



Food cravings prospectively predict decreases in perceived self-regulatory success in dieting



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ABSTRACT

Food cravings are assumed to hamper dieting success, but most findings are based on cross-sectional studies. In the current study, female students were tested at the beginning of their first semester at university and six months later. They completed the Food Cravings Questionnaire-Trait-reduced (FCQ-T-r), the disinhibition subscale of the Eating Inventory, and the Perceived Self-Regulatory Success in Dieting Scale, and their height and weight were measured. Scores on the FCQ-T-r prospectively predicted higher disinhibition and lower perceived self-regulatory success in dieting after six months. Although FCQ-T-r scores did not predict increases in body mass index (BMI) directly, a serial mediation model revealed an indirect effect of FCQ-T-r scores at baseline on BMI after six months via increased disinhibition scores and decreased perceived self-regulatory success in dieting. To conclude, the current results provide evidence for a prospective relationship between trait food craving and decreases in dieting success. Furthermore, they suggest a possible mediator of this association (i.e., increases in disinhibited eating) as well as an indirect effect on body weight. Measurement of trait food craving may be a useful tool for predicting or monitoring treatment changes and relapse in eating- and weight disorders.

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1. Introduction

Food craving can be defined as a strong, irresistible desire to consume a specific type of food (Hormes & Rozin, 2010). Although experiencing food craving momentarily is a transient state, several self-report questionnaires measure the frequency and/or intensity of food cravings in general, which is often referred to as trait or tonic food craving (Boswell & Kober, 2016; Hallam, Boswell, DeVito, & Kober, 2016). Questionnaire-based and laboratory studies suggest that high trait food craving scores are associated with more frequent consumption of high-calorie foods in general and higher intake of such foods in the laboratory (Chao, Grilo, White, & Sinha, 2014; Hofmann et al., 2016; Martin, O'Neil, Tollefson, Greenway, & White, 2008). Studies that applied food diaries, however, have been less consistent. For example, food cravers reported a descriptively, but not significantly, higher energy intake than non-cravers in a small sample (Hill, Weaver, & Blundell, 1991). In another study, only female, but not male, food

cravers reported higher energy intake than non-cravers (Lafay et al., 2001).

Individuals most frequently report food cravings as the reason for failing to adhere to a diet (Hall & Most, 2005). Similarly, trait food craving based on self-report have been associated with lower self-reported dieting success and higher body mass index (BMI) cross-sectionally (e.g., Chao et al., 2014; Franken & Muris, 2005; Meule & Blechert, in revision; Meule, Lutz, Vögele, & Kübler, 2012a; Meule, Westenhöfer, & Kübler, 2011). In contrast, interventional studies have produced mixed findings. For example, both surgical and non-surgical weight-loss treatment studies have often reported reductions in food cravings, with larger reductions being associated with greater weight loss (Batra et al., 2013; Leahey et al., 2012; Martin, O'Neil, & Pawlow, 2006; Martin et al., 2011b). However, no robust relations have been found between baseline levels of food cravings and weight loss (Martin, McClernon, Chellino, & Correa, 2011a). While higher trait food craving scores at baseline were related to higher weight loss in a behavioral weight-loss treatment study (Batra et al., 2013), pre-surgical trait food craving scores did not predict post-surgical weight loss in bariatric patients (Leahey et al., 2012). Finally, more frequent cue-elicited food cravings before surgery predicted higher

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Table 1
Descriptive statistics of and correlations between study variables.

<i>n</i> = 120	<i>M</i>	<i>SD</i>	Range	1.	2.	3.	4.	5.	6.	7.	8.
<i>Variables at baseline</i>											
1. Food cravings	38.5	10.3	20–62	–	0.655*	–0.212*	0.231*	0.737*	0.580*	–0.293*	0.242*
2. Disinhibition	7.09	3.16	1–16	–	–	–0.359*	0.328*	0.534*	0.709*	–0.380*	0.324*
3. Perceived self-regulatory success in dieting	12.0	3.33	3–20	–	–	–	–0.491*	–0.178	–0.400*	0.681*	–0.458*
4. Body mass index (kg/m ²)	22.1	2.71	15.1–29.7	–	–	–	–	0.148	0.347*	–0.315*	0.952*
<i>Variables after six months</i>											
5. Food cravings	36.7	11.0	19–79	–	–	–	–	–	0.709*	–0.277*	0.150
6. Disinhibition	6.73	3.42	1–15	–	–	–	–	–	–	–0.466*	0.329*
7. Perceived self-regulatory success in dieting	11.9	3.21	4–18	–	–	–	–	–	–	–	–0.352*
8. Body mass index (kg/m ²)	22.2	2.65	15.4–29.6	–	–	–	–	–	–	–	–

* $p < 0.050$.

weight loss after surgery, but more frequent feelings of guilt resulting from cravings before surgery predicted lower weight loss after surgery (Crowley et al., 2012). To conclude, although there is ample evidence from cross-sectional studies showing that higher trait food craving scores are associated with higher intake of high-calorie foods, lower dieting success, and higher BMI, there is inconclusive evidence that trait food craving scores can predict such outcomes prospectively.

