

# Understanding the complexity of biopsychosocial factors in the public health epidemic of overweight and obesity

Health Psychology Open  
January-June 2016: 1–4  
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sagepub.com/journalsPermissions.nav  
DOI: 10.1177/2055102916634364  
hpo.sagepub.com  


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## Abstract

Obesity is a complex and multifaceted public health problem. This commentary reflects on a new theoretical model of obesity (i.e. Homeostatic Theory of Obesity proposed by Marks), and calls for additional research to examine biopsychosocial factors that may be of importance in developing interventions that promote long-term maintenance of weight loss and in developing obesity prevention programs. Furthermore, we discuss the role of socioeconomic factors in obesity and call for interdisciplinary efforts to address obesity risk factors in the interest of public health.

## Keywords

biopsychosocial, body mass index, eating behavior, obesity, overweight, sociodemographic variables

Marks' (2015) Homeostatic Theory of Obesity integrates some diverse and valuable literatures into a model aimed toward promoting a better understanding of overweight and obesity. Including some of the social complexities in the obesity epidemic, such as the production and distribution of food (and financial relationships), is a novel perspective. In addition to examining behavioral factors that have demonstrated their importance through empirical study (i.e. physical activity, consumption), Marks proposes that research is needed that focuses on specific social factors and psychological factors including attachment, sense of cohesion, eudaimonic wellbeing, income, and negative affect. The theory emphasizes the role of psychological factors, which have great relevance in understanding the impact of obesity; however, care must be taken to empirically evaluate the psychologically based pathway for obesity etiology that is proposed in the theory's "Circle of Discontent." An integration of the psychological, social, and biological factors, which interact to contribute to the development and maintenance of obesity, remains an important area for continued development as the model presents limited discussion of important biological factors that are critical to development and maintenance of obesity.

The manuscript title "homeostatic theory of obesity" suggests that biological principles of energy balance as applied to intake and expenditure will be discussed as a number of models expanding upon the established energy

balance literature have proposed (e.g. Schwartz et al., 2003). The manuscript does not reference the most obvious ways in which well-established biological homeostasis applies to weight (e.g. energy consumed compared to energy need), though, presumably because other sources have already addressed energy balance in obesity at length (interested readers may refer to handbooks such as Wadden and Stunkard (2002) for more on this topic). While it is understandable to assume readers are familiar with energy balance, other biological mechanisms that relate to the psychological and social issues included in the "Circle of Discontent" also remain absent. In doing so, the theory misses an opportunity to lend a truly integrative biopsychosocial lens to this discussion, as the manuscript is otherwise successful in culling from diverse psychological, financial, and public health literatures. Although it may be outside the scope of a behaviorally based theory to discuss biological aspects at length, there are some factors that bridge the disciplines of biological and

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behavioral obesity research that warrant some mention in the context of this model, such as the role of stress.

Stress responses, exhibited both physiologically and behaviorally, are one example of the link between biological and psychological processes in obesity as stress impacts eating behavior and overweight/obesity risk. The available evidence suggests that due to hormones secreted during stress that promote motivation for food and intake (e.g. glucocorticoids), many individuals overeat in response to chronic stress (Torres and Nowson, 2007). Because glucocorticoids stimulate appetite and preferentially stimulate fat deposition in the abdomen (Adam and Epel, 2007), individuals with central adiposity (i.e. “apples” versus “pears”) are more prone to intermediary conditions (e.g. dyslipidemia, hyperglycemia, and hypertension) and chronic disease (e.g. Type II Diabetes, stroke, coronary heart disease (CHD)) (Alberti et al., 2005); in turn, these individuals may be more vulnerable to the psychological and physical stress response (Björntorp, 2001). Marks’ theory proposes the pathways linking overweight/obesity and negative affect; however, additional exploration of the physiological implications of negative affect in obesity (e.g. through stress responses) would foster a more complete biopsychosocial conceptualization.

With the exception of the missed opportunity to address relevant biological elements, the scope of the article is extensive, multifactorial, and underscores the complex challenges of the public health challenges underlying the obesity epidemic. For example, Marks makes reference to the Foresight Report (2007) and its conclusion that over 100 variables may be effective targets for weight control intervention. This highlights the challenge of finding a balance between a complete model and a model that can be easily applied. Marks incorporates a broader subset of psychological factors as potential factors in the development of obesity than what is typical among models of this kind. Specifically, Marks’ model re-conceptualizes the role of certain psychological factors in obesity as potential maintenance factors operating within feedback loops.

It may be that such psychologically influenced models are highly applicable among subpopulations of those who have comorbid obesity and eating disorders (e.g. binge eating disorder (BED), eating disorder not otherwise specified, or potentially bulimia nervosa), but may be less applicable to others with obesity whose over-consumption of calories is motivated by factors that are not primarily driven by emotions. These factors might include the drive to consume good tasting foods, or “hedonic” hunger (Lowe and Butryn, 2007), and environments that place individuals in frequent proximity to an abundance of highly caloric foods, thereby eroding one’s self-control resources (Lowe, 2003). These and other factors suggest that many cases of obesity do not reflect psychological “discontent” and care should be taken for future scientific research to evaluate the

Circle of Discontent model in various subgroups across the obesity population.

