



Research report

Moderation of distress-induced eating by emotional eating scores [☆]Tatjana van Strien ^{a,b,*}, C. Peter Herman ^c, Doeschka J. Anschutz ^a, Rutger C.M.E. Engels ^a, Carolina de Weerth ^a^a Behavioural Science Institute, Radboud University Nijmegen, The Netherlands^b Institute for Gender Studies, Radboud University Nijmegen, The Netherlands^c Department of Psychology, University of Toronto, Toronto, Ontario, Canada M5S 3G3

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ABSTRACT

Earlier studies assessing the possible moderator effect of self-reported emotional eating on the relation between stress and actual food intake have obtained mixed results. The null findings in some of these studies might be attributed to misclassification of participants due to the use of the median splits and/or insufficient participants with extreme scores. The objective of the two current studies was to test whether it is possible to predict distress-induced eating with a self-report emotional eating scale by using extreme scorers. In study 1 ($n = 45$) we used a between-subjects design and emotional eating was assessed after food intake during a negative or a neutral mood (induced by a movie). In study 2 ($n = 47$) we used a within-subjects design and emotional eating was assessed well before food intake, which occurred after a control or stress task (Trier Social Stress Task). The main outcome measure was actual food intake. In both studies self-reported emotional eating significantly moderated the relation between distress and food intake. As expected, low emotional eaters ate less during the sad movie or after stress than during the neutral movie or after the control task, whereas high emotional eaters ate more. No such moderator effect was found for emotional eating in the entire sample ($n = 124$) of study 1 using the median-split procedure or the full range of emotional eating scores. We conclude that it is possible to predict distress-induced food intake using self-reports of emotional eating provided that the participants have sufficiently extreme emotional eating scores.

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Introduction

Negative mood or distress is associated with both increased and decreased food intake (Greeno & Wing, 1994) with eating less being the typical and predominant response (Gold & Chrousos, 2002; Heatherton, Herman, & Polivy, 1991; Stone & Brownell, 1994). Negative mood or distress is normally associated with a hyperactive hypothalamic–pituitary–adrenal (HPA) axis, with physiological adaptations that are biologically designed to prepare the individual for a fight-or-flight response. These adaptations include inhibition of gastric motility and the release of sugar into the bloodstream, thereby suppressing feelings of hunger (Gold & Chrousos, 2002). However, so-called emotional eaters show an atypical response and eat the same amount or even more during distress (Oliver, Wardle, & Gibson, 2000; Van Strien & Ouwens, 2003).

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Emotional eating is thought to be a learned response (Bruch, 1973). It was found to emerge in adolescence in association with depressive feelings and inadequate parenting (e.g., Ouwens, Van Strien, & Van Leeuwe, 2009; Snoek, Engels, Janssens, & Van Strien, 2007) in interaction with a genetic vulnerability (Van Strien, Snoek, van der Zwaluw, & Engels, 2010; Van Strien, van der Zwaluw, & Engels, 2010). Emotional eating was found to occur in people with poor coping skills, poor interoceptive awareness, and high alexithymia (Larsen, Van Strien, Eisenga, & Engels, 2006; Ouwens et al., 2009; Spoor, Bekker, Van Strien, & Van Heck, 2007; Van Strien & Ouwens, 2007). Emotional eaters have been observed to be poor at recognizing whether they are hungry or satiated or suffer from some other discomfort, and to overeat in response to emotional agitation rather than in response to internal hunger cues. If emotional eating occurs frequently, it may ultimately lead to weight gain and obesity.

Studies assessing the possible moderator effect of self-reported emotional eating on the relation between stress and actual food intake have obtained mixed results. In a laboratory study on the effects of a distress manipulation (the anticipation of a public speaking task), Oliver et al. (2000) found a significant moderator effect of self-reported emotional eating on food choice and food

intake. Stressed emotional eaters ate more sweet, high-fat foods and a more energy-dense meal than did unstressed eaters and non-emotional eaters in the distress condition. Also Wallis and Hetherington (2004) found that emotional eating was associated with greater chocolate intake after an ego-threatening stressor relative to a control task. No such moderator effect for emotional eating on actual food intake, however, was found by Evers, de Ridder, and Adriaanse (2009) and Raspopow, Abizaid, Matheson, and Anisman (2010) ($n = 48$), or Wallis and Hetherington (2009) ($n = 26$).

Evers et al. (2009) used four different emotion-induction procedures in four different experiments (vignettes, $n = 30$; film excerpts, $n = 60$; recall, $n = 37$; false feedback, $n = 57$). Failing to find effects for emotional eating, Evers et al. (2009) argued that assessing oneself as an emotional eater is a “mission impossible” because it may be too difficult for individuals to assess their own emotion-related eating behavior.

Another possible explanation for the null results in some studies is misclassification of ‘low’ vs. ‘high’ emotional eaters due to (a) the use of a median split on the emotional-eating scale or (b) insufficient participants with extreme emotional eating scores or (c) both. Median splits are notoriously vulnerable to misclassification of research participants and spurious effects (Maxwell & Delaney, 1993).

