



Research report

Implicit wanting and explicit liking are markers for trait binge eating. A susceptible phenotype for overeating[☆]

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ABSTRACT

The present study used a measure of trait binge eating (Binge Eating Scale; BES) to examine its association with behavioural markers of appetite and food reward. Non-obese female participants consumed a preload before freely selecting and consuming from a test meal. Subjective hunger and hedonic measures of explicit liking and implicit wanting for food were obtained. Food selection and intake of the test meal were measured. Findings were compared according to individual differences in trait binge eating. BES scores correlated with BMI, food intake and selection of high fat sweet foods in the test meal. Comparison of BES scores revealed that higher scores were associated with weaker suppression of hunger after the preload, greater explicit liking for food generally, and increased implicit wanting for high fat sweet food. Trait binge eating is functional at low levels and implicit wanting measured simultaneously with explicit liking may be useful markers for reward-driven overconsumption in this susceptible phenotype.

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Introduction

Overconsumption leading to a positive energy balance is a major cause of weight gain (Swinburn et al., 2009; Westerterp & Speakman, 2008). This loss of appetite control could be due to defects in homeostatic or hedonic systems of appetite control (Blundell & Finlayson, 2004). There is considerable current interest in identifying psychological and physiological markers that characterise people who are susceptible or resistant to weight gain. A useful psychological marker of weight gain could be one that detects the tendency to overconsume. This could then be examined in test situations of actual eating behaviour to challenge the regulatory system and throw light on the mechanisms of appetite that account for the susceptibility to gain weight. It could also be used to initiate a preventative strategy in people identified as at risk for weight gain – those characterised as ‘susceptible phenotypes’ (Blundell et al., 2010).

‘Binge’ or ‘compulsive’ eating is primarily defined by episodic excessive consumption of food with a sense of loss of control during the episode (DSM-IV-TR). Binge eating is a known risk factor

for weight gain and obesity (Blundell & Gillett, 2001; d’Amore et al., 2001). More recently binge eating disorder (BED) has been conceptualised as a subtype of obesity characterised by genetic markers associated with endogenous μ -opioid and dopamine D2 receptor densities thought to be involved in the regulation of hedonic ‘liking’ and ‘wanting’ for food (Davis et al., 2009). Along with the need to validate criteria for diagnosis of BED, Gormally, Black, Daston, and Rardin (1982) recognised that assessment of the severity of BED behaviours (e.g. eating until nauseous, eating in secret) and cognitions (e.g. sense of loss of control, feelings of guilt after eating) was important to enable clinicians to track changes in the course of the disorder and for researchers to investigate its causes. Therefore the Binge Eating Scale (Gormally et al., 1982) was originally developed to assess severity of binge eating characteristics in obese binge eaters.

However, less is known about how the psychometric properties of the Binge Eating Scale (‘trait binge eating’) apply to the eating behaviour of individuals who are not obese or who do not experience disordered eating. Research suggests that the behaviours and cognitions that underpin binge eating severity may also apply – at lower levels – to appetite control in healthy adults. Kampov-Polevoy, Alterman, Khalitov, and Garbutt (2006) assessed young adults with no history of psychiatric illness and found that degree of hedonic liking for sweetness was associated with use of sweet food to regulate emotion, and impaired feelings of control over consuming sweet food. Similarly, poor perceived control over eating combined with craving for sweet foods predicted binge

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episodes in women without binge eating disorder (Greeno, Wing, & Shiffman, 2000). Binge eating severity is also associated with performance on the food reinforcement paradigm – a measure of hedonic eating – which participants respond on a progressive ratio schedule for quantities of food. In a pooled sample of binge eaters, obese and lean controls (Nasser, Geliebter, & Pi-Sunyer, 2005) reported that Binge Eating Scale scores correlated with food reinforcement after hunger had been reduced by a preload.

Previous research suggests that trait behaviours and cognitions associated with binge eating severity (captured by the Binge Eating Scale) could detect susceptibility towards reward-driven overconsumption and thus serve as an early marker for weight gain in healthy non-obese women. Therefore the present study used an experimental design to examine non-obese women with low to moderate trait binge eating in association with food reward (explicit liking and implicit wanting), hunger, food selection and food intake assessments taken in the laboratory. It was predicted that women with low scores on trait binge eating would demonstrate better appetite control than those with moderate scores, when challenged with a preload followed by a simultaneous choice test meal.

Method

Participants

Thirty four non-obese, non-dieting females aged 18–40 years (age: 24.1 ± 1.0 years, BMI: 21.9 ± 0.5 kg/m²) were selected from an initial screening process to exclude those who were taking medication or reported a history of eating or psychological disorders. Participants were also required to be familiar with and like the study foods. Participants were recruited from the non-psychology staff and student population of the University of Leeds and included a mix of student and non-student women. Informed written consent was obtained prior to the study. Participation was voluntary and no payment was given. All research procedures were reviewed and approved by the Institute of Psychological Sciences Ethics Committee.

