



Emotional eating as a mediator between depression and weight gain



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ABSTRACT

Depression is often associated with weight gain but underlying mechanisms are unclear. This study assessed whether three psychological eating styles (emotional eating, external eating and restrained eating) act as mediators between depression and weight gain. We used structural equation modelling to test the hypothesized mediation models in a sample of 298 fathers and 294 mothers by assessing self-reported eating styles (Dutch Eating Behavior Questionnaire), depressive feelings (Depressive Mood List) and body mass index (BMI) at baseline and BMI after five years. In the model with emotional eating we also assessed the moderation effect of 5-HTTLPR genotype in a sub-sample of 520 Caucasians. All analyses were performed separately for the two sexes. Although the overall effect of depression on weight gain was statistically non-significant in both sexes, there was a causal chain between depression, emotional eating and weight gain in the mothers. Depressive symptoms were related to higher emotional eating and emotional eating predicted greater increases in BMI independently of depression. Moreover, the indirect effect (via emotional eating) of depression on BMI change was significant (Beta = 0.18, P = 0.026). This mediation effect was found to be independent of 5-HTTLPR genotype. No such mediation effect was found for the fathers. Further, external eating and restrained eating did not act as mediators between depression and weight gain in either sex. The finding that emotional eating acted as mediator between depression and weight gain in the mothers suggests that obesity interventions should take emotional eating into account.

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1. Introduction

Meta-analyses of longitudinal studies suggest that depression and obesity are reciprocally linked, with obesity increasing the risk for depression (Luppino et al., 2010) and depression predicting later weight gain and obesity (Blaine, 2008; Luppino et al., 2010). Depression and obesity are common conditions with severe

medical consequences (Alonso et al., 2004; Berghöfer et al., 2008). Because numbers of obesity and depression are still rising (Mathers & Loncar, 2006) there is an urgent need to reduce the incidence of obesity and depression. The exploration of possible underlying mechanisms in the depression-obesity link may provide the key. Here we focus on mechanisms underlying the impact of depressive feelings on subsequent weight gain. Various physiological, psychological and behavioural mechanisms may be involved and in this study three different psychological eating styles are tested as underlying mechanisms.

The first possible mediator of the depression-weight gain link is emotional eating. Emotional eating is eating in response to negative emotions such as depressive feelings. Feeling depressed is normally associated with loss of appetite and subsequent weight loss, however, a depression subtype exists, which is characterized by the a-

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typical features of increased appetite (American Psychiatric Association, 2013), elevated risk of obesity (Levitan et al., 2012), and subsequent weight gain (Lasserre et al., 2014). Emotional eating may be a marker of this atypical depression subtype (Kräuchi, Reich, & Wirz-Justice, 1997; Van Strien, van der Zwaluw, & Engels, 2010), because it shares with this depression subtype the atypical feature of increased appetite in response to distress.¹ There is indeed accumulating evidence from cross-sectional research that the link between atypical depression and obesity is mediated by emotional eating in both sexes (Goldschmidt et al., 2014; Konttinen, Männistö, Sarlio-Lähteenkorva, Silventoinen, & Haukka, 2010), and in women (Clum, Rice, Broussard, Johnson, & Webber, 2014). Whether emotional eating also mediates the link between depression and future weight gain has to the best of our knowledge not yet been investigated. The present longitudinal study is therefore the first to investigate whether emotional eating is a possible mediator in the link between depressive feelings and future weight gain.

External eating would also be a good candidate for mediating the depressive feelings-weight gain link. External eating is eating in response to food stimuli such as sight, smell and taste of attractive food regardless of internal feelings of hunger and satiety. Like emotional eating, external eating has been proposed as a marker for atypical depression (Kräuchi et al., 1997). According to the escape from self-awareness theory of Heatherton and Baumeister (1991), some individuals may narrow their level of attention to the current and immediate stimulus environment (accessible food cues such as snacks) in order to shift the attention away from negative affect. Earlier, a positive relation between depression and external eating was found (Ouwens, van Strien, & van Leeuwe, 2009), whilst external eating in its turn, was found to be associated with increases in body weight (Song, Lee, & Sung, 2014). We are not aware of any published study that tested the possible mediation effect of external eating in the link between depression and future weight. Hence, the current study is the first one to investigate this possibility.

