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Assessing Yourself as an Emotional Eater: Mission Impossible?

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Objective: The extent to which individuals are emotional eaters has typically been assessed by people's self-reported desire to eat when they experience negative emotions. Elevated scores on these emotional eater scales have been associated with eating pathology and obesity. However, evidence that individuals scoring high on these scales truly increase their food intake during emotional encounters is inconclusive. The current studies tested whether emotional eater scales capture the proposed tendency to eat when feeling emotional. ***Design:*** In four experiments with different emotion induction procedures, female participants were randomly assigned to negative emotion or control conditions. In the control conditions positive or no emotions were induced. Next, food consumption was assessed by bogus taste tests. ***Main Outcome Measures:*** Emotional eater status, emotional experience, and actual consumption of different food types. ***Results:*** Individuals describing themselves as emotional eaters did not increase food intake during emotional encounters as compared to control conditions or individuals not judging themselves as emotional eaters. ***Conclusion:*** The results suggest that self-reported emotional eaters do not increase food intake during emotional encounters in the laboratory. Implications of these findings are discussed, including the idea that it may be complex to adequately assess one's own emotional eating behavior.

Keywords: emotional eating, food intake, health behavior, emotion

Since being overweight is a major risk factor for several life-threatening diseases, research has tried to identify the factors that make people vulnerable to engage in overeating. An important individual characteristic that has been linked to overeating is being an "emotional eater." Emotional eaters are defined as individuals with a tendency to overeat in response to negative emotions (Van Strien et al., 1986). The concept of emotional eating originates from work by Bruch (1964), who stated that emotional eaters are unable to differentiate sensations of hunger from emotional arousal. Ever since the concept of emotional eating has flourished in both science and society, and emotional eater scales have been developed to measure people's self reported desire to eat when they feel emotional (Arnow, Kenardy, & Agras, 1995; Masheb & Grilo, 2006; Van Strien et al., 1986). These scales are becoming increasingly associated with eating pathology and obesity (e.g., Stice, Presnell, & Spangler, 2002; Van Strien, Engels, Van Leeuwe, & Snoeck, 2005). Nevertheless, and despite the considerable support for this concept, it has not been thoroughly investigated whether individuals scoring high on these scales increase their food intake in response to negative emotions. Therefore, the present research aims to critically investigate whether these scales do indeed capture the proposed tendency to eat when feeling emotional.

Emotional Eater Scales and Actual Eating Behavior

The idea that self-reported emotional eaters increase their food intake during emotional encounters has often been based on the finding that these individuals portray elevated weight levels or fail in attempts at weight control (Blair, Lewis, & Booth, 1990; Van Strien et al., 1986, 2005). However, whether typically emotions are responsible for such weight issues remains questionable. Positive associations between weight and emotional eater scales may simply reflect overeating in response to all cues. A convincing argument for this explanation is the observation that emotional eater scales are strongly associated with "external eater" scales, the latter tapping the tendency to overeat in response to external food-related cues like the attractive sight of food (Rodin, 1981).

A more plausible approach in determining whether emotional eater scales incorporate actual tendencies of increased eating because of emotions is to test whether they are positively associated with food intake during emotional encounters. Although this notion has often been cited in the literature (e.g., Snoek, Van Strien, Janssens, & Engels, 2007; Van Strien, Schippers, & Cox, 1995), empirical evidence seems debatable. Most studies on emotional eating use retrospective measures of self-reported eating behavior (e.g., Gibsons & Desmond, 1999; Macht & Simons, 2000; Newman, O'Connor, & Conner, 2007), and there is considerable evidence that retrospective measures lead in general to a serious underreport of caloric intake (Stice, Fisher, & Lowe, 2004). For example, Klesges and colleagues (1992) show that one third of people in a national sample reported caloric intakes that would result in death by starvation. Such findings prevent the possibility of inferring strong conclusions on the role of self-reported emotional eating in actual food intake.

The scarce studies examining the role of self-reported emotional eating with more objective measures of food intake during emotional episodes revealed mixed results: Oliver, Wardle, and Gibson (2000) found that stressed emotional eaters ate more unhealthy snacks than unstressed and nonemotional eaters, while other studies reported a lack of impact of emotional eating on stress eating

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relationships (Conner, Fitter, & Fletcher, 1999; O'Connor & O'Connor, 2004). In two recent studies (Adriaanse, De Ridder, & Evers, in press; O'Connor, Jones, Conner, McMillan, & Ferguson, 2008) participants completed food diaries in combination with emotional experiences. To prevent recall-bias, participants daily registered all snacks they consumed. These studies also revealed mixed results. Adriaanse and colleagues demonstrated that emotional eater scales did not predict caloric intake in response to negative emotions, whereas O'Connor and associates observed stronger stress-snacking relationships for those scoring high on emotional eater scales.

Although real life settings have the advantage of ecological validity, there are also several limitations: They contain a wide variety of different emotional encounters with several emotional intensities in combination to both diverse internal states (e.g., degree of hunger) and diverse external states (e.g., food accessibility). Experimental settings can valuably add to existing studies as they include the standardization of both the emotional encounter and internal and external states. For this reason, the present studies entailed experimental settings to assess whether individuals identifying themselves as emotional eaters truly increase their food intake when being emotional.

