The study was approved by the Tufts University Institutional Review Board.

2.3. Food stimuli

Following pilot data collection that asked individuals to rate common breakfast foods on healthfulness on a seven-point Likert scale ranging from 1 (not healthy at all) to 7 (extremely healthy), it was determined that oatmeal with walnuts would be used as the healthy breakfast food ($M \pm SD = 6.19 \pm 0.91$), doughnuts would be used as the unhealthy breakfast food ($M = 1.19 \pm 0.40$), and a no food condition would be used as a control. Health stereotypes are frequently used to determine the weight-altering properties of foods (Oakes & Slotterback, 2005). Previous research shows it is these stereotypes that influence psychological reactions to consumption of foods, even if they are matched on the nutrition property which most directly leads to weight change, namely energy content (Hayes et al., 2011; Lattimore et al., 2010). Thus, we ensured the breakfasts were approximately matched on kilocalories (Table 1). Notably, the breakfasts did vary somewhat on other health properties (e.g., sugars, fiber content).

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