Appetite 100 (2016) 236–243

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

The influence of negative urgency, attentional bias, and emotional dimensions on palatable food consumption

Kendra Davis Becker [a, *], Sarah Fischer [b], Gregory T. Smith [c], Joshua D. Miller [a]

[a] The University of Georgia, United States
[b] George Mason University, United States
[c] The University of Kentucky, United States

ARTICLE INFO

Article history:
Received 16 September 2015
Received in revised form
7 January 2016
Accepted 10 February 2016
Available online 11 February 2016

Keywords:
Stroop
Food
Negative urgency
Arousal
Valence

ABSTRACT

We tested a theoretical model concerning the role of attentional bias and negative affect in food consumption that offers important advances. We hypothesized that the effects of negative affect manipulations on food consumption vary as a function of trait levels of negative urgency (NU; tendency to act impulsively when distressed), and attentional bias and that the roles of emotional arousal and negative emotional valence differ and should be studied separately. 190 undergraduate women were randomly assigned to either an anger or neutral mood condition. Women in both conditions completed the Food Stroop, in which the presentation of food and neutral words were counterbalanced. After the task, participants were given the opportunity to eat mandarin oranges and/or chocolate candy while the experimenter was out of the room. The type and quantity of food consumed was counted after the participant departed. As hypothesized, the roles of emotional arousal and valence differed and the effect of the induced emotion was moderated by NU. Women high in NU who experienced emotional arousal were more likely to eat candy and consumed more candy than other women. Emotional valence had no effect on candy consumption. Neither increases in emotional arousal or emotional valence influenced attentional bias to food cues. Attentional bias was also unrelated to food consumption. The impact of negative mood inductions on palatable food consumption appears to operate through emotional arousal and not negative emotional valence, and it may operate primarily for women high in NU.

The affect regulation model of binge eating suggests that loss of control over eating results from an attempt to reduce acute negative emotions by distracting attention away from an aversive, abstract stimulus to a concrete rewarding stimulus (Heatherton & Baumeister, 1991). Thus, this model purports that binge eating serves a negative reinforcement function. Although EMA methodology has consistently revealed that negative moods rise prior to engagement in binge eating (e.g., Haedt-Matt & Keel, 2011; Smyth et al., 2007; Engel et al., 2013), experimental studies investigating the impact of acute mood inductions on food consumption have yielded mixed and inconsistent findings (Greeno, Wing, & Shiffman, 2000; Loxton, Dawe, & Cahill, 2011; Macht, 2008; van Strien et al., 2013). Some document increased food consumption in women with disordered eating and in college samples following negative mood induction procedures (e.g. Agras & Telch, 1998), and others note decreased consumption or no difference in consumption following experimentally manipulated mood conditions (e.g., Loxton et al., 2011; van Strien et al., 2013).

We believe there are at least two factors that lead to the inconsistency in the existing literature relating acute negative mood and eating behavior. The first potential reason for inconsistent findings in the literature is that the influence of negative mood on food consumption is likely moderated by individual differences among women. One such potential moderator is the personality trait of negative urgency (NU), which reflects individual differences in the tendency to act impulsively when distressed. Individual differences in NU predict the onset and maintenance of binge eating behavior (e.g., Anestis, Selby, & Joiner, 2007; Davis & Fischer, 2013; Fischer, Peterson, & McCarthy, 2013; Pearson, Combs, Zapolski, & Smith, 2012) and current theory proposes that NU moderates the influence of momentary negative affect on bulimic behaviors (Pearson, Wonderlich, & Smith, 2015). A second potential moderator is attentional bias (i.e., preferential allocation of

* Corresponding author. Massachusetts General Hospital, Department of Psychiatry, 2 Longfellow Place, Suite 200, Boston, MA 02114, United States.
E-mail address: krbecker@mgh.harvard.edu (K.D. Becker).

http://dx.doi.org/10.1016/j.appet.2016.02.019
0195-6663/

attentional resources to salient stimuli) toward food (Forestell, Lau, Gyurovski, Dickter, & Haque, 2012). Individuals who engage in emotional eating form positive expectancies (Hohlstein, Smith, & Atlas, 1998) that palatable foods relieve negative affect, and, thus, act as rewards. Attentional bias may reflect an increase in saliency to cues with heightened reward values particularly under emotional distress. Therefore, directed attention to those cues may reflect increased activation of the reward system (Hepwroth, Mogg, Brignell, & Bradley, 2010; Forestell et al., 2012) and perhaps negative affect leads to palatable food consumption for those who are experiencing increased attention towards food related stimuli. The second is that a variety of negative affect states have been utilized in laboratory studies, which vary along dimensions of valence and arousal (Hepworth et al., 2010; Lowe & Maycock, 1988). Valence signifies the extent to which an affective state is pleasant or unpleasant, while arousal captures the extent of an individual's alertness or sluggishness. Additionally, the majority of experimental studies do not assess these dimensions of affect, but rather changes in overall levels of negative mood. Thus, it is unclear which specific negative affect states, and which dimensions of affect most influence eating behavior.