Assessing Yourself as an Emotional Eater

The fact that emotional eater scales do not consistently predict food intake during emotional encounters triggers the question of how accurate people are in assessing themselves as emotional eaters. There is evidence suggesting that people are incompetent in assessing their emotional eating behavior. First, people are generally poor perceivers of their own behavior, an example being their tendency to underreport socially undesirable behaviors and traits. People do not only downplay their weight and caloric intake, they also underreport drug use and personality disturbances (Baer & Miller, 2002). Furthermore, retrospective emotional ratings are also highly sensitive for recall bias (Barrett, 1997) and include risk for under- or overestimation of emotions (Ready, Weinberger, & Jones, 2007). This implies that emotional eater scales potentially involve a triple recall bias: They require individuals to recall their negative emotions, their food intake, and the association between both.

A further indication that people seem inadequate in assessing their emotional eating behavior is that people are often unaware of the impact of hot states on their behavior (Nordgren, van der Plight, & van Harreveld, 2007): When people are in hot states (e.g., emotional) they appreciate the influence of past or future hot states, whereas people in neutral or cold states chronically underestimate the impact of these hot states (Van Boven & Loewenstein, 2003). This finding has important implications for interpreting emotional eater scales, as the assessment of one's emotional eating status may vary according to one's visceral state. In support of this, Bekker et al. (2004) showed that inducing negative affect substantially increases the level of self-reported emotional eating.

Together these findings imply that it would be prudent to provide a test of whether self-reported emotional eaters actually increase food intake when feeling emotional as compared to individuals not rating themselves as such. Accordingly, we conducted several controlled laboratory studies with the advantage of standardizing the emotional encounters along with internal cues like hunger and external cues like food availability. Based on the above-mentioned arguments we expected that people lack the abilities to assess the extent to which they eat in reply to emotions and consequently, that emotional eating scales are poor predictors of actual food intake.

Present Studies: Overview

Procedures

The present studies were presented as unrelated studies about emotions and tasting. To create standardized internal states of satiety, participants were informed upon scheduling an appointment that they would not be allowed to eat 2 hours before participation (Study 3) or had to wait for that time in the laboratory (Studies 2 and 4).[1]

After signing informed consents, emotions were induced by using: vignettes (Study 1), film excerpts (Study 2), recall (Study 3), or providing false feedback (Study 4). The results of these studies were merged into one study to ensure sufficient statistical power (Study 5). As manipulation checks, emotion experiences were assessed at baseline and after the emotion inductions by asking participants how strongly they experienced different emotions extracted from the Post Film Questionnaire, based on 7-point Likert scales ranging from 0 (not at all) to 6 (very much) (Rottenberg et al., 2007). Sadness, fear, anxiety, frustration, irritation, anger, confusion, nervousness, worry, and tenseness were combined into negative emotion compounds. Happiness, pleasure, joy, satisfaction, and cheerfulness were combined into positive emotion compounds.

After the emotion inductions, actual food intake was assessed by bogus taste tests. Bogus taste tests assess actual consumption of different foods, thereby omitting the bias of self-reports or retrospective memories of eating behavior (e.g., Guerrieri, Nederkoorn, & Jansen, 2007; Stice et al., 2004). Participants were provided with bowls containing different foods. Although emotional eater scales do not focus on the type of food intake, some research involved type rather than amount of food in relation to emotional eating. For example, it has been shown that women typically report to eat high caloric sweet foods in response to negative emotions (Dubé et al., 2005). Thus, it may be that type rather than amount of food is different for emotional versus nonemotional eaters. Consequently, the present studies entailed different food types, including both sweet and savory foods. All studies contained chocolate and crisps, but more food variety was ensured by also providing raisins (Study 1), crackers (Studies 1, 2, and 4), cookies (Study 3), or fruit (Studies 1 and 4). Participants were told that the taste test was a pilot study for a large study on eating behavior for which students' preferences for different food types were required. During the taste test, participants were provided with a questionnaire to ostensibly evaluate taste, structure, and perception of the foods, thereby ensuring that they ate at least something of every food type provided. Unbeknownst to the participants, each bowl was weighed in advance. Participants were told to taste as much as

[1] In Study 1 we did not standardize the internal state of satiety yet. Although not being allowed to eat 2 hours before the experiments was a reasonable attempt to standardize for satiety, we recognize that a longer period of abstinence (e.g., 6 hours) would have been superior.

they liked and given 10 minutes for the test.[2] During the taste test the experimenter left the room.

After 10 minutes, the experimenter returned and participants completed the Dutch Eating Behavior Questionnaire (Van Strien, 1986, 2005) to assess the extent to which individuals indentify themselves as emotional eaters (EE-DEBQ: 13 items), external eaters (10 items), and restrained eaters (10 items).[3] This measurement was obtained after the emotion inductions and taste tests to minimize awareness of the goal of our studies.

Across all studies funneled debriefing procedures (Bargh & Chartrand, 2000) were then used to assess if participants were aware of the true nature of the "unrelated studies." Unless specified, participants reported no suspicion. After participants had been fully debriefed and dismissed, the bowls with food were weighed. Participants received course credit for participation.

