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Food cue exposure and body image satisfaction: The moderating role of BMI and dietary restraint

Anne-Kathrin Fett [a,*], Paul Lattimore [b], Anne Roefs [c], Nicole Geschwind [a], Anita Jansen [c]

[a] Department of Psychiatry and Neuropsychology, South Limburg Mental Health and Teaching Network, EURON, Maastricht University, P.O. Box 616, 6200 MD, Maastricht, The Netherlands
[b] School of Psychology, Liverpool John Moores University, Liverpool, UK
[c] Department of Clinical Psychological Science, Maastricht University, Maastricht, The Netherlands

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ABSTRACT

Effects of cue exposure to high and low-caloric food on body image satisfaction and the moderating role of body mass index (BMI) and restraint were investigated in 77 lean unrestrained, lean restrained and overweight restrained females. Body (BS) and weight satisfaction (WS) were assessed before and after the cue exposure. Lean restrained participants were significantly less satisfied with their weight after cue exposure to high-caloric foods in comparison to cue exposure to low-caloric foods, whereas no such effect was present in overweight restrained and lean unrestrained participants. Low-caloric food cues did not influence WS. Food cues had a nonsignificant trend effect on BS. Yet, only lean unrestrained participants experienced significantly more BS in response to food cue exposure.

Introduction

Body image satisfaction is often conceptualized as a discrepancy between current and ideal body shape (Garner, Garfinkel, & O'Shauhnessy, 1985), or the degree of negative feelings about body shape, body parts and weight (Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002). Dissatisfaction with body image is regarded as a risk and maintenance factor in eating pathologies, such as obesity, binge eating, anorexia and bulimia nervosa (Edman, Yeates, Aruguete, & DeBored, 2005; Stice & Shaw, 2002) and appears to be associated with attempts to restrain ones food intake. Restrained eaters have the intention of controlling their weight, but often fail and indulge in high-fat palatable foods that they normally do not allow themselves to eat (Herman & Polivy, 1980). According to cognitive behavioral models, low body image satisfaction reinforces dieting; this in turn is thought to foster the development of eating pathology (Stice & Shaw, 2002). Research revealed that body image satisfaction fluctuates (Melnyk, Cash, & Janda, 2004) and changes with context, especially in persons who are concerned about weight and shape (Tiggemann, 2001).

An important factor that causes fluctuations in body image satisfaction is food intake (Gardner, Espinoza, Urrutia, Morrell, & Gallegos, 1990; Lattimore, 2005; Lattimore et al., 2008; Vocks, Legenbauer, & Heil, 2007; Wardle & Foley, 1989). A possible explanation for this phenomenon is that a person's expectations of the consequences of eating (e.g., weight gain) elicit these changes (Bruch, 1973). Apart from one study (Pietrowsky, Straub, & Hachl, 2003), research shows that the consumption of food causes the desire to be thinner or reduced shape and weight satisfaction. This effect was found to vary with restraint and body mass index (BMI; kg/m^2). Vocks et al. (2007) showed that consumption of a high-caloric milkshake induced a decrease in body image satisfaction and that this reduction was positively correlated to restraint and worries about weight and shape. Wardle and Foley (1989) in contrast reported that food intake decreases body image satisfaction in unrestrained eaters, compared to restrained eaters (Wardle & Foley, 1989). Other studies, additionally, implicated BMI as a moderator of this effect (Gardner et al., 1990; Lattimore, 2005). Lattimore (2005) found that BMI, but not restraint, moderated the relation between food intake and body shape satisfaction. Lean participants rated their current body size larger and showed a larger discrepancy between current and ideal size when satiated than when hungry. Overweight participants were unaffected by the manipulation. Gardner et al. (1990) studied the effects of satiety and hunger in lean and overweight participants. Lean participants' body size ratings were little affected by food intake. Overweight participants in turn estimated their body size larger

* Corresponding author at: Maastricht University, Department of Psychiatry and Neuropsychology (Vijverdal), Faculty of Health, Medicine and Lifesciences, P.O. Box 616, 6200 MD, Maastricht, The Netherlands.
E-mail address: A.Fett@sp.unimaas.nl (A.-K. Fett).

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after having eaten. As findings are equivocal, it remains uncertain how exactly food induced changes in body image satisfaction are moderated by BMI and restraint.

Importantly, previous research often required participants to consume high-caloric food in full awareness of its calorific content (Lattimore et al., 2008). Hence, changes in body image satisfaction could be due to cognitions about the expected effects of food intake instead of the direct effects of eating. Regarding that possibility, Lattimore et al. (2008) suggested that food cue availability might play a role in triggering food related changes in body image satisfaction. They found that when visual cues of a high-caloric meal were available, eating led to a reduction in body image satisfaction in overweight, compared to lean females. When visual food cues were removed, eating a high-caloric meal resulted in reduced body image satisfaction in lean females, whereas overweight females tended to show an improved body image. So, the findings of food intake studies could be attributed to both; the expectations about the effects of food intake, or to the direct, physical effects of the food (e.g., ingestion, fullness, or stomach ache). A recent study, which was conducted to elucidate this interpretative problem of food intake studies has shown that high-caloric food *cues* alone bring about decreases in weight satisfaction and that this effect is more pronounced in individuals with higher dietary restraint (Geschwind, Roefs, Jansen, Lattimore, & Fett, 2008). However, how the effect of food cues is influenced by BMI has not been investigated.

