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The mediation effect of emotional eating between depression and body mass index in the two European countries Denmark and Spain

Tatjana van Strien [a, b, *], Laura Winkens [a], Madeleine Broman Toft [d], Susanne Pedersen [d], Ingeborg Brouwer [a], Marjolein Visser [a, c], Liisa Lähteenmäki [d]

[a] Vrije Universiteit Amsterdam, Faculty of Earth and Life Sciences, Department of Health Sciences and the EMGO Institute for Health and Care Research, Amsterdam, The Netherlands
[b] Radboud University, Behavioural Science Institute, Nijmegen, The Netherlands
[c] VU University Medical Center, Internal Medicine, Nutrition and Dietetics, Amsterdam, The Netherlands
[d] Aarhus University, MAPP Centre, Department of Management, Aarhus BSS, Aarhus, Denmark

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ABSTRACT

In two European countries with a different prevalence of depression, namely Denmark (high) and Spain (low), we assessed whether the mediation effect of emotional eating between depression and Body Mass Index (BMI) as found in earlier studies can be replicated and whether this mediation effect is contingent on 1) change in appetite and 2) gender. Mediation and moderated mediation was assessed with Hayes' PROCESS macro in SPSS. Emotional eating (DEBQ: Dutch Eating Behavior Questionnaire), depressive symptoms (CES-D: Center for Epidemiologic Studies Depression Scale), change in appetite, weight and height were self-reported. In both countries, emotional eating acted as a mediator between depression and BMI (Denmark: B = 0.03 (SE = 0.01), 95% CI, [0.03, 0.05]; Spain: B = 0.03 (SE = 0.01), 95% CI, [0.02, 0.04]). In Denmark this mediation effect was stronger for participants with increased appetite and for females than for participants with decreases/no change in appetite and for males (more appetite: B = 0.08, (SE = 0.03), [0.03, 0.15]; decreased appetite/no change in appetite: B = 0.03 (SE = 0.01), [0.02, 0.04]); females: B = 0.05 (SE = 0.01), [0.03, 0.07]; males: B = 0.01 (SE = 0.01), [0.004, 0.04]. This supports depression with atypical features as an underlying mechanism in the mediation effect of emotional eating. In Spain there was no support for depression with atypical features as underlying mechanism because the mediation effect was neither moderated by change in appetite nor by gender. Instead, *post-hoc* analyses suggested 'stress of unemployment' as possible explanatory factor of the mediation effect, with stronger mediation effects for unemployed than for employed people (unemployed: B = 0.05 (SE = 0.01), [0.03, 0.07]; employed B = 0.02 (SE = 0.01), [0.01, 0.04]). The mediating effect of emotional eating between depressive symptoms and body mass index in both countries suggests that obesity interventions should take emotional eating into account.

1. Introduction

Meta-analyses of longitudinal studies suggest that depression and obesity are reciprocally linked, with obesity predicting later depression (Luppino et al., 2010), and depression increasing the risk for later weight gain and obesity (Blaine, 2008; Luppino et al., 2010). Depression is frequently associated with loss of appetite and subsequent weight loss, however, a depression subtype exists, which is characterized by the atypical features of increased appetite (DSM-5; American Psychiatric Association, 2013), elevated risk of obesity (Levitan et al., 2012), and subsequent weight gain (Lasserre et al., 2014). Emotional eating -an 'obese' eating style of eating in response to negative emotions such as depressive feelings (van Strien, Donker, & Ouwens, 2016)- may be a marker of this depression subtype with atypical features (Kräuchi, Reich, & Wirz-Justice, 1997; van Strien, van der Zwaluw, & Engels, 2010, p. 1040). The link between depression and obesity may therefore be mediated by emotional eating, for which there is indeed accumulating evidence from cross-sectional (Clum, Rice, Broussard, Johnson, &

* Corresponding author. Vrije Universiteit Amsterdam, Faculty of Earth and Life Sciences, Department of Health Sciences and the EMGO Institute for Health and Care Research, Amsterdam, The Netherlands.
E-mail address: t.vanstrien@psych.ru.nl (T. van Strien).

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Webber, 2014; Goldschmidt et al., 2014; Konttinen, Männistö, Sarlio-Lähteenkorva, Silventoinen, & Haukkala, 2010) and longitudinal research (van Strien, Konttinen, Homberg, Engels, & Winkens, 2016).

In the present study, we want to assess whether the mediation effect of emotional eating between depression and obesity could be replicated in two European countries with a different prevalence of depression, namely Denmark and Spain. Denmark is a northern European country with relatively high mental distress, e.g. scoring higher in Hopkins Symptom Checklist than US respondents (Derogatis, 1994). In a study by Olsen, Mortensen, and Bech (2004), the estimated 4 week prevalence of major depression was in Denmark 3.3% (male 3.0%; female 3.6%) the 12-month prevalence for Denmark is not known, but this figure is 6.9% for Europe (Wittchen et al., 2011). Spain is a southern European country with lower rates of depression than the rest of Europe (Gabilondo, Vilagut, Pinto-Meza, Haro, & Alonso, 2012; Gabilondo et al., 2010). In a study by Ayuso-Mateos et al. (2001), the 4-week prevalence of depression in Spain was 1.8% (male 2.0%, female 1.8%). The 12-month prevalence in Spain is 4.0% (Gabilondo et al., 2010)[1].