Data Analysis

The weight of food consumed was calculated based on the difference in weights of the bowl before and after the taste test. Each food type was summed for each participant to create an index of food intake in grams. Hierarchical regression analyses were then performed to test whether self-reported emotional eaters exhibited stronger increases in food intake when feeling emotional than self-reported nonemotional eaters. Food intake was regressed onto negative and positive emotional experience corrected for negative and positive emotion experience at baseline (Step 1); condition (neutral, negative, or positive) and the emotional eater scale (Step 2); and the interaction term between condition and emotional eater scale (Step 3). For the ease of interpretation, we also performed ANOVAs with median splits on the emotional eating scale to compare food consumption for the two separate groups. We will refer to high emotional eaters as emotional eaters and to low emotional eaters as nonemotional eaters. To control for external eating (eating in response to external food cues) and restrained eating (sustained restricted eating for the purpose of weight loss or maintenance), external and restrained eating were added to the equation in Step 2 in separate regression analyses, or as covariates in separate ANCOVAs. Across the studies the regression analyses provided similar results as the ANOVAs; because the latter are easier to interpret, we report solely the ANOVAs.[4] Because participants had to taste all the food types provided, the main measure of interest extracted from this taste test was amount of food consumption. To exclude the idea that the type of consumed food differed for emotional versus nonemotional eaters, the above-mentioned analyses were also performed for the different food types separately. Data from participants with a pathological body mass index (BMI; BMI <18 underweight and BMI >30 obese) were not included in the analyses.

Study 1: Vignette

In this first study, negative emotions were induced by letting all participants read vignettes describing an emotional situation. This vignette methodology was chosen to compare emotional versus nonemotional eaters within a standardized emotional encounter.

Method

Participants, Procedure, and Measures

Thirty female students participated in this study. Average age was 21.80 ($SD = 4.5$) and mean BMI was 21.74 ($SD = 2.40$).

For the induction of negative emotions, participants had to imagine they were the main character of a vignette. The vignette depicted a situation in which their mother unexpectedly died in a car accident (adapted from Keltner, Ellsworth, & Edwards, 1993). Next, the taste test was introduced.

Negative emotional experience ratings were combined into a negative emotion compound ($\alpha_{\text{before induction}} = .81$ vs. $\alpha_{\text{after}} = .91$) and positive experience ratings into a positive emotion compound ($\alpha_{\text{before induction}} = .91$ vs. $\alpha_{\text{after}} = .94$). For the assessment of food intake, participants rated chocolate, crisps, raisins, and crackers. Emotional ($\alpha = .92$), external ($\alpha = .84$), and restrained ($\alpha = .95$) eating behavior was assessed with the DEBQ.

Results and Discussion

Manipulation Check

Negative and positive emotional experience were subjected to a multivariate analysis of variance (MANOVA) with time (before vs. after vignette) as within subjects factor. The multivariate effect for time was significant, $F(2, 27) = 96.43$, $p = .0001$, $\eta^2 = .81$. Univariate analyses revealed that because of the vignette negative emotions increased ($M_{\text{before}} = .70$, $SD = .11$, $M_{\text{after}} = 2.21$, $SD = .24$), $F(1, 28) = 41.49$, $p = .0001$, $\eta^2 = .60$, and positive emotions decreased ($M_{\text{before}} = 3.94$, $SD = .20$, $M_{\text{after}} = .98$, $SD = .14$), $F(1, 28) = 153.12$, $p = .0001$, $\eta^2 = .85$.

Main analyses. Mean score for emotional eating was slightly above average ($M = 2.75$, $SD = .59$) according to the norms for female students (Van Strien, 2005), with a wide variety ranging from "very low" to "very high." BMI did not differ between emotional ($M = 21.64$) and nonemotional eaters ($M = 21.84$), $p = .825$. An ANOVA was performed with emotional eating status as independent variable and food consumption as dependent variable. The effect of emotional eating status was not significant, $p = .85$, indicating that emotional eaters consumed similar amounts of food

[2] Ten minutes was based on, for example, Lowe and Maycock (1988). Additionally, it was checked during the debriefing if participants had ample time for the tasting. All participants indicated that they had been finished several minutes before the experimenter returned.

[3] There are two other scales for assessing emotional eating: the Emotional Eating Scale (EES: Arnow et al., 1995) and the Emotional Overeating Questionnaire (Masheb & Grilo, 2006). The EE-DEBQ is highly similar to the EES as both scales ask for the desire to eat in response to several distinct emotions. The EE-DEBQ assesses desire in terms of frequency using scales ranging from 'never' to 'very often', whereas the EES assesses desire strength, ranging from 'no desire to eat' to 'an overwhelming urge to eat'. Although both measures might be good indicators of emotional eating, we argue that past behavioral frequency as assessed by the EE-DEBQ is more relevant when trying to predict actual eating behavior. The Emotional Overeating Questionnaire (Masheb & Grilo, 2006) was not considered because at the time of data collection, this scale had only been used in binge eating disordered patients.

[4] Results of the regression analyses are available on request from the first author.

($M = 47$, $SD = 9$) as nonemotional eaters ($M = 50$, $SD = 11$), and this was also the case for the food types separately, $p = .543$ (see Table 1 for the means). Including restrained and external-eating behavior as covariates did not moderate these findings: restrained ($ps > .59$) and external eating ($ps > .13$) were insignificant covariates.

In summary, Study 1 showed that while being emotional, individuals identifying themselves as emotional eaters did not consume more food than individuals not identifying themselves as such. In the remaining studies, we wanted to replicate this finding, with the inclusion of control conditions. To this end, neutral or positive emotion conditions were included as control conditions, or both. Moreover, during 2 hours before the taste test, participants were not allowed to eat to standardize their hunger state.

Study 2: Film Excerpts

Film excerpts can reliably induce emotions (e.g., Gross & Levenson, 1995). Negative versus positive emotions (negative vs. positive condition) were induced by using validated film excerpts.

