



Food addiction in children: Associations with obesity, parental food addiction and feeding practices



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ABSTRACT

Food addiction research in children is limited, and to date addictive-like eating behaviors within families have not been investigated. The aim of this study is to understand factors associated with addictive-like eating in children. The association between food addiction in children with obesity, parental food addiction, and parental feeding practices (i.e., restriction, pressure to eat, monitoring) was investigated. Parents/primary caregivers (aged ≥ 18 years) of children aged 5–12 years, recruited and completed an online cross-sectional survey including demographics, the Yale Food Addiction Scale (YFAS), and the Child Feeding Questionnaire (CFQ). Parents, reporting on themselves and one of their children, were given a food addiction diagnosis and symptom score according to the YFAS predefined criteria. The total sample consisted of 150 parents/primary caregivers (48% male) and 150 children (51% male). Food addiction was found to be 12.0% in parents and 22.7% in children. In children, food addiction was significantly associated with higher child BMI z-scores. Children with higher food addiction symptoms had parents with higher food addiction scores. Parents of FA children reported significantly higher levels of *Restriction* and *Pressure to eat* feeding practices, but not *Monitoring*. Children with elevated YFAS-C scores may be at greater risk for eating-related issues.

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1. Introduction

There has recently been a resurgence of interest in the addictive aspects of overeating (Meule, 2015). In animal models, consumption of high-fat, high-sugar foods leads to biological (i.e., dopaminergic downgrading) and behavioral (i.e., enhanced motivation) signs of addiction (Johnson & Kenny, 2010; Brown, Kupchik, Spencer, et al., 2015). While there is no agreed upon definition of addictive-like eating in humans, the Yale Food Addiction Scale (YFAS) is the only existing validated measure designed to assess food addiction (Gearhardt, Corbin, & Brownell, 2009). The YFAS applies the criteria for substance dependence based on the Diagnostic and Statistical Manual of Mental Disorders (DSM) IV (American Psychiatric Association, 2000) to the consumption of highly palatable foods (e.g., ice cream, chocolate, pizza). The YFAS has two scoring options: 1) a continuous summary of the number of symptoms endorsed and 2) a dichotomous diagnostic threshold based on the DSM IV criteria (i.e., three or more symptoms and clinically significant impairment/distress). In adults, food addiction has been associated with biological (e.g., reward dysfunction) (Gearhardt et al., 2011; Davis et al., 2013) and behavioral (e.g., cravings, impulsivity) (Murphy, Stojek, & MacKillop, 2014; Meule & Kübler, 2012; Meule &

Gearhardt, 2014) factors implicated in addictive disorders. Further, food addiction in adults is associated with elevated body mass index (BMI) (Pursey, Stanwell, Gearhardt, Collins, & Burrows, 2014a) and increased visceral adiposity (Pursey, Gearhardt, & Burrows, 2016).

However, there has been limited research on food addiction in children (Burrows & Meule, 2015). If certain foods are capable of triggering an addictive response, children may be at greater risk than adults for experiencing adverse consequences as their neural and psychological systems are still developing (Tapert, Caldwell, & Burke, 2005; Brown, Tapert, Granholm, & Delis, 2000). Whereas the initial use of drugs of abuse (e.g., alcohol, cannabis) typically occurs during adolescence and early adulthood (Johnston, O'Malley, Bachman, & Schulenberg, 2012; Degenhardt, Chiu, Sampson, et al., 2008), consumption of potentially addictive foods (e.g., candy, cake, sugar-sweetened beverages) is more likely to occur during early childhood (Pan et al., 2014; Nickelson, Lawrence, Parton, Knowlden, & McDermott, 2014). Although highly palatable foods may have a lower addictive potential than other substances, the repeated consumption of these foods early in development may increase the risk of deleterious outcomes. Thus, it is important to understand whether food addiction may occur in childhood and its association with other eating-related issues.

Emerging evidence suggests that addictive processes exist in relation to dietary intakes and eating behaviors in children. In a previous qualitative study symptoms associated with addiction including tolerance and cravings were frequently reported with 66% of children

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identifying addiction as a contributor to their eating problems (Pretlow, 2011). In additional studies, children (Merlo, Klingman, Malasanos, & Silverstein, 2009) and adolescents (Laurent & Sibold, 2016; Meule, Hermann, & Kubler, 2015) have reported that they often felt addicted to food. The Yale Food Addiction Scale for Children (YFAS-C) was created to provide a developmentally appropriate way to assess for addictive-like eating in children (Gearhardt, Roberto, Seamans, Corbin, & Brownell, 2013a). The YFAS-C measures the same symptoms as the original YFAS, but at a lower reading level and with questions reframed to be more relatable to children and adolescents (e.g., referencing school, peers, and parents). Few studies have investigated YFAS food addiction in children. One study in a community sample of 75 children ranging in age from 4 to 16 years old, the average number of food addiction (FA) symptoms endorsed was two and a prevalence of FA 7.2% (Gearhardt et al., 2013). An additional study in children 9–14y ($n = 65$) identified a lower prevalence of FA of 4% (Laurent & Sibold, 2016) while another study of overweight and obese adolescents seeking weight-loss treatment found that 38% of participants met the YFAS food addiction threshold and endorsed and average of three symptoms (Meule et al., 2015). Gearhardt and colleagues found that children who endorsed more symptoms of addictive-like eating had lower satiety responsiveness, increased emotional eating and higher BMI (Gearhardt et al., 2013).

