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Is level of intuitive eating associated with plate size effects?

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ABSTRACT

Objective: Intuitive eating is an eating approach that emphasizes increased focus on internal hunger and fullness cues to regulate eating behavior; thus, successful intuitive eating should curb the influence of environmental factors such as plate and portion size on consumption. The current study examined whether self-reported levels of intuitive eating moderated the influence of portion size on college students' food consumption during an afternoon meal of pasta and tomato sauce.
Method: Participants ($N = 137$, 63.5% female) were randomly assigned to either a large plate (12-inch) or small plate (8-inch) external cue condition. All participants fasted for four daytime hours, completed the Intuitive Eating Scale, and then were asked to rate a meal of pasta and tomato sauce on different dimensions of taste. Participants were told that they could eat as much pasta as they would like.
Results: Higher levels of intuitive eating were associated with greater food consumption. At the mean level of intuitive eating, participants ate more pasta in the large plate condition. Furthermore, the influence of plate size on food consumption increased as levels of intuitive eating increased.
Discussion: Individuals who report high levels of intuitive eating may be more likely to eat an objectively larger amount of food in a permissive food environment, and may have implications for eating approaches that promote eating in response to internal hunger and fullness cues.

1. Introduction

Many studies suggest that environmental variables, such as portion and plate size, can influence the amount that individuals consume, such that larger sizes consistently correlate with greater food intake (Diliberti, Bordi, Conklin, Roe, & Rolls, 2004; Fisher & Kral, 2008; Rolls, Morris, & Roe, 2002; Van Ittersum & Wansink, 2012; Wansink, van Ittersum, & Painter, 2006). Schachter (1968) originally suggested that the eating behavior of obese individuals was more strongly influenced by environmental cues than those of non-obese individuals. However, more recent studies have found that environmental cues can affect food intake among individuals of all weight classes (e.g., Wansink, Painter, & North, 2005).

Research shows that larger portion sizes are accompanied by increased caloric intake, and changes in portion sizes appear to affect the consumption of a wide range of individuals (Fisher & Kral, 2008; Rolls, Roe, Kral, Meengs, & Wall, 2004; Wansink et al., 2005; Wansink, Payne, & Shimizu, 2011). Importantly, portion size effects are not limited to single meals, but affect eating behavior over longer time frames. For example, Rolls, Roe, and Meengs (2006) provided normal-weight and overweight women with meals for two consecutive days, during which time they were instructed to follow meal plans provided by the research team. These two-day meal plans were followed once per week, for four weeks. Meals varied in portion size from a standard level (i.e., a single meal designed by the researchers to maintain a 2000 kCal/ day diet) to a reduced portion size (75% of the standard meal size), provided and served by the research team. On reduced portion size days, women ate fewer calories than they do on standard portion days, though they did not differ in ratings of hunger and fullness.

Plate or container size represents another external variable that may have some influence on eating patterns. Although some research have shown no effect of plate size on consumption (Shah, Schroeder, Winn, & Adams-Huett, 2011; Yip, Wiessing, Budgett, & Poppitt, 2013), other works indicate that plate size can impact the amount that individuals consume (e.g., Wansink et al., 2011) and their self-served portion sizes (e.g., Sharp & Sobal, 2012; Wansink & Kim, 2005; Wansink et al., 2006). For instance, movie patrons who were randomly assigned to either stale or fresh popcorn conditions consistently ate more when given a larger popcorn container (Wansink & Kim, 2005). This effect persisted in the stale (unpalatable) popcorn condition, as individuals who were given large containers of stale popcorn continued to eat more than those given medium containers, indicating that container size influences consumption despite discrepant internal cues (i.e., negative taste reactions that might reduce motivation to eat).

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Overall, external variables such as portion size and container size seem to exert effects on eating behaviors across different samples, regardless of weight status. (e.g., Rolls et al., 2006; Wansink et al., 2011) Therefore, strategies to decrease the effects of environmental/external control (i.e., controlling portion size) may be important for both weight loss and healthy weight management (Ello-Martin, Ledikwe, & Rolls, 2005; Ledikwe, Ello-Martin, & Rolls, 2005). Traditional methods of dieting, including cutting down on portion size or restricting high calorie food groups, represent one popular method of controlling the impact of external cues on eating; however, approaches to weight management that are based on dietary restraint may result in higher risk for disordered eating behaviors, such as binge eating (Polivy & Herman, 1985; Stice, 2001).

Internally-focused eating approaches, such as mindful or intuitive eating (IE), offer an alternative to decrease the impact of external cues on eating behaviors while simultaneously circumventing the risk for eating pathology. Varying from more traditional models of dietary restraint, these approaches promote changing eating behavior using internal cues (i.e., increasing awareness and response to hunger or satiety), rather than relying on external, environmentally-based strategies (i.e., limiting calories or portion sizes). In particular, IE is central to non-dieting approaches that promote using internal sensations to determine hunger and fullness (Mathieu, 2009; Tribole & Resch, 2012), and appears to be a negative correlate of disordered eating (Tylka & Wilcox, 2006). In particular, advocates of IE caution that engaging in restriction of certain foods or limiting portion size can lead individuals to feel deprived, which can then place individuals at risk for experiences of counterregulatory eating in which they violate dietary rules and binge eat (Herman & Polivy, 1990; Polivy & Herman, 1985; Tribole & Resch, 2012).