Method

Participants, Procedure, and Measures

Sixty-three female psychology students participated in this study. Data from participants with food allergies ($n = 2$) or having ever been diagnosed with an eating disorder ($n = 1$) were not included in the analyses. The final sample consisted of 60 participants (average age 20.9 years) with a mean BMI of 21.49 ($SD = 2.39$). Participants were randomly assigned to one of the two conditions.

The experimenter randomly started one of four film excerpts. To induce negative emotions, participants watched either a chase scene from the film "Blair Witch Project" (Schaefer, Nils, Sanchez, & Philippot, 2005) or a scene from the film "City of Angels," in which a woman dies (Schaefer et al., 2005). To induce positive emotions, participants watched either a scene from the film "When Harry met Sally," in which a woman fakes an orgasm (Rottenberg et al., 2007), or a scene with playing puppies (e.g., Fredrickson, 2000). Next, the taste test was introduced.

Negative (before vs. after induction: $\alpha = .83$ vs. $\alpha = .90$) and positive emotion compounds (before vs. after: $\alpha = .88$ vs. $\alpha = .92$) were created. For the assessment of food intake, participants rated chocolate, crisps, fruit, and crackers. Emotional ($\alpha = .88$), external ($\alpha = .85$), and restrained ($\alpha = .93$) eating behavior was assessed with the DEBQ.

Results and Discussion

Manipulation check. Negative and positive emotions were subjected to a 2 (time: before vs. after emotion induction) × 2 (condition: negative vs. positive) multivariate analysis of covariance (MANCOVA) with the last factor between subjects and whether the film was seen before as covariate. The covariate was not significant, $p = .561$. The multivariate interaction effect was significant, $F(2, 55) = 33.74$, $p = .0001$, $\eta^2 = .55$. At univariate level this effect was significant for both negative, $F(1, 56) = 16.91$, $p = .0001$, $\eta^2 = .23$, and positive emotions, $F(1, 56) = 67.02$, $p = .0001$, $\eta^2 = .55$. Simple main effects revealed that the emotion ratings did not differ at baseline across conditions, $ps > .152$. In the negative condition negative emotions significantly increased ($M_{before} = 2.16$, $M_{after} = 2.60$, $p = .001$) whereas positive emotions significantly decreased ($M_{before} = 4.07$, $M_{after} = 3.13$, $p = .0001$). In the positive condition negative emotions significantly decreased ($M_{before} = 1.87$, $M_{after} = 1.59$, $p = .023$) whereas positive emotions significantly increased ($M_{before} = 4.35$, $M_{after} = 4.93$, $p = .0001$). Therefore, we conclude that the emotion induction was successful.

Main analyses. Mean score for emotional eating was average ($M = 2.67$, $SD = .50$) according to norms for female students, with a wide variety ranging from "very low" to "very high." BMI did not differ between emotional ($M = 21.25$) and nonemotional eaters ($M = 21.73$), $p = .442$. A 2 (emotional vs. nonemotional eater) × 2 (condition: negative vs. positive) ANOVA was per-

Table 1
Food Intake (Adjusted Means in Grams) for Each Food Type for Emotional and Nonemotional Eaters Broken Down by Condition

		Emotional eaters			Nonemotional eaters		
Study	Food type	Negative	Positive	Neutral	Negative	Positive	Neutral
1	Crisps	7 (2)			11 (3)		
	Chocolate	21 (5)			16 (6)		
	Crackers	8 (3)			14 (3)		
	Raisins	11 (4)			10 (4)		
2	Crisps	14 (2)	10 (2)		14 (2)	12 (2)	
	Chocolate	17 (5)	16 (5)		32 (5)	32 (5)	
	Crackers	7 (1)	5 (1)		7 (1)	7 (1)	
	Fruit	67 (10)	75 (10)		82 (10)	54 (9)	
3	Crisps	13 (3)		15 (3)	13 (4)		13 (3)
	Chocolate	12 (2)		12 (3)	14 (3)		7 (2)
	Cookies	15 (2)		19 (2)	19 (3)		17 (2)
4	Crisps	8 (3)	12 (3)	12 (2)	11 (3)	13 (3)	11 (3)
	Chocolate	19 (7)	21 (6)	26 (6)	20 (7)	22 (7)	22 (8)
	Crackers	5 (1)	5 (1)	5 (1)	5 (1)	7 (1)	6 (1)
	Fruit	52 (11)	65 (10)	59 (9)	65 (11)	70 (11)	70 (12)

Note. Standard errors in parentheses.

formed on the amount of food consumed. The interaction effect was not significant, $F < 1$, $p = .63$, indicating that across conditions emotional eaters consumed similar food amounts as nonemotional eaters (see Table 2). The main effect for emotional eating was not significant ($p = .84$).

The main effect for condition revealed that in the negative condition (M = 121, $SD = 9.18$) slightly more was consumed than in the positive condition ($M = 98$, $SD = 8.55$), $F(1, 56) = 3.31$, $p = .07$, $\eta^2 = .06$. This analysis for the four food types separately revealed that the interaction effect ($p = .14$) and both main effects (emotional eating: $p = .222$; condition: $p = .453$) were not significant (see Table 1). Including restrained and external eating behavior as covariates, did not moderate these findings: restrained ($ps > .78$) and external eating ($ps > .55$) were insignificant covariates.

