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Are emotionally driven and addictive-like eating behaviors the missing links between psychological distress and greater body weight?

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ABSTRACT

There is now a large body of evidence suggesting a significant association between emotional discomfort management, disordered eating behaviors and weight status. In the field of overweight and obesity, emotionally driven eating habits that resemble addictive behaviors are considered as a risk factor. This study aimed to investigate in a large sample of French university students 1) the associations between self-reported levels of psychological distress (PD), emotional eating (EE), food addiction (FA) and Body Mass Index (BMI); and 2) the potential mediation effect of eating behaviors (EE and FA) between PD and BMI. The responses of 1051 students (76.3% females) to self-reports assessing PD (Perceived Stress Scale, Hospital Anxiety and Depression Scale), EE (Intuitive Eating Scale-2) and FA (modified Yale Food Addiction Scale) were analysed. Associations between variables (Spearman correlation) and group comparisons by sex and BMI categories (Student's *t* tests/ANOVA) were tested, followed by Structural Equation Modeling (SEM) by sex. Among females and males, EE and FA scores were positively interrelated and correlated with PD scores and BMI. Moreover, among females and males, SEM showed that both EE and FA acts as mediators between PD and BMI. Hence, among educated young adults, using food consumption for down-regulating negative mood places the individual at risk for overweight and obesity. This study further emphasizes the necessity to take into account emotionally driven and addictive-like eating behaviors in interventions for promoting healthy eating and weight management.

1. Introduction

Food consumption is considered an important mood regulating behavior (Greeno & Wing, 1994; Heatherton & Baumeister, 1991; Polivy & Herman, 1993). In this setting, the terms 'Emotional Eating' (EE) (or 'comfort eating') have been used to reflect the tendency to eat in response to emotions rather than to feelings of hunger or satiety. Indeed, some individuals appear to be more susceptible to unhealthy shift in food choices and consume more hyperpalatable (HP) foods (i.e. sweet, salty, high-fat and energy-dense foods) in order to cope with negative emotions (Macht, 2008; Nguyen-Michel, Unger, & Spruijt-Metz, 2007; Oliver, Wardle, & Gibson, 2000; Rotella et al., 2015). As an example, in a recent American survey among adults, 38% reported overeating unhealthy foods in the past month because of stress, and half of them reported engaging in these behaviors weekly or more (APA, 2015). In a

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French national survey, 44.4% of respondents reported eating more under stress (Beck, Guilbert, Gautier, & Lamoureux, 2007).

In a review on the psychobiology of emotional eating, Gibson (2012) stated that though '*emotional or comfort eating is one of the earliest theoretical accounts of obesity […], there is a risk that at least some of the association of negative affect and eating commonly reported by obese patients could be an epiphenomenon, that is the obese overeat regularly and suffer negative affect and stressful lives, but there may not necessarily be a causal link*' (Gibson, 2012, p.453–454). Among the studies that have started to specifically examine the relationship between mood or psychological distress and vulnerability to obesity, many have related EE to BMI (e.g. Konttinen, Silventoinen, Sarlio-Lähteenkorva, Männistö, & Haukkala, 2010; Laitinen, Ek, & Sovio, 2002; Péneau, Ménard, Méjean, Bellisle, & Hercberg, 2013), to weight gain (e.g. Hays & Roberts, 2008; Koenders & van Strien, 2011) and to depression (Konttinen et al., 2010; Ouwens, van Strien, & van Leeuwe, 2009), but only few recent studies indicate the importance of EE in pathways between mood or psychological distress and overweight/obesity (most of them were conducted among American people). For instance, in three different samples, EE was found to mediate the effects of depressive symptoms on adiposity indicators and BMI among both females and males (Konttinen et al., 2010; van Strien, Winkens, et al., 2016). The same mediation was reported in studies with a majority of females (Antoniou, Bongers, & Jansen, 2017; Goldschmidt et al., 2014) and with females exclusively (Clum, Rice, Broussard, Johnson, & Webber, 2014). Yet, others failed to show that EE mediated the relation between perceived stress and BMI among females (mostly obese; see Richardson, Arsenault, Cates, & Muth, 2015). Finally, van Strien, Konttinen, Homberg, Engels, and Winkens (2016) investigated this issue in a longitudinal study (5-years follow-up) and confirmed that the association between depression and increase in BMI was mediated by EE, but only in females (see also Ibrahim, Thearle, Krakoff, & Gluck, 2016 for a negative result).

