



## Research report

Emotional eating and food intake after sadness and joy<sup>☆</sup>

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## ABSTRACT

Do people with a high score on a scale for eating in response to negative emotions also show high food intake in response to positive emotions? We studied these effects in 60 female students that were prescreened on the basis of extreme high or low scores on an emotional eating questionnaire. Using a between subject design we experimentally tested the difference in food intake following a mood induction designed to induce joy or sadness (the joy vs. sad mood condition). The high and low emotional eaters did not differ in their food intake, but emotional eating significantly moderated the relationship between mood condition and food intake. Whereas low emotional eaters ate similar amounts after the sad and after the joy mood condition, high emotional eaters ate significantly more after the sad mood condition than after the joy mood condition. A further finding was that a similar moderator effect for emotional eating was found for intake of sweet food but not for intake of salty food. These findings would suggest that eating in response to negative and to positive emotions refer to two different constructs.

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## Introduction

Eating in response to positive emotions has been reported to occur as frequently as eating in response negative emotions (Macht, Haupt, & Salewsky, 2004). However, do people with a high score on the scale for eating in response to negative emotions of the Dutch Eating Behavior Questionnaire (DEBQ) (DEBQ-E: DEBQ Emotional Eating Subscale) (Van Strien, Frijters, Bergers, & Defares, 1986) also show high food intake in response to positive emotions?

In a questionnaire study by Nolan, Halperin, and Geliebter (2010), responses on the DEBQ-E were compared with those on scales of the Emotional Appetite Questionnaire (EMAQ) (Geliebter & Aversa, 2003), a questionnaire that includes scales on eating in response to both negative and positive emotions and situations. The two EMAQ positive emotion scales were both significantly and inversely correlated with the DEBQ-E, suggesting that eating in response to negative and to positive emotions may refer to

different constructs. In contrast, in an experiment with a positive and a negative mood manipulation, positive or negative emotional eating status had no main effect or interaction effect with mood condition on food intake (Kenardy, Butler, Carter, & Moor, 2003). Positive and negative emotional eating status was obtained by comparing scores on the positive and negative emotional eating subscales of the Emotional Eating Scale II (EES II). The EES II is an extension of the EES (Arnou, Kenardy, & Agras, 1995) with questions on eating in response to positive emotions (Kenardy et al., 2003). Participants were designated as negative emotional eaters when they had higher scores on negative emotional eating and as positive emotional eaters when they had higher scores on positive emotional eating. A problem with this procedure is that it may have resulted in insufficient participants with extreme scores on the moderating variable (positive or negative emotional eating). According to McClelland and Judd (1993), to detect interaction effect it is crucial to have sufficient extreme observations on the moderating variable.

In the present study we experimentally tested the difference in food intake following a mood induction designed to induce joy or sadness (the joy vs. sad mood condition) in people with high vs. low scores on the DEBQ-E. Inspired by the results of Nolan et al. (2010), we hypothesized that people with high scores on the DEBQ-E would show higher food intake after the sad than after the joy mood induction. In contrast, low emotional eaters were

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expected to show the typical and predominant response to distress (Gold & Chrousos, 2002; Stone & Brownell, 1994) and eat less after the sad than after the joy mood induction. To enhance the chance of finding any interaction effect, which are easily missed in studies with a small number of subjects (Whisman & McClelland, 2005), we only used participants with scores from the extreme ends of the DEBQ emotional eating subscale. To control for the possible confounding effects of other eating styles (external and restrained eating) we controlled in all analysis for restrained eating (eating less than desired to maintain or loose body weight) and external eating (overeating resulting from a high susceptibility to tempting food cues), as measured by the other two DEBQ scales.

## Method

### Participants

Participants were recruited from a pool of students taking courses at the Universities of Valencia and Barcelona (Spain), who had completed in class the Spanish (Castellan) version of the emotional eating scale of the DEBQ (see measures) ( $n = 621$ ). Participants with raw emotional eating scores (EE) below or equal 1.8 or above 2.6 were invited by phone to participate in the study ( $EE > 2.6$ ;  $n = 177$ ;  $EE < 1.8$ ;  $n = 170$ ). Those who agreed to participate ( $n = 97$ ) filled out an additional questionnaire on exclusion criteria. Exclusion criteria included a score higher than 15 on the Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and a score higher than 20 on the EAT-26 (Garner, Olmsted, Bohr, & Garfinkel, 1982) ( $n = 7$ ). For the present study, also males ( $n = 18$ ) were excluded. Of the 72 females who participated, 11 had missing data on additional measures (to be filled out at home) and of one person the food intake data turned out to be invalid. So our final sample had 60 female participants, 31 high and 29 low emotional eaters. The mean and standard deviations (SDs) of age, body mass index ( $BMI = \text{weight (kg)}/\text{height (m}^2\text{)}$ ) and scores on emotional, external and restrained eating of the total sample and the subsamples may be found in Table 1. The study protocol was approved by the ethics board of the University of Valencia.