We also wish to note that while Marks’ theory raises issues regarding the relation between negative affect, psychological distress, and over-consumption that have importance in the context of issues closely related to obesity, such as BED (Heatherton and Baumeister, 1991; Rosenbaum and White, 2013, 2015), these factors may not have as much direct relevance for those with overweight and obesity without comorbid BED or subclinical eating disorder symptoms. Because obesity is a medical disorder, psychological distress is not a hallmark feature of obesity in the same way that it is for eating disorders. While the prospect of psychological factors in the development of obesity is possible, additional research is needed to understand whether an extension of theories of emotional eating and binge eating, which share similarities to Marks’ “Circle of Discontent,” is supported among a broader subset of individuals with overweight and obesity, as Marks suggests.

In addition to addressing potential psychological issues that may be associated with obesity among some individuals, Marks’ theory raises important questions about societal factors. Socioeconomic inequalities have as of yet received less attention in the literature than other potential risk and maintenance factors. While not an official part of the “Circle of Discontent,” Marks highlights important socioeconomic factors in the development of obesity that warrant further investigation (e.g. “... overweight and obesity is not just a health issue, it is about social justice, because the least well off suffer significantly higher rates of obesity,” p. 2). Indeed, factors that confer risk for stress and social inequality, such as racial and ethnic minority group membership and lower socioeconomic status (SES), are associated with increased obesity risk (Broady and Meeks, 2015; Sobal and Stunkard, 1989). Worldwide, both obesity and under-nutrition are common among those struggling with socioeconomic burden, creating a “double burden of disease” and increased mortality risk for some communities and households (World Health Organization, 2015). Although some have called for population-based interventions to address the complex interconnection of obesity risk factors such as gender, race, ethnicity, and SES (Wang and Beydoun, 2007), few conceptual models of obesity have included these important factors.

The relation among socioeconomic factors, and with obesity, is multifaceted. For instance, poverty and obesity have been linked not just through challenges in acquiring healthy food (e.g. high expense and lower quality of fresh produce and healthy food in lower income neighborhoods (Darmon and Drewnowski, 2015; Evans et al., 2015), individuals are less likely to own a vehicle to transport groceries (Ver Ploeg et al., 2015)), but also through limitations in opportunities for physical activity due to unsafe outdoor spaces and limited access to gyms (Levine, 2011). Given

the multifaceted nature of these relations, researchers may be tempted to assume that another discipline would be better equipped to untie the elaborate knots that bind vulnerable groups to obesity risk. Indeed, steps toward addressing the larger social justice issues that set the background for disparities in obesity risk, while sorely needed, may stretch beyond the scope of traditional obesity research; however, rather than waiting for sociology, public health, epidemiology, and other fields to collectively solve this dilemma, it is important for obesity research to encourage creative partnerships and cross-disciplinary collaborations with the above-mentioned fields and others that may help facilitate further progress toward obesity prevention.

We concede that social changes to promote health may be a monumental undertaking. With that in mind, we believe that focusing efforts on factors that have strong empirical support as targets in the development of obesity are needed prior to turning to factors that may have a more theoretical and peripheral role. Research is needed to stimulate the development of new interventions in obesity prevention, weight loss, and weight loss maintenance (MacLean et al., 2015). Finally, although there may be overlap between risk factors for obesity and eating disorders, we believe it is also important to disambiguate steps that may have potential utility in eating disorder prevention from those that may be particularly fruitful in obesity prevention. Further investigation is warranted to evaluate the impact of shared pathways in preventing eating disorders and obesity.

In conclusion, Marks presents a complex model for a complex problem. On one hand, we believe that in some respects, the model is incomplete in addressing obesity from an integrative biopsychosocial perspective. Yet, on the other hand, the ambitious, multisystemic intent of this model, along with previous theory-driven arguments (Smith, 2000), acknowledges the need to expand from nutritional homeostasis models to incorporate more complex behavioral processes that influence overeating. While Marks' model may undervalue biological aspects of obesity, it raises important issues regarding socioeconomic inequalities that contribute to obesity. The theoretical determinants of obesity are multifarious; therefore, without large-scale comprehensive research programs, empirical evaluation of this model may be best suited to interactions among certain components. Furthermore, research aimed toward investigating components that have received less attention in the literature, and have the most likelihood for successful implementation for obesity prevention, such as public health interventions focused on the marketing of highly caloric foods and beverages, is needed. To join others' recent calls for a systems-based approach to public health and clinical interventions, (Carey and Crammond, 2015; Frood et al., 2013), there is a clear need for multifactorial systemic change to slow the rising obesity epidemic.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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