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Impulsivity and emotion dysregulation as predictors of food addiction

Bernadette Pivarunas *, Bradley T. Conner

Department of Psychology, Colorado State University, United States

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ABSTRACT

Food addiction is the clinical occurrence in which individuals develop physical and psychological dependencies on high fat, high sugar, and highly palatable foods. Past research has demonstrated a number of similarities between food addiction and drug use disorders including the activation of specific brain regions and neurotransmitters, disrupted neuronal circuitry, and behavioral indicators of addiction such as continued use despite negative consequences. The present study examined the role of impulsivity and emotion dysregulation in food addiction as both play salient roles in drug use disorders. Poisson regression analyses using data from 878 undergraduate students revealed negative urgency, the tendency to act impulsively when under distress, and emotion dysregulation positively predicted symptom count on the Yale Food Addiction Scale (Gearhardt, Corbin, & Brownell, 2009) whereas a lack of premeditation negatively predicted symptom count (all $ps < 0.05$). Future research is needed to confirm precursors to eating episodes in food addiction, elucidate causal mechanisms, and support an explanatory model of food addiction.

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1. Introduction

Food addiction, the clinical occurrence in which individuals become physically and psychologically dependent on high fat, high sugar (HFHS) foods (Smith & Robbins, 2013), is documented in the literature as early as the 1950s (Hinkle, Fischer, Knowles, & Stunkard, 1959; Randolph, 1956), but has, potentially, an even longer history (Davis & Carter, 2014). Some have asserted that investigations of food addiction have increased in recent years given the zeitgeist's shift from focusing on health-related consequences of obesity to the causal factors of obesity (Davis & Carter, 2014). Existing research suggests a number of similarities between food addiction and drug use disorders.

First, both food and drug cues have been shown to activate the same brain regions including the amygdala, insula, orbitofrontal cortex, and striatum (Dagher, 2009; Gearhardt et al., 2011). Second, there is overwhelming evidence that both food and drugs act on dopamine, within the nucleus accumbens and limbic system in particular, and opiate systems in similar ways with consumption increasing neurotransmitter levels and activity, possibly correcting for hypofunctioning (Blumenthal & Gold, 2010; Davis & Carter, 2009; Hoebel, Rada, Mark, & Pothos, 1999; Pelchat, 2009; Rada, Avena, & Hoebel, 2005; Small, Jones-Gotman, & Dagher, 2003; Smith & Robbins, 2013). Third, food addiction and drug use disorders are both associated with activity in the same neuronal circuits. The proper functioning of neuronal circuits involved in top-down control processes is required to oppose conditioned responses predicting reward (Hyman, Malenka, & Nestler, 2006; Volkow, Wang, Fowler, & Telang, 2008). Repeated exposure to HFHS foods, much like exposure to drugs, can disrupt the balance between circuits motivating behavior and circuits controlling responses such that the expected reward over-activates reward and motivation circuits while impeding the cognitive control circuit resulting in an inability to override the desire to consume (Volkow, Wang, & Baler, 2011; Volkow et al., 2008). Finally, animal research has linked the consumption of excessive sugar to tolerance, withdrawal, and continued use despite negative consequences (Avena, Long, & Hoebel, 2005; Berner, Avena, & Hoebel, 2008; Hoebel, Avena, Bocarsly, & Rada, 2009; Hoebel et al., 1999; Johnson & Kenny, 2010).

The Yale Food Addiction Scale (YFAS) was developed to: 1) operationalize measurement of the food addiction construct and 2) identify those individuals displaying clinical signs of addiction to HFHS foods utilizing the substance dependence criteria specified in the DSM-IV (APA, 1994; YFAS, Gearhardt, Corbin, & Brownell, 2009; Gearhardt et al., 2012). The use of the YFAS in empirical investigations has led to estimates that as many as one half of those with binge eating disorder (Gearhardt, White, Masheb, & Grilo, 2013; Gearhardt et al., 2012), 15 to 25% of obese individuals (Davis et al., 2011; Davis et al., 2013), 30–50% of bariatric surgery patients (Gearhardt et al., 2012; Meule, Heckel, & Kübler, 2012), and 5–10% of community or student samples (Flint et al., 2014; Gearhardt et al., 2009) meet criteria for food addiction.

