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Research report

Chocolate craving and disordered eating. Beyond the gender divide? [☆]Julia M. Hormes ^{a,*}, Natalia C. Orloff ^a, C. Alix Timko ^b^a Department of Psychology, University at Albany, State University of New York, Social Sciences 399, 1400 Washington Ave, Albany, NY 12222, USA^b Behavioral and Social Sciences Department, University of the Sciences, Kline Hall Room 218, 600 South 43rd Street, Philadelphia, PA 19104, USA

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ABSTRACT

Chocolate craving in women has previously been linked to disordered eating behaviors. A relatively higher prevalence of eating disorder pathology may account for the fact that chocolate craving is significantly more common in women in North America, compared to many other countries. While support for a causal role of disordered eating in the etiology of craving in women is growing, little is known about the extent to which food cravings are associated with disordered eating behaviors in men. This study was designed to systematically assess the impact of gender and chocolate craving on measures of attitudes to chocolate, responsiveness to food cues in the environment, body shape dissatisfaction, dietary restraint, and eating disorder and general pathology. Undergraduate men and women ($n = 645$, 37.2% male) were invited to complete self-report questionnaires assessing demographics, height and weight, food cravings, dietary attitudes and behaviors, along with eating disorder and general pathology. Data suggest that the relationship between chocolate craving and disordered eating behaviors in men is the opposite of what has previously been observed in women: compared to non-cravers, male chocolate cravers reported significantly more guilt related to craving, but were significantly less likely to diet and reported lower levels of dietary restraint, less frequent weight fluctuations, and fewer symptoms of eating disorders. Findings indicate that a positive relationship between disordered eating behaviors and chocolate craving may be unique to women (and potentially women in North America). Findings have important implications for our understanding of cultural and psychosocial factors involved in the etiology of food cravings.

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Food cravings are a very common occurrence in North America, with almost all women and more than two thirds of men reporting cravings for one or more specific foods (Pelchat, 1997; Weingarten & Elston, 1991). Food cravings are generally considered benign, especially when compared to the oftentimes harmful consequences of strong urges for tobacco, alcohol, and other drugs. However, food cravings are known to interfere with successful weight loss maintenance (Forman et al., 2007; Lowe, 2003; Lowe & Levine, 2005), and they can trigger episodes of binge eating in women with bulimia nervosa (Waters, Hill, & Waller, 2001). Similarly, obese women who experience food cravings are more likely to meet diagnostic criteria for binge eating disorder, compared to obese controls who do not report cravings (Greeno, Wing, & Shiffman, 2000; Mussell et al., 1996). Even in non-pathological populations cravings have been shown to be associated with strong negative affect such as guilt (Cartwright & Stritzke, 2008; Hormes & Rozin, 2011; Macdiarmid & Hetherington, 1995). The mechanisms underlying food cravings are poorly understood, and as a result there remains a lack of

effective interventions to help weight loss, overweight, obese, and eating disorder patients cope with cravings.

Research to date has focused primarily on studying strong urges for chocolate, which has long been known as one of the most commonly craved foods in North America (Hill & Heaton-Brown, 1994; Rozin, Levine, & Stoess, 1991; Weingarten & Elston, 1991). Studies have repeatedly demonstrated a striking imbalance in the ratio of female to male chocolate cravers, with women in the United States twice as likely as men to report craving for chocolate (Hormes & Rozin, 2009; Yanovski, 2003). Men tend to endorse a preference for savory foods (Zellner, Garriga-Trillo, Rohm, Centeno, & Parker, 1999), especially under stressful conditions (Zellner, Saito, & Gonzalez, 2007). The higher prevalence of chocolate craving in U.S. women appears to be due to a marked increase in the frequency and intensity of craving episodes specifically in the days around the onset of menstruation in about half of female cravers (Rozin et al., 1991; Zellner, Garriga-Trillo, Centeno, & Wadsworth, 2004). The cyclic nature of craving in a significant proportion of female cravers has given rise to a number of hypotheses implicating physiological factors such as hormonal fluctuations, nutritional deficits, or the effects of pharmacologically active ingredients in the etiology of strong urges for chocolate; however, evidence to date has generally not supported these theories (Hormes, 2014; Hormes & Rozin, 2009;

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Michener, Rozin, Freeman, & Gale, 1999; Pelchat & Schaeffer, 2000; Rodin, Mancuso, Granger, & Nelbach, 1991).

There exists an inverse relationship between the amount of cacao produced and the amount of chocolate consumed in any given region of the world (Hormes, 2014). Belgian and Luxembourgian per capita consumption of chocolate is about 13 lb a year (Richardson, 2003), and Americans consume approximately 11.7 lb of chocolate per person annually (Yin, 2004). By comparison, in the Ivory Coast and Indonesia, the world's leading cacao producers, annual consumption of chocolate is only about 1 and .08 lb per capita (Richardson, 2003). Chocolate craving prevalence also varies significantly by geographic location, with countries like Egypt reporting very low incidence compared to the United States and Canada, and the marked gender differences and cyclic fluctuations that characterize chocolate craving in the United States are less pronounced or altogether absent in other countries, such as Spain or New Zealand (Gendall, Joyce, & Sullivan, 1997; Osman & Sobal, 2006; Parker, Kamel, & Zellner, 2003). Most languages outside of English do not lexicalize the word "craving," indicating that the notion of strong urges for specific foods may have little importance in many non-English speaking countries (Hormes & Rozin, 2010). Taken together, these findings suggest that chocolate craving may be a culture-bound syndrome, limited to a large extent to North America. Thus, although physiological or biochemical hypotheses regarding the reasons for craving are appealing, individual and contextual factors appear to play a more significant role (Cartwright & Stritzke, 2008; Hormes, 2014; Osman & Sobal, 2006; Rogers & Smit, 2000; Zellner et al., 2004).