In summary, self-reported emotional eaters did not consume more than self-reported nonemotional eaters, regardless of whether or not they experienced negative emotions. A limitation, however, is that there was no neutral control condition. Moreover, although film excerpts are commonly used to induce emotions, participants themselves are not the actor in the emotional encounter. Study 3 aimed to address these limitations.

Study 3: Recalling Sad Events

For the emotion induction a standardized, ecological valid recall procedure was used (Neumann & Waldstein, 2001).

Method

Participants, Procedure, and Measures

Forty female university students participated in this study. Data from participants who were obese (BMI >30; $n = 3$) were not included in analyses. The final sample consisted of 37 participants (average age 22.84 years) with a mean BMI of 22.99 ($SD = 2.97$).

In the negative condition, participants were instructed in Step 1 to recall and re-experience a recent, personally relevant sad event. It was stressed that it had to be an event that still evoked sadness when brought to mind. Participants were instructed to talk until they re-experienced the event again. In Step 2, they were instructed to think in silence for two more minutes about the event. In the neutral condition, the instructions were equal, but instead of emotional events, participants had to recall regular, daily events, like taking a walk. Next, the taste test was introduced.

Negative (before vs. after induction: $\alpha = .91$ vs. $\alpha = .91$) and positive (before vs. after: $\alpha = .90$ vs. $\alpha = .97$) emotion compounds were created. For the assessment of food intake, chocolate, crisps, and cookies were rated. Emotional ($\alpha = .89$), external ($\alpha = .78$), and restrained ($\alpha = .92$) eating behavior was assessed with the DEBQ.

Results and Discussion

Manipulation check. Negative and positive emotions were subjected to a 2 (time: before vs. after emotion induction) × 2 (condition: negative vs. neutral) MANOVA with the last factor between subjects. The multivariate interaction effect was significant, $F(2, 34) = 25.45$, $p = .0001$, $\eta^2 = .60$. At univariate level, this effect was significant for negative, $F(1, 35) = 22.96$, $p = .0001$, $\eta^2 = .40$, and positive emotions, $F(1, 35) = 42.93$, $p = .0001$, $\eta^2 = .55$. Simple main effects revealed that emotions did not differ at baseline across conditions, $ps > .468$. In the negative condition, negative emotions significantly increased ($M_{before} = 1.30$, $M_{after} = 2.50$, $p = .0001$) whereas positive emotions significantly decreased ($M_{before} = 3.59$, $M_{after} = 1.95$, $p = .0001$); the neutral condition did not evoke any changes in negative ($M_{before} = 1.04$, $M_{after} = .98$, $p = .770$) and positive emotion ratings ($M_{before} = 3.78$, $M_{after} = 3.74$, $p = .851$). Thus, the emotion induction was successful.

Main analyses. Mean score for emotional eating was slightly high ($M = 2.82$, $SD = .65$) according to norms for female students, with a wide variety ranging from "very low" to "very high." BMI did not differ between emotional ($M = 22.19$) and nonemotional eaters ($M = 23.75$), $p = .112$. A 2 (emotional vs. nonemotional eater) × 2 (negative vs. neutral condition) ANOVA was performed on the food consumption. The interaction effect was not significant, $F(1, 33) = .99$, $p = .33$, $\eta^2 = .03$, replicating the previous findings that emotional eaters did not eat more when being emotional than nonemotional eaters (see Table 2 for the means). Main effects for emotional eating ($p = .45$) and condition ($p = .98$) were not significant. This analysis for the three food types separately revealed similar results: The interaction effect ($p = .401$) and the main effects (emotional eating: $p = .850$; condition: $p = .547$) were not significant (see Table 1). Including restrained and external eating behavior as covariates, did not moderate these findings: restrained ($ps > .11$) and external eating ($ps > .63$) were insignificant covariates.

In summary, self-reported emotional eaters again did not consume larger food amounts than self-reported nonemotional eaters irrespective of being emotional or unemotional. The control condition was completely neutral, and participants were the actual actors of the emotional encounter. Study 4 aimed to replicate and extend these findings.

Table 2
Total Food Intake (Adjusted Means in Grams) in Studies 2–5 for Emotional and Nonemotional Eaters Broken Down by Condition

	Study 2: Condition		Study 3: Condition		Study 4: Condition			Study 5: Condition		
	Negative	Positive	Negative	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral
EE	119 (11)	103 (11)	41 (5)	47 (6)	92 (17)	98 (16)	107 (14)	72 (7)	102 (10)	71 (11)
NonEE	123 (15)	94 (13)	43 (6)	37 (6)	93 (14)	113 (13)	102 (16)	91 (7)	100 (9)	62 (12)

Note. EE = emotional eaters. Standard errors in parentheses.

Study 4: False Feedback

Participants were again the actor of the emotional encounter, but this time the emotional encounter was standardized. Moreover, in addition to a neutral (nonemotional) condition, negative *and* positive emotion conditions were included. Emotions were induced by giving false feedback on a performance task, an induction procedure that has been proven reliable in inducing the intended emotions (Evers et al., 2005).

Method

Participants, Procedure, and Measures

Sixty-one female psychology students participated in this study. Data from participants who were underweight (BMI <18; $n = 3$) and from one participant who in the course of debriefing reported a connection between emotion ratings and the taste test were not included in the analyses. The final sample consisted of 57 participants (average age 20.8 years) with a mean BMI of 21.80 ($SD = 2.46$). Participants were randomly assigned to one of the three conditions.