The third possible mediator in the depression-weight gain link is restrained eating. Restrained eating is eating less than desired to maintain or lose body weight. In a classic study by Polivy and Herman (1976), unrestrained eaters showed the typical response to depression, which is weight loss. In contrast, restrained eaters reacted to depression with the atypical response of weight gain, a finding that was explained by Herman and Polivy (1980) in terms of 'emotional turmoil' disrupting the dietary restraint of the restrained eaters (disinhibition effect; see Wallis and Hetherington (2004) for more possible explanations). Mixed results are found with regard to restrained eating and body weight. Restrained eating was found to be associated with increases in body weight three years later in women (Van Strien, Herman, & Verheijden, 2014), but it was not associated with weight gain four years later in patients with Type 2 diabetes (Van Strien et al., 2007). Restrained eating did not mediate the link between depression and body mass index (Clum et al., 2014). However, this was a cross-sectional study including women only. Because of this lack of clarity, it is of interest to investigate the possible mediation effect of restrained eating in a prospective study that includes both men and women.

This study aims at exploring the possible mediation effects of the three eating styles (emotional eating, external eating, and

restrained eating) on the link between baseline depression and future weight gain in a sample of Dutch adults by using a longitudinal five-year follow-up design. Because of sex-differences in depression, emotional eating and restrained eating, and because we were interested in finding out whether there would be sex differences in any mediation effects, all analyses were performed separately for the fathers and the mothers.

A potential mediation effect of emotional eating on the association between depressive feelings and future weight gain may be related to genetic predisposition. One important candidate is the serotonin transporter-linked polymorphic region (5-HTTLPR). We have previously shown that adolescents with depressive feelings showed more increase in emotional eating if they carried the 5-HTTLPR genotype that results in lower serotonin activity (s-allele) (Van Strien, van der Zwaluw, et al., 2010). While this increase was found in both sexes in the younger adolescents (mean age: 13 years), this increase was only found in the girls among the older adolescents (mean age: 15 years) (see the discussion section of Van Strien, van der Zwaluw, et al. (2010) for possible explanations of this finding). Additionally, the 5-HTTLPR is well-known to be associated with depression (Caspi et al., 2003; Karg, Burmeister, Shedden, & Sen, 2011) specifically atypical depression (Willeit et al., 2003). There is also evidence for an association between the 5-HTTLPR s-allele and increased body weight (Sookoian, Gianotti, Gemma, Burgueño, & Pirola, 2008), although this association may be dependent on the individual's affective state (Markus & Capello, 2012). Because the mediation effect might be stronger for carriers of the 5-HTTLPR s-allele than for no carriers of the s-allele, we were additionally interested in whether the 5-HTTLPR genotype moderated the potential mediation effect of emotional eating on the depressive feelings-weight gain link.

2. Method

2.1. Participants and procedure

The sample consisted of Dutch parents who participated in the longitudinal Family and Health study (Van der Vorst, Engels, Meeus, Deković, & Van Leeuwe, 2005; Van Strien, van der Zwaluw, et al., 2010). Both at baseline (T1) and at 5-year follow-up (T2), they were visited by trained interviewers who made sure that extensive questionnaires were filled out separately and individually. When all family members had completed the questionnaires, the family received a voucher of 30 Euros. When excluding the two participants with at T1 (2002/2003) underweight [body mass index (BMI, kg/m²) <=18], 592 participants (298 fathers and 294 mothers) had complete data, including their self-reported body weight at T2 (2007/2008). At T1 the mean age was 45.04 (SD = 3.9) and the mean BMI was 24.99 (SD = 3.7); 43.2% of the participants had a BMI ≥ 25 and 7.9% had a BMI ≥ 30. At T2 (after five years) the mean BMI was 25.26 (SD = 3.4). With 298 of the 428 parents (69%) participating after 5 years the attrition was acceptable.

The possible role of the serotonin transporter (5-HTT) gene (SLC6A4) was studied in a subgroup of 520 Caucasian participants (259 fathers and 261 mothers) whose DNA samples had been collected by means of saliva after they had given written informed consent to be genotyped (see further Van Strien, van der Zwaluw, et al., 2010). For this specific analysis we excluded participants with other ethnicities (n = 30) to control for allelic variance distribution to population stratification across racial groups.

The study protocol was approved by the Central Committee on Research Involving Human Subjects in the Netherlands.

¹ The evolutionary adaptive and biologically 'natural' response to distress is loss of appetite and weight loss because distress is associated with physiological reactions designed to prepare the individual for a fight-or-flight reaction: inhibition of gastric motility and promotion of the release of sugar to the bloodstream, thereby suppressing feelings of hunger (Gold & Chrousos, 2002).

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