Oliver et al. (2000) and Wallis and Hetherington (2004), who did find a significant moderator effect for emotional eating, also used a median-split procedure for their classification of participants into low and high emotional eaters, though, so a median split approach to participant classification is not necessarily fatal. Further, some studies with no significant moderator effect for emotional eating (additionally) used multiple regression analyses on the full range of scores. Another possible explanation for the null results in some studies may be that there had been insufficient participants with extreme scores on the moderating variable. According to McClelland and Judd (1993), pp. 382–383 “jointly extreme observations are crucial for detecting interactions.” In comparison with the ‘four-corners design,’ in which 25% of cases are allocated to each extreme, “a normal like distribution of the two variables has a relative efficiency of only .06 for detecting an interaction and requires nearly 17 times as many observations to have comparable efficiency” (Whisman & McClelland, 2005, p. 117). Interestingly, most studies with no moderator effect for emotional eating that (additionally) used multiple regression analyses only had a small number of subjects in their study.¹

In the following two studies we experimentally tested whether emotional eating moderates the effect of distress on eating by using only subjects with scores from the extreme ends of the DEBQ emotional eating subscale (Van Strien, 2011). In the first study, “an examination of general TV viewing behavior in daily life”, we analyzed data from a study (Anschutz, Van Strien, & Engels, 2008) of participants’ snack intake during exposure to a negative vs. a neutral film. In addition to analyses of extreme scores, we also conducted analyses on the entire sample using a median split classification and the full range of scores on the DEBQ emotional eating subscale. This study used a between-subjects design, and emotional eating was assessed after the experimental procedure. In the second study, an investigation of “health and physiology”,

we analyzed food intake following a laboratory control task or stress task (Trier Social Stress Test; TSST). In this study we used a within-subjects design in which all subjects performed the control task and the acute stress task on two consecutive days. A further difference was that emotional eating was assessed well before the experiment, by recruiting participants from a pool of female students taking introductory psychology or pedagogy courses who had completed the emotional eating scale and then inviting only those with scores at the extreme ends to participate in a study on ‘health and physiology’.

Both studies included only females, because there is a greater prevalence of stress-induced food intake in females (O’Connor et al., 2008). We hypothesized that low emotional eaters (i.e., people who score low on the DEBQ emotional eating subscale) would eat less in the negative mood or acute stress condition than in the neutral or control condition, whereas high emotional eaters (i.e., those who score high on the DEBQ emotional eating subscale) would eat more.

Study 1

Methods

Participants

The sample consisted of 124 female students at the Radboud University Nijmegen. They participated in exchange for money or course credits. We also performed analyses on those participants with scores at the extreme ends of the emotional eating subscale of the DEBQ (Van Strien, 2011), using scores below the 20th and above the 80th percentile in the Dutch norm group of females.² Corresponding cut-points are <1.82 and >3.25 .³ A total of 45 female students fulfilled these criteria, 23 low and 22 high emotional eaters. The mean and standard deviations (SD) 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.

Procedure

The study was presented as an examination of general TV viewing behavior in daily life. To increase ecological validity, we tested the subjects in a specially equipped, relaxing room at our lab, with a comfortable couch and a big TV screen. On the side table in front of the couch stood a glass of water, two pre-weighed bowls with crisps and M&Ms, and a glass of water. Participants were informed that they would watch TV for about 45 min and were invited to drink or eat whatever they liked while watching. To make sure that everyone would eat something, the experimenter asked them to eat at least one piece of one type of snack food.

Half of the participants viewed a sad movie, “Breaking the Waves,” and the other half viewed a neutral movie, “Travelling Birds.” After 14 and 33 min, the movies were interrupted by a 3.5-min commercial break, containing either neutral ads (e.g., promoting a car or a video camera) or ads with slim models or diet products (e.g., promoting shaving gel or low-fat cheese). For the present study, these ads were not of relevance but in the statistical

¹ This observation also provides a possible explanation for O’Connor, Jones, Conner, McMillan, and Ferguson’s (2008) finding a significant moderator effect for emotional eating in a regression analysis even though they used the entire continuum of emotional eating. O’Connor et al.’s diary study of the effects of daily hassles and eating style on food intake had 422 participants! This line of reasoning would also apply to the results of Conner, Fitter, and Fletcher (1999), who found no moderator effect for emotional eating in a highly similar study with only 60 participants. O’Connor and O’Connor (2004), used 155 participants in their diary study and a median split classification for low vs. high emotional eating but their results were in the predicted direction (For the present article we restrict ourselves to studies that assessed the moderation of distress-induced eating by emotional eating scores).

² Preliminary results with other cut-off points of the first (of three) analyses of Study 1 have been reported in a Letter to the Editor of *Health Psychology* (Van Strien, 2010).

³ In their fMRI study, Bohon, Stice, and Spoor (2009) used 1.6 and 3.6 as qualifying scores for low vs. high DEBQ emotional eaters. Some other researchers prefer the median split $\pm 1SD$. However with a median of $2.68 \pm .78$ for emotional eating in Study 1, the cut-off score for low emotional eaters would have been exactly the same as our present cut-off point, and the score for high emotional eaters would have been even higher than the score that we used. So we preferred to use cut-off scores derived from the DCOTAN (Dutch Committee of Test and Testing) representative Dutch norm sample.

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