There are specific concerns in using questionnaires about dietary intakes and behaviors in children, which are related to child cognitive development and capacity to concentrate, and may influence their ability to both recall foods and estimate portion sizes (Livingstone, Robson, & Wallace, 2004). For these reasons child dietary behaviors are commonly reported by a proxy, usually parents (Livingstone et al., 2004) and most commonly by the mother (Burrows, Martin, & Collins, 2010) who is regarded as the gatekeeper of food provision within the family environment. Specifically, children younger than 12 years may lack the insight or awareness to accurately report on their eating behaviors with parents of younger children previously shown to be more accurate (Burrows et al., 2013). Asking parents to report on their children's addictive-like eating behaviors may provide a useful approach to assessing food addiction earlier in development.

It is plausible that parental attributes may be associated with an increased likelihood of addictive-like eating in children. Children of parents with substance use disorders (SUDs) are more likely to exhibit problematic patterns of substance use (Merikangas, Stolar, Stevens, et al., 1998). This increased familial risk is likely due to a multitude of contributors, including genetic and environmental factors (McGue, Elkins, & Iacono, 2000; Goldman, Oroszi, & Ducci, 2005; Weinberg, 2001). In the context of food addiction, no prior research has examined whether there is an association between parents' and children's addictive-like eating. Further, as food addiction is associated with obesity in adults (Pursey, Collins, Stanwell, & Burrows, 2015), it is also possible that parents with a higher BMI may have children with more food addiction symptoms. If children of parents with food addiction or obesity are more prone to experience addictive-like eating, this highlights an important at-risk group that may benefit from early intervention.

Another factor that may be associated with higher food addiction in children is parental feeding practices. Parental feeding practices represent a caregivers' approach to maintaining or modifying children's behavior with respect to eating (Birch & Fisher, 1995). The Children's Feeding Questionnaire (CFQ) is the most commonly used measure to assess these feeding-related parental practices (Birch et al., 2001; Collins, Duncanson, & Burrows, 2014). The CFQ examines several different aspects of feeding practices, with the majority of existing research focused on three: (Meule, 2015) Restriction (e.g., restriction of children's access to "junk" foods), (Johnson & Kenny, 2010) Pressure to eat (e.g., pressuring child to eat more food at mealtimes), and (Brown et al., 2015) Monitoring (e.g., overseeing children's food consumption). More restrictive feeding practices have generally been associated with higher BMI in cross-sectional studies, however, longitudinal studies

are less consistent (Shloim, Edelson, Martin, & Hetherington, 2015). Although some studies have found that restrictive feeding practices were associated with future obesity risk (Dev et al., 2013), other studies found no association (Gubbels, Kremers, Stafleu, et al., 2011; Webber, Hill, Cooke, Carnell, & Wardle, 2010) and one study found that restriction was protective against future unhealthy weight gain in younger children (Campbell, Andrianopoulos, Hesketh, et al., 2010). Thus, it is unclear whether restrictive parental feeding practices may cause problematic eating patterns or are reactions to the child's existing high-risk eating tendencies (Shloim et al., 2015). Pressure to eat has generally been associated with lower child BMI, which may reflect parental responses to children with weaker appetites and less enjoyment of eating (Wehrly, Bonilla, Perez, & Liew, 2014). Monitoring appears to be the feeding practice that shows the weakest association with child BMI (Shloim et al., 2015), although there is some evidence that monitoring may be protective against unhealthy weight gain (Gubbels et al., 2011). There has been no prior research examining whether certain parental feeding practices are more likely to occur with children with more addictive-like eating.

In the current study, we aim to more fully understand the factors associated with addictive-like eating in children based on parental report. In a community sample, we hypothesize that children with elevated YFAS-C scores (i.e., symptom count and diagnostic threshold) will have higher BMI z-scores and will be more likely to be obese. Next, we hypothesize that children with higher food addiction scores will have parents with more addictive-like eating behavior and higher BMI. Finally, we will investigate whether food addiction in children is associated with certain parental feeding practices (i.e., restriction, pressure to eat, monitoring).

2. Methods

2.1. Participants

Parents/primary caregivers of 5 to 12 year-old children, were recruited through Amazon Mechanical Turk (MTurk, <http://www.mturk.com>). MTurk is an online market place, which is becoming an increasingly popular mechanism for recruiting participants and collecting survey data for scientific research online (Paolacci & Chandler, 2014; Buhrmester, Kwang, & Gosling, 2011; Schleider & Weisz, 2015). Recent findings suggest MTurk offers a viable alternative for data collection and MTurk workers are slightly more demographically diverse than standard Internet samples (Paolacci & Chandler, 2014; Shapiro, Chandler, & Mueller, 2013). Furthermore, the data yielded are often of similar reliability to more traditional convenience sampling techniques (Paolacci & Chandler, 2014; Paolacci, Chandler, & Ipeirotis, 2010). All data gathered via Qualtrics online survey software are encrypted (Transport Layer Security) and password protected.

2.2. Measures

The survey used in this study was piloted with University of Michigan staff and employees prior to implementation on MTurk ($n = 6$), with minor modifications made to improve readability, modification of some of the food names to align with local naming conventions, for example, capsicum was changed to pepper. The survey was loaded into Qualtrics online survey software, then listed on the HIT page of MTurk and made available to U.S. residents for a 3-day period from February 18–20, 2015. Participants were recruited and resided in the U.S. and were compensated US\$0.50 for survey completion.

The final survey consisted of 146 items and was completed by the parent/primary caregiver reporting on both themselves (demographics, addictive eating behaviors and parental feeding practices) and one of their children, known as the index child (demographics and addictive eating behaviors; dietary intake). To determine eligibility, participants interested in the study completed a 2-item qualifying questionnaire as

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