Cross-sectional studies have shown that higher levels of IE are associated with lower levels of chronic dieting and binge eating, as well as lower BMI (Denny, Loth, Eisenberg, & Neumark-Sztainer, 2013; Hawks, Madanat, Hawks, & Harris, 2005; Madden, Leong, Gray, & Horwath, 2012; Smith & Hawks, 2006; Webb & Hardin, 2012). Additionally, there is a growing body of research suggesting that interventions designed to increase IE are associated with beneficial outcomes on both psychological and physiological variables, although the magnitude of the effects are generally modest (Anglin, 2012; Bacon et al., 2002; Bacon, Stern, Van Loan, & Keim, 2005; Gagnon-Girouard et al., 2010; Hawks et al., 2005; Leblanc et al., 2012; Provencher et al., 2009; Van Dyke & Drinkwater, 2014). However, limited research has examined whether elevated levels of IE are consistently related to positive and negative health outcomes across various populations. For example, elevated awareness to internal cues may differentially relate to eating behaviors among healthy weight individuals, as compared to overweight or obese individuals. Better clarification of whether the apparent benefits of IE are consistent across different populations and weight classes is warranted.

While existing work suggests that IE is associated with positive outcomes, there are still questions about the consistency of and mechanisms underlying the observed positive effects. For example, a recent review of interventions designed to increase intuitive and mindful eating behaviors found mixed effects on dietary intake and eating patterns (Van Dyke & Drinkwater, 2014). To date, no studies have directly evaluated the objective success of IE in utilizing internal cues, as opposed to external cues, to regulate food intake. If IE works as hypothesized, environmental cues (i.e., plate and portion size) should have less influence on food consumption among individuals who report high levels of IE, as compared to those who report low levels of IE. However, the influence of external variables (i.e., plate or portion size effects) has been shown to be robust to changes in mindfulness, a related construct, leading researchers to suggest that external cue effects may act independently from internal cues (Marchiori & Papies, 2013). Therefore, the current study sought to clarify whether individuals who reported elevated IE, a construct that has been consistently linked with successful weight management and lower BMI, would be less influenced by external cue effects. In particular, this study examined the effect of external cues (i.e., plate size and portion size) on eating behavior across different levels of reported IE. Given the consistent findings on the impact of portion size on consumption and the mixed results for the impact of IE, we hypothesized that, regardless of self-reported IE levels, the impact of portion-size manipulation would exert a more robust effect across participants, such that individuals receiving larger plates (and, thus, larger serving sizes) would eat more than individuals receiving smaller plates.

2. Material and method

2.1. Participants and procedure

A total of 137 college students participated in the study, and participants received course credit for study completion. The university's Institutional Review Board approved this study. The sample was primarily female (63.5%), had a mean age of 19.3 ± 1.3 years, and reported a mean BMI in the non-obese range (23.0 ± 3.8 kg/m^2). The majority of participants self-identified as Caucasian (65.7%), while other participants identified as Black (12.4%), Asian (12.4%), Multiracial (4.4%), and Other (4.6%).

Participants were screened for relevant food allergies and ability to fast for four daytime hours. They were instructed not to eat for 4 h prior to their appointment to control for baseline hunger. All appointments were held on a weekday afternoon. Upon arrival to the laboratory, participants provided informed consent and were asked to complete several survey measures. Prior to completing the survey measures, participants were asked to provide verbal confirmation that they had completed a 4-hour fast. During this time, research assistants cooked a meal of pasta and tomato sauce for participants. Participants were randomly assigned to either a small (8-inch) plate condition, which included two servings of pasta with one serving of tomato sauce (n = 72), or a large (12-inch) plate condition, which included four servings of pasta with two servings of tomato sauce (n = 65). Across both conditions, a single serving of pasta was equal to 2 oz (measured when dry; totaling 212 cal); a single serving of tomato sauce was equal to 4 oz (1/2 cup; 70 cal). Participants were instructed to complete a taste-test of the pasta, in which they rated the pasta on several taste qualities. Similar to other experimental eating paradigms (e.g., Polivy, Heatherton, & Herman, 1988; Polivy, Herman, & McFarlane, 1994; Stice, Fisher, & Lowe, 2004), participants were told that they could eat as much pasta as they would like, and that any leftovers would be thrown out. Plates were weighed before and after consumption to measure the amount of pasta eaten.

2.2. Measures

2.2.1. Intuitive Eating Scale (IES; Tylka, 2006)

The IES is a 21-item self-report measure that evaluates the degree to which individuals utilize an intuitive approach to eating. The IES includes 3 subscales: unconditional permission to eat, eating for physical rather than emotional reasons, and reliance on internal hunger/satiety cues, which load onto a higher order factor of intuitive eating. Each item is rated on a 5-point scale that ranges from 1 (*strongly disagree*) to 5 (*strongly agree*). IES scores are shown to be internally consistent and stable over a 3-week period (r = .90; Tylka, 2006). Scores on the IES positively relate to body acceptance, body appreciation, and overall well-being, and negatively relate to eating disorder symptomology, body dissatisfaction, pressure for thinness, and body mass (Avalos & Tylka, 2006; Tylka, 2006). To our knowledge, the psychometric properties of the IES have not yet been documented in men.

2.2.2. Hunger ratings

To ensure that participants did not differ in current hunger levels according to plate size or level of intuitive eating, participants were asked