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High BMI and reduced engagement and enjoyment of pleasant events

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Abstract

While the link between obesity and reduced physical activity is well established, the relationship between obesity and engagement in a wide range of positively reinforcing behaviors has been studied very little. We hypothesized that higher body mass index (BMI) would be associated with diminished engagement in rewarding behavior, and that this relationship would be mediated by depressive symptomatology and/or subjective enjoyment of rewarding behavior. Participants ($N = 290$; 58% female) completed questionnaires about depression as well as frequency and subjective enjoyment of rewarding behaviors. Hierarchical regression analyses revealed that BMI predicted lower rates of positive reinforcing behavior for females ($p < .02$) only. Women with higher BMI reported less engagement in rewarding behavior and their disengagement was mediated by a diminished subjective enjoyment of those behaviors ($p < .001$), but not depressive symptomatology. Obesity among women may be associated with reward deficiency, in which ordinary reinforcers lack potency to induce pleasure.

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1. Introduction

Obesity has reached epidemic proportions in the US with 65% of the nation either overweight or obese (Hedley et al., 2004). Obesity arises generally from the development of positive energy balance for which behavioral risk factors include high caloric intake (CDC, 2004) and low rates of physical activity (Jebb & Moore, 1999). The Nurses Health Study (Hu, Li, Colditz, Willett, & Manson, 2003) revealed that obesity onset was predicted by reduced rates of not only moderate and vigorous physical activities but also light intensity behaviors (Hu et al., 2003). The only behavior besides dietary consumption, of which *high* rates predicted obesity was television viewing. In addition to overeating, obesity may extend beyond simply reduced rates of physical activity, but rather a narrowed repertoire of many activities.

Obesity research strongly targets both diet and activity, but the latter is typically addressed in terms of energy expenditure, either sedentary or active (e.g., Hu et al., 2001, 2003; Janz et al., 2002). However, physical activity and sedentary behaviors are exemplars of a much larger body of behaviors that are typically viewed as pleasant and rewarding, including sensory, social, and vocational behavior, among others. Very few studies have addressed whether obesity is associated with an overall narrowed repertoire of pleasurable and rewarding behaviors. The present study addresses whether heightened BMI is associated with reduced engagement in rewarding behaviors.

A narrowed repertoire of rewarding behavior among obese persons might be a result of vulnerability to depression. Depression is prevalent among obese individuals (Bulik, Sullivan, & Kendler, 2002; Goldsmith et al., 1992). Anhedonia (reduced engagement and interest in rewarding behavior), is among the symptoms of depression, as are weight gain and overeating (APA, 1994). According to behavioral theory (Jacobsen, Martell, & Dimidjian, 2001; Lewinsohn, Antonuccio, Breckenridge, & Teri, 1984), anhedonia plays a cardinal etiological role in the onset and maintenance of depression leading to curtailed access to positive reinforcers. Our first aim was to test an inverse relationship between BMI and engagement in rewarding behaviors. Next, we aim to test whether depressive symptomatology mediates this relationship.

Another possible explanation for the association between obesity and reduced engagement of rewarding behaviors is that obesity might be associated with reduced reward sensitivity, a psychological trait involving the mesolimbic dopamine pathway (Davis, Strachan, & Berkson, 2004). Findings from behavioral studies of reward sensitivity and weight are mixed. One study found that obese women reported greater anhedonia, which the authors conceptualized as lowered reward sensitivity, than their overweight counterparts (Davis et al., 2004). Alternatively, another study found body weight predicted *heightened* reward sensitivity among female young adults (Franken & Muris, 2005). The small proportion (9%) of overweight and obese participants in the latter study make it difficult to draw conclusions about reward sensitivity and overweight. Biological studies have found evidence of reward *deficiency* in obesity. Obese individuals, particularly females, are more likely to carry genes that have been linked to variants in the D2 dopamine receptor (DRD2) gene, and perhaps as a consequence, to diminished reward sensitivity (Blum et al., 1996; Comings & Blum, 2000). This DRD2 variant appears to be linked to obesity, addictive, and compulsive disorders, and may give rise to a “reward deficiency syndrome” where the individual is biochemically unable to derive reward from normal everyday activities (Blum, Cull, Braverman, Chen, & Comings, 1997). Our second aim was to test whether an association between

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