The study was presented as two unrelated studies about writing abilities and food taste. First, participants were instructed to write an essay. Participants received positive ratings and a remark stating that the essay was well written in the positive emotion condition; negative ratings and a remark stating that they were naive and had immature viewpoints in the negative emotion condition; and in the neutral condition participants were told to receive the evaluation at the end of the experiment (see Evers et al. [2005] for all details). Next, the taste test was introduced.

Negative (before vs. after induction: $\alpha = .87$ vs. $\alpha = .92$) and positive (before vs. after: $\alpha = .85$ vs. $\alpha = .91$) emotion compounds were created. Food intake was assessed by ratings of chocolate, crisps, fruit, and crackers. Emotional ($\alpha = .89$), external ($\alpha = .67$), and restrained ($\alpha = .94$) eating behavior was assessed with the DEBQ.

Results and Discussion

Manipulation check. Negative and positive emotions were subjected to a 2 (time: before vs. after emotion induction) × 3 (condition: negative vs. positive vs. neutral) MANOVA with the last factor between subjects. The multivariate interaction effect was significant, $F(4, 106) = 8.73$, $p = .0001$, $\eta^2 = .25$, for both negative, $F(2, 54) = 12.99$, $p = .0001$, $\eta^2 = .33$, and positive emotions, $F(2, 54) = 11.10$, $p = .0001$, $\eta^2 = .29$. Simple main effects revealed that emotions did not differ at baseline across conditions, ps $> .385$. In the negative condition negative emotions significantly increased ($M_{before} = .85$, $M_{after} = 1.37$, $p = .0001$) whereas positive emotions significantly decreased ($M_{before} = 3.39$, $M_{after} = 2.92$, $p = .003$); in the positive condition negative emotions significantly decreased ($M_{before} = .77$, $M_{after} = .58$, $p = .05$) whereas positive emotions significantly increased ($M_{before} = 3.8$, $M_{after} = 4.3$, $p = .001$); and the neutral condition did not evoke any changes in negative ($M_{before} = .61$, $M_{after} = .65$, $p = .71$) and positive emotions ($M_{before} = 3.53$, $M_{after} = 3.41$, $p = .44$). Thus, the emotion induction was successful in evoking the intended emotions.

Main analyses. Mean score for emotional eating was slightly high ($M = 2.74$, $SD = .59$) according to the norms, with a wide variety ranging from "very low" to "very high." BMI did not differ between emotional ($M = 21.92$) and nonemotional eaters ($M = 22.19$), $p = .720$. A 2 (emotional vs. nonemotional eater) × 3 (condition: negative vs. positive vs. neutral) ANOVA was performed on food consumption. The interaction effect was not significant, $F < 1$, $p = .77$, indicating that emotional eaters did not eat more when being emotional than nonemotional eaters (see Table 2). The main effects for emotional eating ($p = .76$) and condition ($p = .63$) were not significant. This analysis for the four food types separately revealed similar results: The interaction effect ($p = .994$) and both main effects (emotional eating: $p = .476$; condition: $p = .952$) were not significant (see Table 1). Including restrained and external eating behavior as covariates, did not moderate these findings: restrained (ps $> .71$) and external eating (ps $> .68$) were not significant.

In summary, results replicate the previous findings. Participants were the actual actors of a fully standardized emotional encounter, and positive emotional states were induced in addition to negative and neutral states. By also sampling positive emotional experience, we were able to exclude the alternative explanation that identifying oneself as an emotional eater may result in increased food intake because of increased positive feelings.

Study 5: Merged Studies

Although each study separately showed that self-reported emotional eating status did not affect food intake, the power of these studies was limited. Therefore, we merged all separate studies into one powerful study. Merging was assumed as possible on the grounds that (a) emotional experience should affect emotional eating regardless type or antecedent of emotion; (b) all studies attracted identical emotional ratings followed by taste tests; and (c) all studies incorporated negative emotion conditions along with positive and/or neutral control conditions. Given the sample size of 184, we had a power of more than .80 to detect a medium effect size ($r = .30$).

To verify the finding that emotional eater scales do not predict actual food intake during emotional encounters, we performed the same analyses as in the separate studies. However, as an alternative and additional test we regressed, vice versa, the emotional eater scales onto food intake among the participants in the negative emotion conditions, to assess if food intake was related to the emotional eater scales.

Results and Discussion

Manipulation check. The emotion ratings were subjected to a 2 (time: before vs. after induction) × 3 (condition: negative vs. positive vs. neutral) MANOVA. The interaction effect was significant, $F(4, 356) = 35.38$, $p = .0001$, $\eta^2 = .29$, for both negative, $F(2, 179) = 40.34$, $p = .0001$, $\eta^2 = .31$, and positive emotions, $F(2, 179) = 74.50$, $p = .0001$, $\eta^2 = .45$. Simple main effects analyses revealed that emotions did not differ at baseline across conditions, ps $> .25$. In the negative condition negative emotions significantly increased ($M_{before} = .98$, $M_{after} = 1.95$, $p = .0001$) whereas positive emotions significantly decreased ($M_{before} = 3.50$, $M_{after} = 1.90$, $p = .0001$); in the positive condition negative

emotions significantly decreased ($M_{before} = .82$, $M_{after} = .57$, $p = .033$) whereas positive emotions significantly increased ($M_{before} = 3.52$, $M_{after} = 4.06$, $p = .0001$); and the neutral condition did not evoke any changes in negative ($M_{before} = .82$, $M_{after} = .81$, $p = .953$) and positive emotion ratings ($M_{before} = 3.65$, $M_{after} = 3.57$, $p = .667$).