Design

The study conformed to a within-subjects randomised cross-over design with two conditions: savoury or sweet tasting preload followed by ad libitum test meal). Participants were given a fixed energy preload consisting of a sandwich and hot drink with either sweet or non-sweet taste followed 30 min later by a simultaneous choice test meal comprising a selection of foods that were sweet or non-sweet tasting, and high or low in fat content. The taste of the preload was manipulated in order to test the hypothesis that savoury sensory properties will suppress appetite, influence food choice, and reduce food intake relative to sweet. The preloads were identical in palatability, energy and macronutrient properties but had no differential effect on hunger [$F(1,33) = 1.41, p = 0.26$, partial $\eta^2 = .04$] or food intake at the test meal [$F(1,33) = 0.76, p = 0.38$, partial $\eta^2 = .03$].

Measures

Trait binge eating

Participants completed the Binge Eating Scale (BES, Gormally et al., 1982) on a separate day to their laboratory visits. The BES was developed to measure severity of binge eating – defined as the uncontrolled consumption of a large amount of food. Since its development, the BES has been used widely in research to measure binge eating severity and to determine whether potential research participants meet the inclusion criteria of binge eating. The BES consists of 16 items, 8 describing the behavioural manifestations of

binge eating (e.g. “I have the habit of bolting down my food, without really chewing it. When this happens I usually feel uncomfortably stuffed because I’ve eaten too much.” And “I have a strong habit of eating when I’m bored. Nothing seems to help me break the habit.”) and 8 describing feelings and cognitions associated with binge eating (e.g. “Almost all of the time I experience strong guilt or self-hate after I overeat.” And “It seems to me that most of my waking hours are pre-occupied by thoughts about eating or not eating. I feel like I’m constantly struggling to not eat.”). Scores on the 16 items are summed to produce a total score ranging from 0 to 46. Marcus, Wing, and Hopkins (1988) proposed cut-off scores for the BES in obese patients denoting mild (≤ 17), moderate (18–26) and severe (≥ 27) binge eating problems.

Test foods

A preload-test meal design was chosen as a sensitive assay as it enables the controlled examination of appetite variables in response to a fixed energy load that can also be related to freely selected food intake under ad libitum conditions. The preloads consisted of sandwiches with a hot drink. The sweet version consisted of strawberry jam on white bread served with chocolate milk. The non-sweet version was hummus on wholemeal bread served with vegetable soup. The preloads varied in taste (sweet or non-sweet) but volume (200 g), energy (265 kcal) and macronutrient content (50% CHO, 10% pro, 40% fat) were fixed. A taste panel prior to the main study confirmed there were no significant differences in pleasantness, intensity or texture of the preload combinations. Participants were given 10 min to consume all the preload.

The ad libitum test meal was a simultaneous choice format and comprised a selection of 8 foods that were chosen to be high (>50%) or low (<20%) fat and predominantly sweet or non-sweet in taste. The foods in each category were: crisps (chips) and cheese (high fat non-sweet); oat biscuits and garden salad (low fat non-sweet); flapjacks and milk chocolate (high fat sweet); and yoghurt coated crackers and fruit salad (low fat sweet). Participants ate alone and foods were served at the same time on separate 8 in. plates in quantities large enough to fill each plate. Instructions were given to eat as much or as little as they wanted from any of the food plates. Energy intake at the test meal (in kcal) was calculated by weighing each food item on its plate before and after consumption (to the nearest 0.1 g) and with reference to the manufacturer’s energy values.

Food reward: explicit liking and implicit wanting for food

Components of food reward were assessed by the Leeds Food Preference Questionnaire (LFPQ), which is a validated tool developed and extensively described elsewhere (Blundell et al., 2009; Finlayson, King, & Blundell, 2008). The computerised procedure included photographs of 20 food items categorised according to fat content (high or low) and taste (sweet or non-sweet). See Table 1 for a list of food images used in the LFPQ. To measure explicit liking, a single presentation of a food item was shown and participants had to rate “how pleasant would you find the taste of this food right now?” on a VAS (100-unit).

Table 1

Food images used in the Leeds Food Preference Questionnaire to assess liking and implicit wanting.

Non-sweet		Sweet	
High fat	Low fat	High fat	Low fat
Cheese	Herb biscuits	Chocolate	Fruit salad
Chips	Bread roll	Cream cake	Sweet biscuits
Fries	Pasta in sauce	Doughnut	Jelly babies
Olives	Boiled potatoes	Blueberry muffin	Marshmallows
Peanuts	Pilau rice	Cream pastry	Jello

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