Food Addiction among Men and Women in India

Ashley A. Wiedemann, Ph.D.[#1], **Jessica L. Lawson, Ph.D.**[#1], **Paige M. Cunningham**[1], **Kathryn M. Khalvati**[1], **Janet A. Lydecker**[1], **Valentina Ivezaj**[1], and **Carlos M. Grilo**[1,2]

[1]Yale School of Medicine, Psychiatry Department, New Haven, CT

[2]Yale University, New Haven, CT, 06511

[#] These authors contributed equally to this work.

Abstract

Objective: This study aimed to address a cultural gap in the food addiction (FA) literature by examining FA and associated clinical features in a non-clinical group of men and women residing in India.

Method: Participants (*N*=415) were recruited from Amazon Mechanical Turk to complete an online survey about weight and eating. Participants completed self-report measures assessing FA (YFAS), eating-disorder psychopathology (EDE-Q), health-related quality of life (SF-12), and depression (PHQ-2).

Results: The FA symptom mean was 3.53 (*SD*=1.90); 32.5% (*n*=129) met FA clinical threshold on the YFAS. Groups categorized with and without FA on the YFAS did not differ significantly in sex or BMI. YFAS scores were significantly correlated with greater frequency of binge-eating, higher severity scores on all EDE-Q subscales, higher depression, and poorer functioning scores on the SF-12 (all *p*'s<.05).

Conclusions: Food addiction, as conceptualized and measured by the YFAS, appears to be common among individuals residing in India.

Introduction

The concept of food addiction continues to gain attention, with recent interest directed towards understanding the cross-cultural presentation of food addiction symptomology and clinical correlates (Brunault, *et al.*, 2017; Chen, Tang, Guo, Liu, & Xiao, 2015). The food addiction model posits that certain individuals are susceptible to a patterned addictive response to highly palatable foods, which reinforces problematic eating behavior (Gearhardt, Davis, Kuschner, & Brownell, 2011). Among the scientific community, the construct of food

Correspondence: Ashley A. Wiedemann, Ph.D., Yale School of Medicine, Program for Obesity, Weight, and Eating Research, 301 Cedar Street, New Haven, CT 06519, Phone (203) 737-4460; Fax (203) 785-7855; ashley.wiedemann@yale.edu.

addiction is considered controversial, with debated discourse centering around the neurobiological mechanisms of food addiction and its relation to discriminating features of other addictive and eating disorders (Long, Blundell, & Finlayson, 2015). The examination of food addiction from varied cultural perspectives may help address gaps in the literature and contribute to greater understanding of the construct.

Food addiction (generally assessed using versions of the Yale Food Addiction Scale (YFAS; Gearhardt, *et al.*, 2009), in both clinical and non-clinical study groups, has consistently been associated with biopsychosocial variables. Prior findings suggest strong associations between food addiction and obesity, depression, health-related quality of life, and disordered eating behaviors, including emotional eating and binge eating (Burrows, Kay-Lambkin, Pursey, Skinner, & Dayas, 2018; Chao, *et al.*, 2017; de Vries & Meule, 2016; Gearhardt, Boswell, & White, 2014; Gearhardt, Corbin, & Brownell, 2009; Gearhardt, *et al.*, 2012; Pursey, Stanwell, Gearhardt, Collins, & Burrows, 2014; Schulte, Grilo, & Gearhardt, 2016; Wolz, Granero, & Fernandez-Aranda, 2017). Food addiction appears more common in women, while studies examining the association of food addiction and racial/ethnic identity have been mixed (Burrows, *et al.*, 2018). Overall, the majority of studies examining food addiction have been conducted in the United States with relatively homogeneous participant groups (e.g., White women with obesity). Further, food addiction is most commonly studied among individuals seeking weight loss treatment, individuals with disordered eating, and undergraduate students (Burrows, *et al.*, 2018; Pursey, *et al.*, 2014). These parameters limit generalizability of findings to populations of diverse ethnicity, race, socio-economic and weight status, as well as to non-clinical groups.

