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How do I look? Focusing attention on the outside body reduces responsiveness to internal signals in food intake

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HIGHLIGHTS

- Focusing on appearance interferes with reliance on satiety signals in consumption.
- Mirror exposure interferes with compensation for a high caloric preload.
- Exposure to ads with models leads to less reliance on satiety cues in consumption.

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ABSTRACT

The current study investigates the relationship between focusing on body appearance and the ability to adjust food consumption according to feelings of satiety. Based on a resource perspective, we propose that focusing on outward appearance negatively affects people's ability to respond to satiety signals. Specifically, we argue that focusing on appearance takes up attentional resources required for sensing and relying on physiological satiety cues in food consumption. The findings of two experiments support this and show that focusing on appearance through a short mirror exposure (Experiment 1) or by looking at advertisements of models (Experiment 2) interferes with people's ability to compensate for previous consumption (Experiment 1) and leads them to rely less on satiety signals in their eating behavior (Experiment 2). These findings suggest that an emphasis on outer body appearance reduces people's reliance on satiety cues.

Introduction

The number of people who are overweight or obese has increased steadily since the 1980s (WHO, 2004) leading to a range of public health problems. At the same time, there is an increasing emphasis on thinness ideals and outward appearance, especially in modern-day TV commercials and music video clips (Sypeck, Gray, & Ahrens, 2004). These two phenomena may not be unrelated. In fact, a chronic focus on outward appearance may negatively affect eating behavior: People who are more focused on their appearance have more difficulties in keeping a diet and a higher chance of developing unhealthy eating patterns and even eating disorders (Harrison & Cantor, 1997; Putterman & Linden, 2004; Tiggemann & Kuring, 2004).

The current study examines whether a temporary focus on appearance also affects eating behavior. A range of environmental cues such as mass media portrayals of thin models and mirrors temporarily heighten people's awareness of their appearance (Harper & Tiggemann, 2008; Tiggemann & Boundy, 2008). This focus on outward appearance has been suggested to reduce the awareness of physiological body cues, such as heart beat or temperature, by depleting attentional resources that are required for sensing these cues (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998) but this has not been tested experimentally or assessed in actual eating behavior. We propose that an appearance focus reduces people's ability to detect and respond to satiety cues in eating behavior through a reduced availability of resources. The ability to sense and rely on satiety cues is an important aspect of eating behavior, and a poor sensitivity to hunger and satiety cues (as well as other information coming from the body) is a key aspect of eating disorders (Garner, Olmstead, & Polivy, 1983). Among non-clinical populations, the ability to rely on physiological satiety cues has been identified as a general marker for healthy eating patterns (Avalos & Tylka, 2006; Drapeau et al., 2005) and is related to a lower susceptibility to gain weight (Cornier, Grunwald, Johnson, & Bessesen, 2004).

The idea that an appearance focus reduces the awareness and reliance on physiological cues has been posed in self-objectification theory, a research framework which delineates the psychological consequences of focusing on outward appearance (Fredrickson & Roberts, 1997). In support, prior survey studies have shown that a chronic focus on appearance is related to a decreased awareness of body cues such as

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arousal (Miller, Murphy, & Buss, 1981) and heartbeat (Ainley & Tsakiris, 2013), and to a lower self-reported awareness of physiological sensations in general (Daubenmier, 2005; Myers & Crowther, 2008; but see also Bekker, Croon, & Vermaas, 2002; Spoor, Bekker, Van Heck, Croon, & Van Strien, 2005). Support has also been found for the hypothesized mechanism: a temporary focus on appearance has indeed been found to deplete attentional resources (Fredrickson et al., 1998; Quinn, Kallen, Twenge, & Fredrickson, 2006). Based on research in eating behavior which shows that people need sufficient attentional resources to rely on satiety cues (Bellissimo, Pencharz, Thomas, & Anderson, 2007; Ogden et al., 2013), we thus expect a focus on appearance to disrupt people's ability to rely on satiety cues. The present research builds on and extends prior self-objectification research by testing the causal effects of experimentally induced appearance focus (rather than a personality trait) on the reliance on satiety cues in actual food consumption.

This research also extends previous research in other ways. First, prior studies on the effects of idealized body images on food intake have explained findings in terms of shifts in individuals' self-perceptions and body image, and in most studies effects occur only for individuals who are highly concerned with their appearance, or for restrained eaters (Mills, Polivy, Herman, & Tiggemann, 2002; Monro & Huon, 2006). The resource perspective that we propose should apply to people more generally and not be limited to specific groups of people. Second, whereas prior studies on outward appearance and food consumption have mostly examined consumption at a single moment in time (Mills et al., 2002; Strahan, Spencer, & Zanna, 2007), we focus on how consumers compensate for previous consumption to assess reliance on satiety cues. Given that people consume food at several moments throughout the day, insights in their ability to compensate over these multiple consumption moments will add to our understanding of eating behavior. Third, the present study adds insights to the literature on environmental distractions and eating. Specifically, self-objectification has been defined as a form of self-consciousness, characterized by vigilant monitoring and a preoccupation with physical appearance (Fredrickson et al., 1998), which may carry-over into subsequent tasks more easily than momentary distractions in the environment (such as viewing 'neutral' television shows or advertisements), as we will explore.