### Procedure

Participants were instructed to refrain from food intake for at least 2 h. Experimental sessions were scheduled at noon (1200 h) or in the afternoon (1700 h), which is well before lunch (which is in Spain between 1400 h and 1500 h) or dinner (in Spain: after 2100 h). Upon arrival participants filled out the BDI and the EAT-26 (Garner et al., 1982). Those with scores higher than 15 on the BDI ( $n = 5$ ) or with scores higher than 20 on the EAT-26 ( $n = 2$ ) were for ethical reasons not allowed to participate in the experiment.

Participants were told that they would take part in a mood induction procedure (MIP) involving a virtual reality experience,

where they had to make some exercises explained by a voice-over. Subsequently, the experimenter connected the software and left the participants, who were each of them individually tested, alone in a virtual reality room. Participants were assigned ad random to a joy or sad mood induction condition using the program Random Allocation Software. The mood induction was done with a virtual reality (VR–MIP) system developed specifically for that aim; the system was adapted for the sad induction and for the joy induction. The scene where the VR–MIP happen is an urban park. The movements around the park are made with a rumble pad (game controller). The efficacy of this VR–MIP is described in previous work (Baños et al., 2006). Specifically, the emotional environment of VR to induce joy or sadness includes several methods to induce mood such as excerpts of music and movie scenes (for their effectiveness, see: Eich & Metcalfe, 1989; Gross & Levenson, 1995; Lang, Bradley, & Cuthbert, 2001; Velten, 1968). The mood induction for joy used an excerpt of the movie “Singing in the Rain” (Donen, Kelly, & Freed, 1952) whereas for induction of sadness an excerpt of the movie “The Champ” was chosen (Gross & Levenson, 1995; Lovell & Zeffirelli, 1979). The VR–MIP was visualized through a projector, without stereoscopy.

After the mood induction, participants were asked to fill out the questions on mood for the second time. Subsequently they were taken to a separate room with a table with on individual plates (always in the same order) a choice of high and low energy-dense foods: apple (1 piece), banana (1 piece), salty peanuts (100 g), sweet peanuts (100 g), chips (50 g), jellies (100 g), cereal bar (4 pieces), chocolate (100 g), rice diet bar (4 pieces), rosquilla (4 pieces) (Valencian snack made of toast bread). Participants were invited to smell the food and to indicate on a questionnaire their desire to eat each of the individual food items (not of relevance to the present study). Subsequently they were left alone for 5 min after they had been invited to eat as much as they wanted. After this, participants were asked to fill out the questions on mood for the third time in addition to questions about the eating experience (not of relevance to the present study). They also received a set of further questionnaires to fill out at home. Further, for ethical reasons, the participants who had received the sadness mood induction were invited to receive the joy mood induction. After this, the participant was debriefed and thanked. The design of the study may be found in Fig. 1.

### Measures

Eating behavior was assessed with a validated Spanish translation of the *Dutch Eating Behavior Questionnaire* (DEBQ; Cebolla, Van Strien, Baños, Etchemendy, & Oliver, submitted for publication; Van Strien et al., 1986). The DEBQ has 33 items with 5-choice answers (ranging from “never” to “very often”): 13 on “Emotional eating”, 10 on “External eating” and 10 on “Restrained eating”. The three scales have a good construct and predictive validity (Van Strien, Herman, Anschutz, Engels, & De Weerth, 2012a; Van Strien, Herman, Engels, Larsen, & Van Leeuwe, 2007; Van Strien & van de Laar, 2008; Van Strien, van Herman, & Anschutz, 2012). Also the internal consistency is high. In the present study the Cronbach’s alphas were .96, .85 and .92 for emotional eating, external eating and restrained eating, respectively. The emotional eating scale was completed 1–3 months before the study. The other DEBQ scales were included in the questionnaire to be filled out at home.

Mood was measured upon arrival and at two more time points: immediately after the mood induction and immediately after the food intake. A visual analog scale (VAS; Gross & Levenson, 1995) was used for rating joy and sadness. Each emotion has to be rated on a 7-point scale ranging from 1 (not at all) to 7 (totally applicable).

**Table 1**  
Characteristics of total sample and the subsamples of low and high emotional eaters.

|                   | Total sample<br>$N = 60$ |     | Low emotional<br>eating $N = 29$ |     | High emotional<br>eating $N = 31$ |     |
|-------------------|--------------------------|-----|----------------------------------|-----|-----------------------------------|-----|
|                   | Mean                     | SD  | Mean                             | SD  | Mean                              | SD  |
| Age               | 23.9                     | 6.9 | 25.4                             | 9.2 | 22.6                              | 3.3 |
| BMI               | 22.1                     | 2.9 | 21.6                             | 3.0 | 22.5                              | 2.8 |
| Emotional eating  | 2.4                      | 0.9 | 1.5                              | 0.3 | 3.1                               | 0.5 |
| External eating   | 3.3                      | 0.6 | 2.9                              | 0.6 | 3.5                               | 0.4 |
| Restrained eating | 2.5                      | 0.9 | 2.2                              | 0.8 | 2.8                               | 0.8 |

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