A model that explains the relationships among negative affect, NU, and attentional biases and their joint effects on eating behavior has not been articulated and tested. Furthermore, past work has not investigated individual dimensions of emotional experience (emotional arousal, emotional valence) in motivating food consumption. We propose a model whereby individuals who are both high in levels of trait NU and exhibit a food attentional bias will be the most likely to consume palatable foods when emotionally distressed. These individuals may be the most intolerant of aversive negative moods, acting impulsively to decrease emotional distress (i.e., high in NU) and be the most likely to choose eating behaviors to regulate emotional distress because of increased attentional resources directed at rewarding food related stimuli. We also examined the influence of aspects of emotional experience, arousal and valence, on eating behavior. In the following sections we review the literature relating NU, negative affect, and attentional bias to eating behavior and suggest that our proposed model would advance our understanding of these constructs and better identify the individuals most at risk for emotional eating.

1. NU and food consumption

The trait of NU is consistently associated with binge eating, accounts for more variance in these symptoms than other impulsivity-related traits (Fischer, Smith, & Cyders, 2008), and has been identified as a validated binge eating risk factor because it prospectively predicts binge eating in multiple longitudinal studies (see Anestis et al., 2007; Culbert, Racine, & Klump, 2015; Fischer et al., 2013; Pearson et al., 2012). This association has been replicated in youth, clinical samples, and community samples (Fischer, Settles, Collins, Gunn, & Smith, 2012; Racine et al., 2015). Recent theory proposes that the impact of state negative mood on eating behavior is higher for women with elevated levels of NU (Pearson, Wonderlich, & Smith2015). Despite the fact that individual differences in NU account for significant variance in eating behavior, and the hypothesis that individuals with NU are more likely to act impulsively under conditions of heightened negative affect, only one published study has investigated the effects of NU on food consumption under negative mood conditions in a laboratory setting. This study demonstrated that NU was correlated with caloric intake in individuals who either also endorsed dietary restraint or low levels of positive affect following a negative mood induction (Emery, King, & Levine, 2014). Thus, the hypothesis that individuals with high levels of NU are actually more likely to impulsively eat during acute negative affect has been largely untested.

2. Heterogeneity of negative affect: dimensions of arousal and valence

Individuals with high levels of NU are hypothesized to act impulsively during acute negative affect. Negative affect itself is a multi-faceted construct, though. One important distinction that has been made is between the dimensions of emotional valence and emotional arousal within overall negative affectivity (Morgan & Heise, 1988; Russell, Weiss, & Mendelsohn, 1989). This two dimensional model of emotional experience is supported in both self-report studies and neurobiological studies showing that certain peripheral physiological responses are uniquely related to arousal levels (e.g., skin conductance and heart rate) while others are more closely associated with valence levels (e.g., facial muscle movement; Posner, Russell, & Peterson, 2005; Posner et al., 2009).

Some authors theorize that emotional arousal levels may be more varied across individuals in similar situations than valence levels and, therefore, may be more predictive of dysregulated behaviors including eating behavior (Chanel, Kronegg, Grandjean, & Punn, 2006; Cools, Schotte, & McNally, 1992). Data from one study that assessed these two dimensions indicated that arousal levels motivate emotional eating behavior more so than emotional valence (Cools et al., 1992). Additionally, findings with individuals who have experienced sexual trauma suggest that heightened physiological arousal mediates the relationship between trauma and the development of disordered eating (Holzer, Uppala, Wonderlich, Crosby, & Simonich, 2008). It is unclear whether or not the general feeling of unpleasantness, or an aversive shift in arousal, is more likely to facilitate impulsive behavior in individuals with high levels of NU.

Of course, another distinction one can make is between discrete affective states, such as anger, sadness, and anxiety. Among those states, to date anger has been shown to be relevant for problematic eating behavior in both non-clinical (Milligan & Waller, 2000) and clinical (Engel et al., 2007) samples. Additionally, anger is characterized by both negative valence and high arousal (Klonsky, 2009; Morgan & Heise, 1988). Thus, the discrete state of anger provides both heightened unpleasantness and heightened arousal, both of which may facilitate impulsive behavior.

3. Attentional bias and food consumption

NU appears to operate as a transdiagnostic risk factor, in that it prospectively increases risk for a range of impulsive behaviors, including binge eating, alcohol use, drug use, risky sex, gambling, and self-harm (Smith & Cyders, in press). Considerable evidence supports the hypothesis that those high in the trait act rashly to gain an immediate reduction in negative affect (Smith & Cyders, in press). Thus, an important question concerns what factors lead a women with elevated NU to choose food consumption, rather than some other impulsive behavior, when distressed. Attentional biases to food cues may be one such pathway. A recent meta-analysis of risk for substance abuse indicated that higher levels of impulsivity appear to increase attentional biases to substance related cues (Coskunpinar & Cyders, 2013), however, no study has yet investigated the relationship between impulsivity and attentional bias in relation to food behaviors. However, there are significant correlations between attentional biases to food words and food intake (Maalouf & Yeomans, 2010; Overduin, Jansen, & Louwerse, 1995). Furthermore, increased latencies for unhealthy food words during a laboratory task predicted increases in body mass index (BMI) over a year's time (Calitri, Pothos, Tapper, Brunstrom, & Rogers, 2010).