Main analyses. Mean score for emotional eating was slightly high ($M = 2.74$, $SD = 2.85$) according to the norms, with a wide variety ranging from "very low" to "very high." BMI did neither differ between emotional ($M = 21.71$) and nonemotional eaters ($M = 22.30$) nor between studies, ps $> .134$. A 2 (emotional vs. nonemotional eater) $\times$ 3 (condition: negative vs. positive vs. neutral) ANCOVA was performed on food consumption with study type as covariate. The covariate was significant, $p = .02$. The interaction effect was again not significant, $F(2, 183) = 1.60$, $p = .204$, $\eta^2 = .02$, replicating the finding of the separate studies that emotional eaters did not eat more when being emotional than nonemotional eaters (see Table 2). The main effect for emotional eating was not significant ($p = .73$); the main effect for condition was significant, $F(1, 183) = 5.69$, $p = .004$, $\eta^2 = .06$. Simple effects revealed that participants in the positive emotion condition consumed more ($M = 101$, $SD = 7$) than participants in the negative ($M = 81$, $SD = 8$) or neutral condition ($M = 67$, $SD = 5$), ps $< .02$. The difference between the negative and control condition was not significant, $p = .16$. Including restrained and external eating behavior as covariates, resulted in similar findings. Restrained ($p = .55$) and external eating ($p = .37$) were insignificant covariates.[5]

As study type was a significant covariate, we wanted to ensure the correctness of these results and gain additional information by using multilevel data analyses. Intraclass correlation was .35, indicating that 35% of the variance was between studies and 65% between subjects. Multi linear hierarchical modeling, with standardization of food intake within the studies, showed that study type was not responsible for the results mentioned above; the emotional eater scale did not predict food intake ($p = .522$).

To assess if food intake was related to the emotional eater scales, we regressed the emotional eater scales onto food intake among the participants in the negative emotion conditions. The amount of food consumed when feeling negative did not predict the score on the emotional eater scale ($\beta = .001$, $p = .273$). Thus, increased consumption in negative emotional encounters was not associated with elevated levels on the emotional eater scale.

General Discussion

Results from the merged studies replicate those of the separate studies and suggest that self-reported emotional eating status does not affect food intake, regardless of being in neutral or emotional conditions. These studies emerge as the first laboratory studies to critically test whether emotional eater scales capture the proposed tendency to eat when feeling emotional while standardizing for internal cues like hunger and external cues like food availability.

These null findings cannot be easily attributed to a lack of power, because all studies collectively had adequate power to detect a medium effect size. In addition, the wide range in food intake across the studies (12–238 gr) makes it unlikely that a restriction in range constrained our ability to detect effects. Likewise, the wide range in scores on the emotional eater scales makes it unlikely that a restriction in variety on these measures contribute to the nonsignificant findings (1.31–4.46 out of a possible range from 1–5). Finally, it is unlikely that food type rather than food amount was associated with emotional eater status, because the taste tests entailed different sweet and savory foods and emotional eater status did not predict consumption of any food type.

An important implication of these results is that it may be prudent to cautiously interpret findings from studies that used emotional eater scales, including those that have suggested that emotional eating in normal population is a risk factor for subsequent onset of eating pathology (Stice et al., 2002). If individuals have difficulties to adequately assess the antecedents of their food intake, then it may not be emotional eating that increases the risk for eating pathology and obesity. Alternatively, self-reported emotional eating may reflect beliefs about emotional eating rather than one's actual eating behavior when being emotional. Indeed, Wardle and colleagues (1992) demonstrated that adolescents scoring high on emotional eating felt fatter even though there was no association between their emotional eating scores and BMI. Additionally, they more often reported feeling upset about eating even though their food attitudes were less problematic than those of "restrained eaters." Other studies have also suggested that self-reported emotional eating may be an expression of beliefs about the frequency of eating when emotional (Lluch, Herbeth, Méjean, & Siest, 2000); the relation between emotions and eating (Bekker et al., 2004); or the comforting role of eating in case of negative emotions (Spoor, Bekker, Van Strien, & van Heck, 2007). There is also evidence that emotional eating is associated with emotional problems (Van Strien et al., 1995), which suggests that self-reported emotional eaters may experience more emotional distress but do not necessarily respond to distress by increasing food intake.

The current findings further demonstrate that it is in general complex to perceive one's own emotion-related eating behavior. This finding is consistent with findings from research in other emotion domains, indicating that people are biased in assessing physiological changes that accompany emotions (Edelmann & Baker, 2002; Levine, 1997), and in their recall of emotional experiences (Barrett, 1997; Ready et al., 2007). Thus, our findings indicate that retrospective reflections on emotions as instigators for behavior seem hardly valid for the prediction of actual behavior. Considering that people are additionally biased in assessing their actual food and caloric intake (Baer & Miller, 2002), self-reported emotional eating seems to include several sources for bias that prevent reliable prediction of actual food intake under emotional conditions.

