Does Impulsive Response to Internal and External Food Cues Lead to Higher Calorie Intake? Self-Control and Food Intake

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ABSTRACT

Measuring the impact of self-control on caloric intake has proved challenging in non-experimental studies. In this article, we study the relationship between self-control and food intake quantified by calories. Using validated behavioral measures, we find that impulsivity increases caloric intake, and that restraint decreases intake. Furthermore, the effect of impulsivity and restraint is more pronounced at the upper end of the caloric distribution. Thus, individuals already consuming more calories display a heightened reaction and likelihood to succumb to food environmental pressures. An individual’s decision to diet, when allowed to vary with behavioral measures, bears no unique significance on caloric intake. Our results are robust to different levels of physical activity and generally robust to underreporting.

KEYWORDS

Behavioral Economics, Diet, Health, Impulsivity, Nutrition, Restraint, Self-Control

INTRODUCTION

Healthy eating and physical exercise, among others, are the keys to maintaining a healthy weight (Prentice and Jebb 1995; Astrup 1999). In the literature, a consensus exists that calorie intake has increased and calorie expenditure has decreased over the last few decades (Cutler, Glaeser, and, Shapiro 2003; Philipson and Posner 2003). A review article by Finkelstein et al. suggests decreasing food price, reductions in relative-price of energy-dense foods, increasing wages, increasing female labor force participation and the increased availability of fast-food restaurants are among several reasons for increased caloric intake (Finkelstein, Ruhm, and Kosa 2005). One stream of literature has focused on the role of behavioral factors on food intake. As a result, there is a growing interest in measuring the impact of impulsiveness or lack of self-control on dietary choices (Jamison and Wegener 2010). Studying diet behavior is important since food not only satisfies an individual’s calorie needs and gratifies in the present but also has long-term health effects. In this study, we examine the role of impulsivity and self-control in determining calorie intake in the context of internal food cues and cues in the external environment. Self-control can be thought of as restraint dominating the impulse.
Impulsive factors separately measure the effect of eating in response to internal cues (i.e., internal impulsivity) and that in response to external environment (i.e., external impulsivity). We also examine how these factors affect calorie consumption for those groups consuming greater quantities of calories over and above the energy intake conditional on their physical activity levels. Previous studies on impulsivity and caloric intake or food choices were mostly undertaken in experimental settings which, typically, involves small samples selected from a population of specific characteristics (Guerrieri et al. 2009; Forzano, Chelonis, and Casey 2010; Hou et al. 2011). Nederkoorn et al. (2009), for example, studied less than 100 subjects and found the group demonstrating higher levels of restraint consumed 200 fewer calories per day compared to the low restraint group. Our study uses a large sample from a more broadly defined population and therefore, our findings more representative and applicable to a broader population. Here, we use secondary data for a random sample of about 1,500 residents of the United Kingdom (UK).

Research on impulsive behaviors has recently gained interest in behavioral economics (Gul and Pesendorfer 2004; Fudenberg and Levine 2006; Brocas and Carrillo 2008). These studies have drawn evidence from neuroscience and psychology, and have proposed models of a dual self that explicitly account for restraint and impulsivity. Following the behavioral economics literature, the short-term self in this study is measured by impulsivity, while the long-term self that considers long-term implications is measured by restraint.

Neuroscientific evidence also favors such dietary behaviors. For example, using functional magnetic resonance imaging (MRI), McClure et al. (2004) demonstrated that two separate systems in the brain are involved in intertemporal decisions. The following studies also suggest that impulsive choices can be restrained, and that they involve different regions of the brain. Affective reactions to taste are highly sensitive to neural manipulations which, according to Berridge and Robinson (2003), imply that the “onset, quality, quantity and duration of an eliciting gustatory stimulus” can all be controlled. Kalenscher et al. (2006) have clearly shown that impulsivity and self-control are two antagonistic choice dispositions. In particular, they found that the mammalian forebrain structures play a key role in determining the time and length of response inhibition. Another study by Knoch et al. (2006) identified specific parts of the brain which play a key role in overriding self-interested impulses. In essence, if our innate impulse is to eat more and the trained or tempered behavior is to restrain, then these constructs are measuring two processes in an individual that are antagonistic.

In this study, we test two hypotheses. First, that internal tendencies to impulsive eating leads to increased calorie intake, and that explicit restraint of food intake leads to decreased calorie intake. Second, that individuals who consume more calories are more impulsive. Impulsivity and restraint measures relating to food are constructed using responses to the Dutch Eating Behavioral Questionnaire (DEBQ) of a national survey conducted in the United Kingdom (UK). These measures have been tested for their validity and applied to a broad range of populations with different body mass index as well as across gender, ethnicity and countries (Rounin et al 2001; Bardone-Cone and Boyd 2007; van Strien and van de Laar 2008).

From a public health perspective, it is more important to understand the nature of self-control problems for those who consume calories in excess of their physical needs. If individuals consuming high amounts of foods eat impulsively in response to emotional factors, then improving the food environment to reduce calorie intake may be ineffective. Emotional eaters might need cognitive behavioral therapy, for example, to cope with their emotional responses. Reducing exposure to external food cues might be more effective for individuals with significant impulsivity to the external environment.

This study estimates the effects of impulsivity and restraint on calories from fats, sugars, and total calories. Foods with a higher proportion of fat and sugar are important because such foods generally have more calories, are more calorie dense and are more likely affected by impulsive behavior (Kant 2000; Dobson and Gerstner 2010). We find an increase in calorie intake owing to impulsivity, and that the effect is more pronounced at the upper tail of the distribution. This higher intake is seen in the
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