The mediation effect of emotional eating between depression and obesity may be contingent and hence moderated, in that "this mediation effect may operate differently for different people or in different contexts or circumstances" (Hayes, 2013, p.327). Therefore, we were also interested whether the mediation effect in the two countries is contingent on 1) change in appetite and 2) gender.

The mediation effect of emotional eating may be contingent on change in appetite, because change in appetite was found to be the key symptom (together with body weight) for distinguishing the two depression subtypes (decreased in typical and increased in atypical) in a large sample of persons with a clinical diagnosis of depression (Netherlands Study of Depression and Anxiety; NESDA) (Lamers et al., 2010; Milaneschi et al., 2016)[2]. The 4 DSM-5 criteria of atypical depression-of which at least 2 of the symptoms are required-are 1) increased appetite or significant weight gain, 2) hypersomnia, 3) leaden paralysis, and 4) a long standing pattern of interpersonal rejection sensitivity (DSM-5; American Psychiatric Association, 2013). The DSM-5 symptoms are based on clinical observations. However, as pointed out by Milaneschi et al., (2016): "not all DSM criteria have been justified by research, and recent studies based on data driven techniques highlighted the importance of vegetative symptoms (particularly appetite and weight) in distinguishing subtypes (decreased in typical and increased in atypical)" (p. 516). Earlier it was found that atypical depression could be well defined solely by the reversed vegetative symptoms; oversleeping and overeating (Benazzi, 2002), whilst in a more recent study the validity of the association of oversleeping with overeating in atypical depression was challenged (Ohayon & Roberts, 2015)[3]. Lasserre et al. (2014) applied in their study on 'depression with atypical features' only the appetite or weight gain criterion for designating atypical depression.

In line with increased appetite as symptom of atypical depression, it was found that patients with atypical depression, compared to those with typical depression, consumed more energy-dense low quality foods such as sweets or snacks, possibly because of their increased appetite (Rahe et al., 2015), and that emotional eating may be a possible explanatory factor in this (Konttinen et al., 2010). There is also evidence that depression is associated with more emotional eating (e.g. Konttinen et al., 2010; Ouwens, van Strien, & van Leeuwe, 2009) and that emotional eating is associated with overweight and prospective weight gain (Koenders & van Strien, 2011; Sung, Lee, & Song, 2009; van Strien, Herman, & Verheijden, 2009; van Strien, Herman, & Verheijden, 2012). There is, however, no evidence on whether the mediation effect of emotional eating between depression and overweight is contingent on the key vegetative marker of typical versus atypical depression: decrease versus increase in appetite in the past two weeks. This is of interest because a stronger mediation effect for those with increased compared to those with decreased or no change in appetite would point at depression with atypical features as possible explanatory factor of the mediation effect of emotional eating between depression and obesity So with the aim of filling this knowledge gap this moderated mediation effect was assessed (see Fig. 1B). Because of the female preponderance in atypical depression and emotional eating (Novick et al., 2005; van Strien et al., 2010), we also assessed whether the mediation effect was moderated by gender (see Fig. 1C).

The mediation and two moderation mediation effects will be assessed with segregated analyses (separate analyses) for Denmark and Spain, because of evidence of fundamental differences in response tendencies (acquiescence and socially desirable responding) between collectivistic (Spain) and individualistic cultures (Denmark) (https://geert-hofstede.com/spain.html; Johnson, Kulesa, Cho, & Shavitt, 2005); Results between the two countries on the level of individual questions or scales cannot be compared, because this would be similar to comparing apples with oranges (Stegmueller, 2011).

We have the following hypotheses. We expect that emotional eating will act as mediator between depression and Body Mass Index (BMI) in both Denmark and in Spain. For reason of the relative higher rate of depression (and perhaps also depression with atypical features) in Denmark, we expect that depression with atypical features is the underlying explanatory factor of this mediation effect for Denmark (but leave this an open empirical question for Spain). Hence we expect for Denmark that the mediating effect of emotional eating is moderated by a) change in appetite: the mediating effect is expected to be stronger in people with increased appetite versus those with a decreased appetite or no change in appetite, and b) gender: the mediating effect is expected to be stronger in females than in males.

2. Method

2.1. Participants and procedure

The data collection in Denmark and Spain was carried out with Qualtrics – a panel service agency - in June and July 2014. The panel service agency invited a randomly selected representative sample of their panelists to fill out an online questionnaire. Qualtrics follows the ESOMAR principles in their data collection activities and panel management, so that respondents have to confirm their willingness to take part in the study and their data will be handled with anonymity and confidentiality in accordance with the provisions of the Declaration of Helsinki.

BMI was calculated based on self-reported height and weight. Before calculating BMI, body weight and body height were inspected for outliers, defined as >3 SD above the mean. One Danish male had an outlying value on body height and was deleted from the dataset. Self-reported height and weight are considered

[1] In this context it should be noted that the suicide rate, of which depression is a major cause, is in Spain among the lowest in Europe (http://ec.europa.eu/health/ph_determinants/life_style/mental/docs/background_paper_en.pdf).

[2] The result by Lamers et al. (2010) was obtained with a latent class analysis using 16 different depressive symptoms associated with the two depression subtypes -including leaden paralysis, interpersonal rejection sensitivity, early morning awakening and diurnal variation of mood (see further Lamers et al., 2010).

[3] According to Ohayon and Roberts (2015) there is more evidence that overeating and weight gain is associated with under-than with oversleeping (see also van Strien & Koenders, 2014).