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The mediating role of dichotomous thinking and emotional eating in the relationship between depression and BMI

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ABSTRACT

Obesity and depression have important health implications. Although there is knowledge about the moderators of the depression-obesity association, our understanding of the potential behavioral and cognitive mediators that may explain the relationship between depression and obesity, is scarcely researched. The aim of this study is to investigate the mediating role of emotional eating and dichotomous thinking in the depression-obesity relationship.

Data on 205 individuals from a community-based study conducted at Maastricht University, Netherlands were used. Self-reported data on depression, emotional eating and dichotomous thinking were collected and BMI scores were calculated in a cross-sectional research design.

Correlations between variables were calculated. The primary analysis tested the hypothesis that depression has an effect on BMI through dichotomous thinking and emotional eating. A two–mediator model was used to predict the direct and indirect effects of emotional eating and dichotomous thinking on the depression-BMI relationship.

Depression was positively correlated with BMI ($r = 0.21$, $p = 0.005$), emotional eating ($r = 0.38$, $p < 0.001$) and dichotomous thinking ($r = 0.49$, $p < 0.001$). Dichotomous thinking and emotional eating were positively correlated with BMI ($r = 0.35$, $p < 0.001$; and $r = 0.45$, $p < 0.001$ respectively). Both dichotomous thinking ($Z = 2.54$, $p = 0.01$, 95% confidence intervals = 0.01–0.17) and emotional eating ($Z = 3.92$ $p < 0.001$, 95% confidence intervals = 0.06–0.19) could explain the depression-BMI relationship.

The assessment of emotional eating and dichotomous thinking might be useful in guiding assessment and treatment protocols for weight management.

The present study adds to the existing literature on the role of dysfunctional cognitions and emotions on eating behavior, and particularly to the factors that may impede people's ability to control their eating.

1. Introduction

Obesity and depression are problems with important public health implications (Mathers & Loncar, 2006; Murray & Lopez, 1997; von Ruesten et al., 2011). Obesity is a major risk factor for cardiovascular disease, diabetes, and cancer (Organization, 2013). The 2011 World Mental Health Survey, including data from 17 countries, found that approximately 1 in 20 people report experiencing a depressive episode (Marcus, M., Van Ommeren, Chisholm, & Saxena, 2012). Depressive symptoms can cause considerable impairments in an individual's ability to handle daily responsibilities (Marcus et al., 2012). In this respect, both depression and obesity can increase the burden of disease with enormous economic costs (Marcus et al., 2012; Organization, 2013). Studies (Carpenter, Hasin, Allison, & Faith, 2000; McElroy et al., 2004) have shown that people with obesity are more likely to experience a mood disorder, like depression compared to those who are not obese. A meta-analysis of 17 community-based cross-sectional studies among adults, showed a positive overall association between depression and obesity (de Wit et al., 2010) suggesting that depression is associated with an 18% increased risk of becoming obese.

Potential moderating factors of the association between depression and obesity include being female (Heo, Pietrobelli, Fontaine, Sirey, & Faith, 2006) (Scott, McGee, Wells, & Oakley Browne, 2008), having higher education (Ross, 1994) and being younger (Blaine, 2008; Heo et al., 2006). Although there is knowledge about the moderating factors in the depression-obesity relationship, our understanding of the potential mediators that could explain how the relationship between depression and obesity forms, is scarcely researched.

It is evident that depression and obesity are diseases of current scientific interest which are not caused by single factors, but by complex patterns of risk factors. Identifying such mechanisms, which may vary

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in different subgroups and populations, requires determination of how these patterns of risk factors may "work together" (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001). Investigating the mediating factors of the depression-obesity relationship, can lead to the design of interventions in order to discontinue those mechanisms responsible for this relationship.

In their theoretical review of the depression-obesity association, Markowitz and colleagues (Markowitz, Friedman, & Arent, 2008) suggest that behavioral and cognitive mechanisms may mediate the depression-obesity relationship. In this study, we will focus on emotional eating and dichotomous thinking as potential behavioral and cognitive mechanisms which could shed some light on why depression and body weight are related.

Disturbances in eating behavior are common in both depression and obesity, and eating to alleviate negative affect may be one pathway to obesity in depressed individuals. Negative emotions, such as depression, are one of the most proximate psychological factors related to disordered eating. In an attempt to identify why some individuals eat more than others while suffering depressive symptoms, a main disordered eating style has been identified. Some individuals, who struggle with their weight, engage in a maladaptive eating behavior termed emotional eating (Geliebter & Aversa, 2003a). An aspect of emotional eating refers to the tendency to eat in response to aversive negative states (Alberts, Thewissen, & Raes, 2012) and has been related to both obesity (Geliebter & Aversa, 2003b; Ozier et al., 2008) and depressive symptoms (Owens, v. S., & van Leeuwe, 2009).