In the current study, trait food craving, disinhibited eating, and perceived dieting success were assessed in female students at the beginning of their first semester and were reassessed after six months. Based on cross-sectional studies, which tested food cravings as predictor of perceived dieting success (Meule & Blechert, in revision; Meule et al., 2011), it was expected that higher trait food craving scores at baseline would predict lower perceived dieting success after six months (food cravings → dieting success). As food cravings likely translate into lower dieting success via increased food intake (Martin et al., 2008), it was hypothesized that the relationship between trait food craving at baseline and lower perceived dieting success after six months would be mediated by increased disinhibited eating (food cravings → disinhibited eating → dieting success). Based on cross-sectional studies, which tested food cravings as predictors of BMI (Burton, Smit, & Lightowler, 2007; Joyner, Gearhardt, & White, 2015), it was expected that higher trait food craving scores at baseline would result in higher BMI after six months. Finally, based on cross-sectional studies, which tested perceived dieting success as predictor of BMI (dieting success → BMI) (Meule & Blechert, in revision; Meule, Hofmann, Weghuber, & Blechert, 2016), it was hypothesized that the relationship between food cravings and BMI would be mediated by increases in disinhibition and decreases in perceived dieting success (food cravings → disinhibited eating → dieting success → BMI).

2. Methods

2.1. Participants and procedure

One-hundred and thirty-three female university freshmen were recruited at the University of Würzburg, Germany. They provided informed consent and participated in two laboratory sessions at the beginning of their first and second semester, during which they completed several questionnaires, and their height and weight were subsequently measured. Parts of these data have been published previously (Meule et al., 2014a; Meule & Platte, 2016). Complete data of all measures used in the current analyses were available for $n = 120$ participants. Mean period between the two measurements

was $M = 170$ days ($SD = 9.01$). Mean age was $M = 20.1$ years ($SD = 2.80$), mean body weight was $M = 62.9$ kg ($SD = 8.86$), and mean BMI was $M = 22.1$ kg/m² ($SD = 2.71$). Nine participants (7.50%) were underweight (BMI < 18.5 kg/m²), 95 participants (79.2%) had normal weight (BMI = 18.5–24.9 kg/m²), and 16 participants (13.3%) were overweight (BMI ≥ 25.0 kg/m²). Forty participants (33.3%) indicated that they were currently restricting their food intake to control their weight (e.g., by eating less or avoiding certain foods).¹

2.2. Measures

2.2.1. Food Cravings Questionnaire-Trait-reduced (FCQ-T-r)

Trait food craving was assessed with the FCQ-T-r (Meule, Hermann, & Kübler, 2014b). The scale consists of fifteen items (e.g., “If I am craving something, thoughts of eating it consume me.”, “Food cravings invariably make me think of ways to get what I want to eat.”), which are scored on a six-point scale ranging from *never/not applicable* to *always*. Higher scores indicate more frequent and/or more intense food craving experiences in general. Internal consistency was $\alpha = 0.904$ at baseline and $\alpha = 0.929$ after six months.

2.2.2. Disinhibition

Disinhibited eating tendencies were assessed with the disinhibition subscale of the *Eating Inventory* (formerly Three-Factor Eating Questionnaire; Pudel & Westenhöfer, 1989; Stunkard & Messick, 1985). The scale consists of sixteen items (e.g., “I usually eat too much at social occasions, like parties and picnics.”, “Sometimes when I start eating, I just can't seem to stop.”) with different response formats. Higher scores indicate higher disinhibition. Internal consistency was $\alpha = 0.727$ at baseline and $\alpha = 0.786$ after six months.

2.2.3. Perceived Self-Regulatory Success in Dieting Scale (PSRS)

Perceived self-regulatory success in dieting was assessed with the PSRS (Meule, Papiés, & Kübler, 2012b). The scale

¹ We thank one of the reviewers for pointing out that it cannot be determined by PSRS scores alone if participants are actually currently dieting or have ever engaged in dieting (also see Nguyen & Polivy, 2014). Therefore, we explored if current dieting status at baseline predicted PSRS scores after six months. After controlling for the influence of PSRS scores at baseline ($b = 0.63$, $SE = 0.07$, $p < 0.001$), being a dieter at baseline was associated with lower PSRS scores after six months ($b = -1.07$, $SE = 0.46$, $p = 0.021$). Thus, this prospective relationship suggests that participants reporting low self-regulatory success in dieting as measured with the PSRS have indeed engaged in dieting attempts in the past. Including current dieting status at baseline as covariate in the serial mediation model presented in Section 3.4, however, did not change the indirect effect of trait food craving on BMI (bootstrap estimate 0.001, $SE = 0.001$, 95% CI [0.0002, 0.01]).

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