In some cases, like for drug misuse, the increase in frequency and quantity of 'comfort foods' intake may lead to an addiction disorder. Sinha and Jastreboff (2013) proposed a heuristic model of how HP foods, food cues and stress exposure may alter metabolic, stress and reward-motivation pathways in the brain and body to promote HP food motivation and intake. The authors described a sensitized feed-forward process that would in turn induce weight gain in vulnerable individuals (Sinha & Jastreboff, 2013). This would be particularly at stake among individuals vulnerable to hedonic drives or internally-driven motives. Similar to what has been described for the association between stress and drug intake, in these individuals, increased eating may help to regulate their mood and alleviate the distress evoked by intrinsic or extrinsic stress exposure (Burgess, Turan, Lokken, Morse, & Boggiano, 2014; Garg, Wansink, & Inman, 2007; Gibson, 2012; Macht, 2008; Volkow, Wang, Tomasi, & Baler, 2013). The concept of Food Addiction (FA) has been used to account for such addictive mechanisms underlying habit-forming processes related to overeating HP foods in the absence of hunger and their impact on weight gain (Davis, 2013; Meule, 2015; Parylak, Koob, & Zorrilla, 2011; Piccinni et al., 2015). In other words, FA is considered an extreme or psychopathological state where, beyond the psychological motivation of a mood change (i.e. emotional eating), compulsive eating of HP food is due to other mechanisms implicated in addiction such as reward dysfunction and impulsivity (Schulte, Grilo, & Gearhardt, 2016; Volkow et al., 2013). However, the concept of food addiction is controversial (Hebebrand et al., 2014; Ziauddeen & Fletcher, 2013) and additional research is needed to evaluate its utility and validity.

In this framework, the Yale Food Addiction Scale (YFAS) (Gearhardt, Corbin, & Brownell, 2009) was developed by modeling the DSM-IV criteria for substance dependence to be applicable to eating behaviors. If YFAS scores have been positively associated with symptoms of psychological distress (in particular depression) on the one hand, and increased weight on the other hand (see Pursey, Stanwell, Gearhardt, Collins, & Burrows, 2014 for a review), to the best of our knowledge, no study tested whether addictive-like eating (as assessed through YFAS scores) mediate the association between mood or psychological distress and BMI – as it seems to occur for EE. In recent models proposing a dimensional view of overeating and FA spectrum, EE has been viewed as a potential precursor in the escalation of addictive-like eating behaviors (Davis, 2013; Piccinni et al., 2015). If it is reasonable to assume that, due to an excessive motivational drive for food, emotional eaters are exposed to repeatedly consume naturally rewarding food, which in turn can alter the neurobiological systems mediating addictive behaviors (Volkow, Koob, & McLellan, 2016), this explanatory mechanism remains theoretical. So far, EE and FA have been found to co-occur and/or to be positively associated, but with a level of association of medium magnitude (see Pursey et al., 2014). This is notably the case among people with clinically significant compulsive overeating (such as in bulimia nervosa and binge eating disorder), with studies showing that some but not all the patients are affected by these behaviors (e.g. Ahmed & Sayed, 2017; Fischer et al., 2007; Granero et al., 2014; Meule, von Rezori, & Blechert, 2014). As EE and FA are only partially overlapping, their potential influence on weight should be examined separately.

The aim of our study was to test the potential mediation effect of these two potential pathways (emotionally driven food intake, and addictive-like eating behaviors) between psychological distress and weight in a large sample of young adults. We expected to confirm the literature findings showing that EE acts as a mediator between psychological distress and BMI. However, in the absence of prior studies on the potential mediation effect of FA on the psychological distress-weight gain link, this issue was investigated from an exploratory perspective and no hypothesis was formulated.

We chose to investigate these issues among university students as they are considered at risk for developing unhealthy eating behaviors and for rapid weight gain. Indeed, university entrance is marked by new stressful issues and significant changes, which require adaptive resources. The students' financial constraints impact the healthiness of their diet (Gibson, 2012). Several studies showed that students' weight (Anderson, Shapiro, & Lundgren, 2003) and perceived stress (Tavolacci et al., 2013) increase, while at the same time physical activities decrease (Boujut & Koleck, 2009). Studies have also shown that exam periods are associated with an increased tendency to eat, with higher energy intake and less healthy diet (Barker, Blain, & Russell, 2015).

In addition, because females are more prone than males to show symptoms of psychological distress and are disproportionately affected by disordered eating behaviors and obesity, there may be sex-related mechanisms that could foster cumulative disadvantage in weight gain over time among females compared to males (Gibson, 2012; Hallam, Boswell, DeVito, & Kober, 2016). For instance, it stems from French epidemiological studies that i) females are more prone to report eating for emotional reasons than males and that ii) sex impacts the association between EE and weight status as well as the association between depression, emotionally driven eating behaviors and consumption of energy-dense food (stronger among females) (Camilleri et al., 2016, 2014; Péneau et al., 2013). Similarly, in the field of Food Addiction, females report higher levels of FA symptoms and the overall prevalence of FA diagnosis was found to be higher among females (Pursey et al., 2014). Because of sex-differences in psychological distress, emotional eating and food addiction, which could influence mediation effects, all analyses were performed separately for