Previous research suggests that individuals with depressive symptoms also show evidence of "depressogenic schematic processing" which includes patterns of negative and "all-or-none thinking" (Teasdale et al., 2001). The individual's tendency to think in terms of binary opposition, such as "black or white", and "good or bad", is a cognitive process termed dichotomous thinking. Dichotomous thinking has recently been found to be involved in eating disorders (Fairburn, Cooper, & Shafran, 2003) as well as in obesity. A study by Dove, Byrne, and Bruce (2009) showed that dichotomous thinking moderated the association between depression and obesity in weight loss treatment seeking obese and overweight individuals. Those with a dichotomous thinking style tended to have similar levels of depression, regardless of whether they were obese or overweight. This suggests that any irregularity from what a dichotomous thinker considers an "acceptable" body weight may increase their risk for depression.

Eating disordered individuals with dichotomous thinking styles also tend to think of food as "good or bad", themselves as being "on" or "off" a diet and their weight as "acceptable" or "totally unacceptable" (Williamson, White, York-Crowe, & Stewart, 2004). Rigid dietary rules and all-or-nothing cognitions (i.e., I have blown my diet after eating one piece of "forbidden food") are generally present in individuals with weight and eating concerns.

The existing evidence suggests that depressive symptoms are related to obesity, although the evidence is mainly focused on clinically depressed individuals. A few studies in community samples, suggest that increased levels of depression are associated with obesity (Baumeister & Harter, 2007; Herva et al., 2006).

Emotional eating is associated with depression (Owens et al., 2009) and obesity (Ozier et al., 2008). Only two studies (Kontinnen, Silverntoinen, Sarlio-Lahteenkorva, Mannisto, & Haukkala, 2010) have researched the role of emotional eating as a mediator in the relationship between depression and several adiposity indicators, including BMI or weight gain (T. van Strien, Konttinen, Homberg, Engels, & Winkens, 2016). These studies have examined the role of emotional eating as a mediator in the relationship between depression and obesity without looking at dichotomous thinking style. With this study we aim to examine in one model the direct and indirect effects of these two mediators.

The only available evidence on the association between dichotomous thinking and BMI comes from clinical settings with obese people with diagnosed eating disorders investigating primarily weight loss as an outcome (Dove et al., 2009; Lethbridge, Watson, Egan, Street, & Nathan, 2011) or having used a pre-treatment sample (Dove et al., 2009). Pre-treatment samples are not really representative of the general population.

The aim of this study is to investigate the association between depression and BMI in a non-treatment sample motivated to lose weight. Based on previous research findings, it is hypothesized that depression will be positively associated with obesity and that emotional eating and dichotomous thinking will mediate this relationship. Beck's cognitive-behavioral theory (Beck, 2008) highlights the role of thoughts and negative mood in depression. Further, we hypothesize that depressive thoughts may influence emotional eating leading to overweight or obesity. The model we will employ to investigate the total and specific effect of each of the two mediators is schematically presented in Fig. 1.

2. Methods

2.1. Subjects

Data for this cross-sectional study were used from a volunteer population-based study conducted at Maastricht University, Netherlands. The study collected panel data on physiologic and psychological traits of overweight, obese and normal weight people between 19 and 58 years old, followed through time at intervals of six months. Data are collected since January 2012. Overweight/obese participants were selected to participate in the study if their body weight index was above 27. All participants were recruited via local advertisements of the study and via posts in the social media (Facebook and internet account of the study). Pregnant and breastfeeding women were excluded from the study, as well as people using corticosteroids or those with thyroid gland diseases. In addition, people were excluded if they were undergoing psychological or medical treatments for eating or other disorders at the time of the study. For the purposes of this study we used data from the baseline measurements collected between January 2012 and January 2015. A total of 205 individuals were included in the analyses. Of those, 60 were classified as normal weight ($18.5 < BMI < 24.9$ kg), 40 as overweight ($27 < BMI < 29.9$ kg) and 105 as obese ($BMI \geq 30$ kg). All participants consented before participation and the study was approved by the Ethics Committee Psychology of Maastricht University.

2.2. Materials

2.2.1. BMI

BMI was determined following measurement of height and weight, with the participants in light clothing and no shoes. Weight was measured using an appropriate medical scale and standing height was

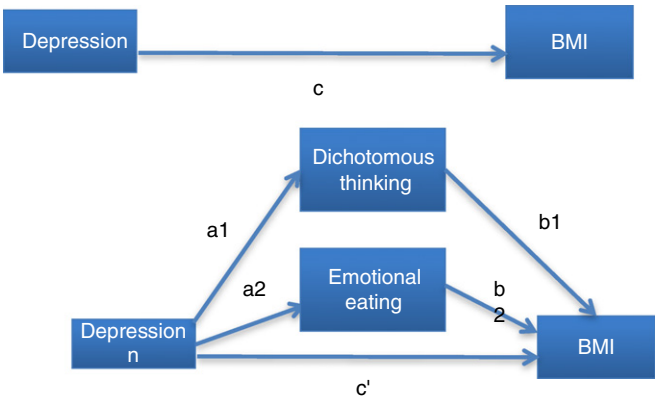

Fig. 1. Illustration of a two-mediator design. (A) Depression affects BMI. (B) Depression is hypothesized to exert indirect effects on BMI through dichotomous thinking (M_1) and emotional eating (M_2).