Reliance on physiological cues in food consumption

The amount that a person eats may simultaneously depend on the presence of other people (Hetherington, Anderson, Norton, & Newton, 2006), the portion size (Rolls, Morris, & Roe, 2002), and the taste of the food (Yeomans, 1996). People are also equipped with a physiological system that signals when and how much to eat through complex feedback mechanisms involving the mouth, gut and brain (Benelam, 2009). The extent to which people sense and rely on these physiological cues is typically investigated using a preload design where participants are required to consume a food product (the preload) of which the caloric content is (covertly) varied across conditions. At a later point in time, these participants encounter another consumption opportunity. The extent to which they adjust this consumption to the caloric content of the preload is taken as a measure of how well they sense and rely on physiological cues.

Overall, the evidence from preload studies has been mixed. Several studies have found that people are not able to compensate for previous consumption and conclude that reliance on physiological cues is weak or imprecise (Kral, Roe, & Rolls, 2004; Levitsky, 2005). Other studies have demonstrated that people are able to sense 'hidden' additional calories and lower their subsequent consumption (Foltin, Fischman, Moran, Rolls, & Kelly, 1990; McKiernan, Hollis, & Mattes, 2008). Partly, these mixed findings may be due to substantial individual differences in people's ability to rely on physiological cues. Specifically, restrained eating has been associated with a lack of awareness and responding to internal hunger and satiety cues (Heatherton, Polivy, & Herman, 1989; Herman & Mack, 1975), men are better than women in relying on physiological cues and also people who exercise more frequently compensate better for prior food intake (Jokisch, Coletta, & Raynor, 2012; Ranawana & Henry, 2010).

The extent to which people are able to rely on physiological cues also depends on the strength of the signal. According to the boundary model, people rely on physiological cues only when they are particularly hungry or full (Herman & Polivy, 1984). Furthermore, the signaling strength of satiety cues appears to be less powerful than hunger cues and satiety cues are therefore more easily overridden (Jebb et al., 2006; Zheng, Lenards, Shin, & Berthoud, 2009). As a result, people are more precise in adjusting for a decrease in calories in their diet, than they are in adjusting for an increase in calories (Mattes, Pierce, & Friedman, 1988). This asymmetry is often attributed to the environment in which humans evolved. Due to the scarcity of food the development of strong hunger signals provided an evolutionary advantage over strong satiety signals (Zheng et al., 2009).

In modern obesogenic food environments, the ability to rely on satiety cues is an important skill with beneficial health outcomes. An individual's ability to sense feelings of satiety is related to a lower overall food intake at another point in time (Drapeau et al., 2005) and to a lower susceptibility to gain weight (Cornier et al., 2004). Conversely, overweight individuals tend to rely less on feelings of fullness to end a meal (Tylka, 2006; Wansink, Payne, & Chandon, 2007) and are less effective in compensating for previous consumption (Benelam, 2009; Ebbeling et al., 2004) than normal-weight individuals. Finally, a study among children showed that a greater responsiveness to satiety cues at age two predicted a lower BMI and food intake two years later (Mallan, Nambiar, Magarey, & Daniels, 2014). It is thus important to understand when people are better or worse at relying on satiety cues. We propose a resource perspective to examine this.

The effects of appearance focus: a resource perspective

Attending to several types of information from within the body, such as temperature, pain, or feelings of hunger and satiety requires attentional resources and this competes with attention that is directed elsewhere (Pennebaker & Lightner, 1980). Several studies have pointed towards (lack of) attention as an important determinant of people's food intake (Robinson et al., 2013). For example, watching television during a meal increases food intake during that meal (Bellisle, Dalix, & Slama, 2004) as well as later on (Robinson et al., 2013). A lack of attentional resources during a meal constrains people's ability to monitor how much they eat, and this can explain both increased consumption during a meal, as well as increased consumption later on, as people have formed less vivid memories of how much they have eaten. However, besides such a cognitive effect, recent findings suggest that attentional resources are also necessary to become aware of physiological satiety cues that develop during and after consumption (Ogden et al., 2013). Distraction during a consumption episode may interfere with the awareness of satiety that develops after eating (Marsh, Ni Mhurchu, & Maddison, 2013; Ogden et al., 2013). In line with this, Brunstrom and Mitchell (2006) found that participants who had been distracted during consumption experienced smaller changes in fullness following consumption than did non-distracted participants. In further support, Bellissimo et al. (2007) showed that boys adjusted their consumption at lunch according to whether they had previously consumed a preload with glucose or a (covert) non-caloric substitute, but not when they had been watching television during lunch.

In sum, people need sufficient attentional resources to sense satiety cues that develop after consumption in order to rely on these in adjusting subsequent food intake. Intuitively, focusing attention towards the self may then help individuals to access internal satiety cues. In line with this idea, early studies in the field of perceptual accuracy theory have attempted to demonstrate that focusing attention towards the self leads to a more accurate view of one's thoughts,