The idea that it is demanding for individuals to assess their own emotional eating behavior is in line with Robinson and Clore's emotional accessibility model (Roginson & Clore, 2002). When

[5] Regressing food intake onto the negative and positive emotion ratings (Step 1), condition and the emotional eater scale (Step 2), and the interaction term between condition and the emotional eater scale (Step 3) resulted in similar findings. Only Step 1 was significant, $\Delta F(2, 181) = 8.94$, $p = .0001$, and a decrease in negative emotional experience predicted increased food intake ($\beta = 9.298$, $p = .036$); a borderline significant increase in positive emotional experience predicted increased food intake ($\beta = 5.044$, $p = .097$). None of the other predictors were significant (ps $> .42$).

people report on emotions that they are not currently experiencing, they shift to a semantic retrieval strategy. Such strategy entails that people access their generalized beliefs about their emotions rather than experiential emotion knowledge. Moreover, "the prototypical use of semantic emotion knowledge likely occurs when one reports on emotional traits" (Robinson & Clore, 2002, p. 199), which is the case regarding emotional eater scales, since people have to report on general tendencies to overeat in response to negative emotions. This suggests that people have shaped beliefs about themselves that become dissociated from their actual behavior in daily life.

The present research further revealed that positive emotional encounters evoked increased food intake. Although the relation between positive emotions and food intake has been largely ignored, it has been stated previously that positive emotions may affect eating behavior (Macht, Roth, & Ellgring, 2002). If individuals are inclined to eat in positive emotional encounters or situations that trigger decreased negative feelings, it would be prudent to include positive emotions in emotional eater scales; current scales incorporate solely negative emotions. Although such inclusion would not assure an improved sufficiency of individuals in assessing themselves as emotional eaters, such inclusion would anyhow cover a more adequate reflection of the phenomenon of emotional eating.

Limitations and Future Avenues

One limitation is that we only examined one emotional eater scale. Although this scale is widely used, inclusion of multiple emotional eater scales would have been desirable. However, as the existing emotional scales are highly similar, it does not seem likely that the type of scale is a causal factor for the finding that self-reported emotional eating status does not affect food intake.

Further, emotional eater scales tap the desire to eat when you feel certain emotions. In our studies, participants are exhibited to only one emotional encounter in the laboratory; which may not correlate to a more general desire to eat under emotional conditions in real life. However, if people identify themselves as emotional eaters, one could expect at least a trend in this group toward increased eating when feeling emotional, and across studies we used different emotional induction procedures to create a variety of emotional antecedents. Moreover, in a previous study participants completed daily food diaries during a week (Adriaanse et al., in press) and emotional experiences were registered for each consumption. This study also demonstrated that emotional eater scales did not predict caloric intake in response to negative emotions.

Although other studies exposed a lack of stress eating relationships for emotional eaters as well (e.g., Conner et al., 1999; O'Connor & O'Connor, 2004), O'Connor and colleagues (2008) found that individuals high on restraint, emotional and external eating, and who were obese, showed stronger associations between daily hassles and snacking. Importantly, consumption was registered during a wide time frame, and emotional eating was the greatest moderating variable of the stress snacking relationship. There are several explanations why their results may diverge from ours. The study was performed in a naturalistic setting; the population differed strongly as it entailed both men and women and obese people; and eating behavior and hassles were self-reported and registered at the end of each day, not during the day. Nevertheless, these diverging findings warrant further research as they show that across different settings or populations, emotional eater scales inconsistently predict food intake during emotional encounters.

Alternatively, rather than emotions per se, it may be important to consider the antecedent of the emotions, as it has been shown that restrained eaters (Heatherton et al., 1991) and emotional eaters (Wallis & Hetherington, 2004) are particularly vulnerable for increased eating in response to ego-threatening stressors. Only one of our studies explicitly entailed such an ego-threatening stressor, and emotional eaters did not show increased eating in response to this type of stressor. Therefore, an intriguing avenue for future research is to investigate if emotional eaters specifically show increased consumption in response to ego-threatening encounters, and if this is the case (see Wallis & Hetherington, 2004), whether people are more accurate in assessing themselves as emotional eaters in such specific encounters.

A further limitation is our use of healthy women only. We focused on women to reduce between-participants variance and because women generally assess themselves more strongly as emotional eaters than men do (e.g., Oliver et al., 2000). Moreover, we focused on participants with a nonpathological BMI only. Many emotional eating studies focus on obese persons, however, because typically obese individuals seem to excessively eat in response to negative emotional states (Van Strien, 2005). Nguyen-Rodriguez and colleagues (2008), however, showed that emotional eating is not an issue only for overweight and obese persons. Consequently, many studies have assessed emotional eating and its correlates in healthy samples as well (e.g., Newman et al., 2007; O'Connor & O'Connor, 2004; O'Connor et al., 2008). Nevertheless, it is worth investigating our research question additionally in obese individuals.

Regarding future avenues, it would be interesting to investigate if self-reports of emotional eating would be more accurate when assessed under "hot" states, because people predict the influence of past or future hot states more accurately when they are in a corresponding state (Van Boven & Loewenstein, 2003). Previous research already showed that self-reported emotional eating is moderated by the emotional states of individuals (Bekker et al., 2004), such that the induction of negative affect substantially increased the level of self-reported emotional eating within participants. It remains to be assessed if people are more accurate perceivers of their own emotional eater behavior when they fill in the emotional eater scales while being emotional.

Finally, because emotional eater scales do not seem to predict actual food intake during emotional encounters, an important concern for future research will be to determine the exact construct that is assessed by these scales. Although research showed that self-reported emotional eaters are more concerned about their eating behavior (e.g., Wardle et al., 1992), additional research is needed to understand what it means when people label themselves as emotional eaters.

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