Western cultures, and the United States in particular, are known for the media portrayal of a largely unobtainable female "thin ideal." Internalization of this thin ideal is associated with eating pathology in women, including the restricted intake of highly palatable, yet seemingly "taboo" foods like chocolate (Stice, Spangler, & Agras, 2001; Thompson & Stice, 2001). Evidence suggests that when consumption is restricted, for example when dieting, the salience of cues related to the forbidden food increases (Hollitt, Kemp, Tiggemann, Smeets, & Mills, 2010; Placanica, Faunce, & Soames Job, 2002), which may result in a greater likelihood of craving (Durkin, Rae, & Stritzke, 2012; Kemp & Tiggemann, 2009; Massey & Hill, 2012).

Evidence to suggest a link between food cravings and disordered eating attitudes and behaviors is growing. In a sample of Spanish men and women acute food deprivation was uniquely associated with state cravings for a variety of foods, while eating disorder symptomatology was found to predict trait food cravings (Cepeda-Benito, Fernandez, & Moreno, 2003). American women who experience cyclically fluctuating chocolate craving have been shown to report more dietary restraint, higher body mass indices, and less flexible control over their food intake (Hormes & Timko, 2011). Chocolate-deprived women high in levels of dietary restraint and women currently dieting indicate significantly greater craving in response to chocolate-related cues, compared to non-dieters and non-chocolate deprived women (Fletcher, Pine, Woodbridge, & Nash, 2007; Polivy, Coleman, & Herman, 2005). Chocolate-related guilt was found to be significantly associated with dysfunctional eating patterns in a predominantly female sample of adults in Australia (Cartwright & Stritzke, 2008), and with greater body image dissatisfaction and dieting behaviors in both male and female children (Cartwright et al., 2007). Similarly, a sample of self-identified "chocolate addicts" in Great Britain reported significantly elevated levels of both cravings and guilt (Macdiarmid & Hetherington, 1995).

Though they constitute appealing alternatives to earlier physiological and biochemical accounts of craving etiology, hypotheses of chocolate craving implicating disordered eating behaviors remain to be elucidated further. A significant problem is the fact that these hypotheses are highly gender-specific, and the extent to which they apply to male chocolate cravers has not been systematically

examined. As of now, there is a dearth of research examining food cravings and their relationship with maladaptive eating behaviors specifically in men, both as a group and in comparison to women. The present study was designed to fill this gap in the literature by examining the prevalence of chocolate craving and the relationships between craving, weight- and eating-related attitudes and behaviors, and symptoms of eating disorders in a large group of male respondents. It was hypothesized that less frequent and less intense craving in men would coincide with an absence of the link between craving and disordered eating that has been observed in women.

Materials and methods

All methods were approved by the Institutional Review Boards at the participating universities.

Participants

Participants were 645 undergraduate students (37.2% male, $M_{age} = 19.40$, $SD = 2.54$) recruited at two comparable, large mid-Atlantic universities. Respondents self-identified as White (72.4%, $n = 467$), African-American (11.3%, $n = 73$), Asian/Pacific Islander (10.4%, $n = 67$), Hispanic (3.3%, $n = 21$) or "other" (2.6%, $n = 17$).

Procedures

Respondents visited the laboratory in small groups to complete the battery of measures described in detail below confidentially via the secure online server SurveyMonkey. Measures were selected to replicate and expand upon a previous study, which examined the relationship between chocolate craving and eating- and weight-related behaviors and attitudes specifically in women (Hormes & Timko, 2011).

Measures

Participants were asked to indicate their gender, age, race/ethnicity, and height and weight. Research suggests that both men and women tend to overestimate height and underreport weight in self-report (Engstrom, Paterson, Doherty, Trabulsi, & Speer, 2003; Gorber, Tremblay, Moher, & Gorber, 2007); however, these discrepancies tend to be relatively small (Elgar, Roberts, Tudor-Smith, & Moore, 2005; Taylor et al., 2006). Participants were invited to report on the presence of general food cravings and specific craving for chocolate, and chocolate craving frequency (on a scale of 1 to 5, where 1 = "never," 2 = "once a month or less," 3 = "a few times a month," 4 = "a few times a week," 5 = "daily," and 6 = "several times a day") and intensity (on a scale of 1 to 5, where 1 = "none," 2 = "mild," 3 = "moderate," 4 = "strong," and 5 = "extreme") (Hormes & Rozin, 2009). Women who reported craving chocolate were asked if they felt that their craving episodes were more likely to occur at any particular point during their menstrual cycle. Respondents then completed the following widely used and well-validated measures.

The Attitudes to Chocolate Questionnaire

The Attitudes to Chocolate Questionnaire (ACQ) is a 24-item self-report measure that was developed to quantify attitudes to chocolate (Benton, Greenfield, & Morgan, 1998). Three factors measure "craving," or the tendency to use chocolate for comfort in emotionally stressful conditions (Cronbach's α in the present combined sample of men and women = .91), "guilt," or the experience of negative feelings associated with the consumption of chocolate (Cronbach's α = .92), and a "functional" approach to eating chocolate, for example when exercising or to replace a skipped meal (Cronbach's α = .75). In the original validation of the ACQ it was found

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