Given the similarities between food addiction and drug use disorders previously described, it is likely that food addiction and drug use disorders share salient etiological variables such as impulsivity and emotion dysregulation and thus, such should be examined. As food

* Corresponding author at: Department of Psychology, Colorado State University, 1876 Campus Delivery, Fort Collins, CO 80523-1876, United States. Tel.: +1 970 236 6317.
E-mail address: bernadette.pivarunas@colostate.edu (B. Pivarunas).

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addiction, it can be argued, constitutes a form of disinhibited eating, or eating characterized by a lack of self-awareness and appropriate restraint over the behavior (Heatherton, Striepe, & Wittenberg, 1998; Shomaker, Tanofsky-Kraff, & Yanovski, 2011), we will briefly review what is known about impulsivity and emotion dysregulation in disinhibited eating, namely binge eating and bulimia nervosa, since research investigating impulsivity and emotion dysregulation in food addiction is sparse, before testing the associations between impulsivity, emotion dysregulation, and food addiction in a large, cross-sectional sample.

As in drug use disorders (de Wit, 2009; Dick et al., 2010; MacKillop et al., 2011), impulsivity likely plays a key role in food addiction. Impulsivity is a predisposition towards hasty, unintended reactions to stimuli, internal or external, without concern for the negative consequences of these reactions (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001; Stanford et al., 2009). Whiteside, Lynam, Miller, and Reynolds (2005) defined impulsivity as being comprised of 4 subfacets: urgency (a tendency to act quickly when experiencing negative emotions), lack of premeditation (difficulty thinking of potential consequences prior to action), lack of perseverance (inability to continually focus on and/or complete a task) and sensation seeking (openness to and preference for excitement and stimulation). Other researchers, in efforts to clarify measurement of this multidimensional construct, have separated urgency into two facets, negative urgency (a tendency to act impulsively when under distress) and positive urgency (a tendency to act impulsively when experiencing exceptionally elevated moods) (Cyders & Smith, 2007, 2008; Stautz & Cooper, 2013).

There is some evidence that overweight individuals who meet criteria for binge eating disorder and food addiction exhibit significantly greater levels of impulsivity than those not meeting criteria for food addiction (Davis, 2013). Broadly speaking, individuals with eating disorders are significantly more impulsive than healthy controls (Davis et al., 2011; Galanti, Gluck, & Geliebter, 2007). Past research attempting to explicate which particular subfacets of impulsivity are most germane to disinhibited eating and food addiction results in contradiction. Murphy, Stojek, and MacKillop (2014) found that a lack of perseverance was significantly associated with food addiction in a cross-sectional, university-based sample. Kelly, Bulik, and Mazzeo (2013) found that those with binge eating endorsed significantly greater sensation seeking behaviors than those without binge eating. Moreover, multiple studies have found that sensation seeking is significantly associated with disinhibited eating behaviors (Carrard, Crépin, Ceschi, Golay, & Van der Linden, 2012; Claes, Vandereycken, & Vertommen, 2005; Davis & Fischer, 2013; Fischer, Anderson, & Smith, 2004; Fischer, Smith, & Anderson, 2003; Fischer, Smith, & Cyders, 2008; Whiteside & Lynam, 2001). While research to date on the role of positive urgency in disinhibited eating and food addiction is lacking (Cyders & Smith, 2008), negative urgency's role is extensively supported in bulimia nervosa (Carrard et al., 2012; Claes et al., 2005; Cyders & Smith, 2008; Davis & Fischer, 2013; Fischer et al., 2004, 2003, 2008; Whiteside & Lynam, 2001). Negative urgency's role in disinhibited eating, and potentially food addiction, may relate to affect; individuals are more likely to act impulsively when under distress in hopes of reducing negative affect (Tice, Bratslavsky, & Baumeister, 2001). Said differently, individuals act impulsively in an effort to regulate their emotion. Certainly, clarification is needed as to which subfacets of impulsivity are most relevant to food addiction as well as insight into the potential association between emotion regulation and food addiction.