The current study aimed to provide a more comprehensive test of whether cognitive effects of food cues can cause changes in body image satisfaction. We used a food cue exposure paradigm where individuals were not allowed to eat during the experimental procedure. To investigate how BMI and dietary restraint moderate the effects of food cues on body image satisfaction we examined lean (BMI < 25) unrestrained, lean restrained, and overweight (BMI > 25) restrained females. We expected that high-caloric food cues would cause decreased body image satisfaction in restrained individuals and that this effect would be more pronounced in those with a high BMI.

Method

Participants

To pre-select potential participants with a sufficient range of restraint scores a screening questionnaire was emailed to all female students of Liverpool John Moores University. Inclusion criteria were an age between 18 and 40 years, BMI $\geq 18 < 40$, no food allergies, no history of eating disorder or mental health problems, pregnancy, diabetes or using anti-depressant and/or weight loss medication. Seventy-seven female participants were included. A payment of £10 was given for participation. Participant characteristics are presented in Table 1.

Design

The effects of food cue exposure on body image satisfaction were assessed in a 2 (Exposure: high-caloric vs. low-caloric cues) $\times$ 3 (Group: lean unrestrained (LUR) vs. lean restrained (LR) vs. overweight restrained (OWR)) between-subjects design. The primary dependent variables were change scores (post- minus pre-exposure) in body and weight satisfaction (BS and WS, respectively).

Measures

An eligibility questionnaire was used to select participants. The time between screening and the experiment was at least 2 weeks. We adapted the questionnaire from a Dutch questionnaire, which has been used previously to screen student populations for dietary restraint and BMI. The questionnaire contained three questions from Herman and Polivy's Restraint Scale (1980) and has proven to be a good indicator of the overall restraint status. To get estimations of BMI the questionnaire contained questions asking for height and weight. Additional questions checked the inclusion criteria. The questions for restraint, BMI and the inclusion criteria were disguised among irrelevant questions to keep the purpose of the study concealed.

The original Restraint Scale is a 10-item scale that assesses the extent of intended restraint over food intake. It has excellent test–retest reliability ($r = .95$; Allison, 1992) and a good internal consistency ($\alpha = .88$). Restraint, as defined by the Restraint Scale is regarded as a trait like, stable construct (Polivy, Herman, & Howard, 1988). Though it is considered a trait-measure, we chose to have the Restraint Scale completed 1 week after the experiment to prevent possible carry-over effects of cue exposure.

Visual analogue scales (VAS, 0–100 mm, paper and pencil) are sensitive to subtle changes in emotion and cognition and have been proven to be reliable and valid under controlled conditions (De Boer et al., 2004; Stubbs et al., 2000). We used VAS to assess changes in body image satisfaction from pre- to post-exposure. Body image satisfaction was operationalized by two VAS on *weight satisfaction* (WS, "Right now, I feel not at all (0)/very (100) satisfied with my weight") and *body satisfaction* (BS, "Right now, I feel: not at all (0)/very (100) satisfied with my body"). The VAS were presented in a booklet that included irrelevant items to prevent participants from becoming aware of the true purpose of the study and to prevent possible memory effects from pre- to post-test.

Procedure

Prior to the study ethical approval was obtained from the University Ethics Committee. Based on the screening questionnaire participants were allocated to one of three groups (LUR, LR and

Table 1
Means and standard deviations for participant characteristics and measures of body and weight satisfaction by group and condition.

Variable	Lean unrestrained				Lean restrained				Overweight restrained			
	Low-cal ($n = 13$)		High-cal ($n = 13$)		Low-cal ($n = 14$)		High-cal ($n = 12$)		Low-cal ($n = 12$)		High-cal ($n = 13$)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age	21.6	2.8	20.8	2.2	22.5	3.4	20.3	2.0	22.7	5.5	23.5	6.5
BMI	19.9	1.5	21.1	1.8	21.8	1.5	22.0	1.4	31.3	3.6	29.0	2.7
Pre-BS	65.7	23.6	57.1	20.7	41.3	15.3	40.7	20.1	26.5	21.2	23.0	11.6
Pre-WS	73.6	19.3	56.5	23.8	38.7	16.6	36.1	16.6	21.8	18.0	21.3	10.8
Restraint	8.1	3.5	7.9	4.0	17.7	3.8	17.4	3.0	20.2	3.5	20.9	4.6
ΔBS	5.8	6.9	6.5	7.2	0.1	10.4	−1.0	9.7	−1.3	14.8	5.0	12.9
ΔWS	3.0	5.5	6.1	10.5	1.7	7.4	−5.0	7.1	0.7	6.7	5.1	11.0

Note: Δ = change score (post-minus pre-test rating).