Emotion regulation also likely plays a part in food addiction as it does in drug use disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Fox, Hong, & Sinha, 2008; Li & Sinha, 2008). Emotion regulation is the extent to which individuals influence, experience and express their emotions (Hofmann, Sawyer, Fang, & Asnaani, 2012). Dysregulation occurs when an individual does not possess the skills necessary to regulate negative affect or emotional distress (Stepp et al., 2013). Anestis, Selby, Fink, and Joiner (2007) and Anestis, Smith, Fink, and Joiner (2009) found support for an emotion dysregulation model of disordered eating (Heatherton & Baumeister, 1991) in which disordered eating behaviors are conceptualized as being driven by attempts to ameliorate negative affect and, by extension, regulate negative emotions.

Across eating disorder psychopathology, it has been found that: 1) individuals with eating disorders report significantly greater emotion dysregulation than healthy controls (Harrison, Sullivan, Tchanturia, & Treasure, 2010), 2) emotional dysregulation accounts for significantly more of the variance in binge eating over sex, food restriction, the valuation of weight and shape, and negative affect (Gianini, White, & Masheb, 2013; Whiteside et al., 2007), and 3) emotion dysregulation is significantly associated with overeating (van Strien & Ouwens, 2007) such that increased food consumption down-regulates emotional intensity (Aldao et al., 2010). In fact, emotion dysregulation has been posited and empirically supported as primary trans-diagnostic phenomena across the eating disorder spectrum (Brockmeyer et al., 2014; Treasure, Corfield, & Cardi, 2012). Given the role of emotion dysregulation in drug use disorders and disinhibited eating and eating disorders, the role of emotion dysregulation in food addiction should be assessed.

The purpose of this investigation was to examine the associations between impulsivity, emotion dysregulation, and food addiction. It was hypothesized, that: 1) lack of perseverance, sensation seeking, and negative urgency would be positively associated with food addiction and 2) emotion dysregulation would also be positively associated with food addiction.

2. Method

2.1. Participants

Participants were 878 undergraduate students (69.2% female, 30.8% male). Age ranged from 16.5 to 55.0 years old ($M = 19.8$, $SD = 2.5$). A majority of the sample, 76.4%, self-reported race/ethnicity as non-Hispanic White, followed by 14.9% Hispanic, 2.2% non-Hispanic Black, 2.1% Asian, and 4.4% Others (including multiracial and American Indian).

2.2. Measures

The Yale Food Addiction Scale (YFAS, Gearhardt et al., 2009) measures clinical symptoms of food addiction according to the substance dependence criteria in DSM-IV as well as assessing clinical impairment or distress (APA, 1994). Consumption over the past 12 months is measured with 25 items. Research has shown this scale to have good psychometric properties including internal reliability (Kuder–Richardson $\alpha = 0.86$) (Gearhardt et al., 2009). In the current study, data analysis supported previous psychometric data, including internal reliability (Kuder–Richardson $\alpha = 0.82$). On 16 items, participants respond from 0 to 4 (0 = never to 4 = 4 or more times or daily), 8 items are dichotomous (0 = no, 1 = yes) and the final item is answered from 1 to 5 (1 = 1 time to 5 = 5 or more times). Following the scoring instructions detailed by Meule and Gearhardt (2014), all items were dichotomized for the purpose of indicating whether the diagnostic criterion corresponding to a given item was positively endorsed. Then, a continuous symptom count (ranging from 0 to 7) was calculated by summing the number of endorsed criteria. Symptom count on the YFAS was used as the dependent variable in this study.

Impulsivity was measured using the UPPS + P Impulsive Behavior Scale (Lynam, Smith, Whiteside, & Cyders, 2006; Whiteside et al., 2005). Impulsivity is measured by 59 items on which participants respond from 1 to 4 (1 = agree strongly to 4 = disagree strongly). Previous research supports the psychometric properties of the UPPS + P with subscale internal reliabilities ranging from 0.82 to 0.95 (Cyders & Smith, 2007; Cyders et al., 2007; Lynam et al., 2006; Whiteside & Lynam, 2001; Whiteside et al., 2005). The UPPS + P consists of five subscales, each

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