As so few studies have examined food addiction in culturally-heterogenous groups, little is known about how food addiction presents in these understudied populations. As noted above, the method predominately used to measure and operationalize food addiction (i.e., the YFAS (Gearhardt, *et al.*, 2009), is a self-report questionnaire based on the seven substance use disorder diagnostic criteria in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association [DSV-IV-TR], 2000). Two recent meta-analytic studies reported the weighted mean percentage of participants that met the YFAS clinical-threshold for food addiction was 16.2% and 19.9%, respectively (Burrows, *et al.*, 2018; Pursey, *et al.*, 2014). Burrows et al. (2018) observed that the YFAS has been translated and validated into several languages including Arabic, Italian, French, German, Spanish, Chinese, and Turkish. Such work takes important steps towards understanding how food addiction translates across cultures by evaluating the validity of the food addiction construct. Research is still needed, however, to understand cultural influences and correlates of food addiction across cultural constructs. Addressing this gap may be particularly pertinent for countries undergoing rapid cultural and economic changes, as eating behaviors appear to be shaped by sociocultural phenomena and thus may respond to cultural transition (Kelly, 2003; Pike, Hoek, & Dunne, 2014).

India is one such country undergoing rapid global integration characterized by economic, nutritional and sociocultural changes (Raskind, Patil, Haardörfer, & Cunningham, 2018; Thomas, Lee, & Becker, 2016). Food addiction and associated clinical features remain relatively understudied among individuals from India. Importantly, a study conducted with

an ethnically-diverse online international sample found that non-White ethnicity was significantly associated with increased likelihood of a food addiction "diagnosis" and moreover, this effect was driven predominately by participants identifying as South Asian (Meadows, Nolan, & Higgs, 2017). Compared to White participants, South Asian participants endorsed significantly more YFAS symptoms, and were significantly more likely to self-classify as having food addiction (Meadows, *et al.*, 2017). These findings parallel research citing significantly more disordered eating behaviors (such as binge eating) and atypical cultural presentations of eating disorders in individuals from the Indian subcontinent when compared with White individuals (Gupta, Chaturvedi, Chandarana, & Johnson, 2001; Lal, Abraham, Parikh, & Chhibber, 2015). These findings may also be of importance within the context of the rising obesity prevalence in India, which has increased from 12.1%, documented in 2000, to 19.7% in 2016 (World Health Organization, 2016).

A recent review suggests that increases in obesity and problematic eating behaviors have occurred concurrent with the rise of globalization and industrialization in South Asian countries, including India (Pike & Dunne, 2015). Moreover, emerging evidence suggests that meeting the clinical threshold of food addiction may be even more common among Indian individuals compared to other ethnicities (Meadows, *et al.*, 2017). Coupled together, these findings provide further clinical relevance for assessing food addiction in this population. This study aims to address a cultural gap in the food addiction literature and examine food addiction, as measured by the YFAS, and associated clinical features among an online community group residing in India.

Methods

Participants

Participants (*N*=415) were recruited from the Mechanical Turk website to complete an online survey about weight and eating. Individuals were eligible to participate and included in study analyses if they were over 21 years old, spoke English, and were born and currently resided in India. Mechanical Turk is a recruitment platform that yields high-quality and convenient participant data (Buhrmester, Kwang, & Gosling, 2011; Buhrmester, Talaifar, & Gosling, 2018; McCredie & Morey, 2018), in part by including checks for attentiveness during survey completion. Samples have greater demographic (e.g., age) and geographical diversity than traditionally-recruited convenience samples, such as undergraduate students and other internet samples (Behrend, Sharek, Meade, & Wiebe, 2011), but otherwise have similar characteristics to samples recruited by other methodologies (McCredie & Morey, 2018). Mechanical Turk also allows for the specific recruitment of participants by qualifications, including country where they reside (i.e., India). Comparisons of the psychometric properties of measures completed by Mechanical Turk participants have similar reliability and validity as those completed by participants recruited using traditional sources (Hauser & Schwarz, 2016; Shapiro, Chandler, & Mueller, 2013). Mechanical Turk has increasing popularity in the social sciences (Buhrmester, *et al.*, 2018), and has been used in psychological and psychiatric research (Mathes, Norr, Allan, Albanese, & Schmidt, 2018; McCredie & Morey, 2018), including eating research (Burrows, *et al.*, 2017; Powell, Frankel, Umemura, & Hazen, 2017). For the present investigation participants were paid 50

cents, consistent with most Mechanical Turk research (Buhrmester *et al.,* 2011). This payment exceeds the payment threshold recommended in a recent study to increase the attentional aspects and quality of data provided by Mechanical Turk participants recruited in India (Litman, Robinson, & Rosenzweig, 2015).

Among participants, 79.5% (*n*=330) reported English as their primary language. Participants were predominantly male (63.4%, *n*=263) and the racial-ethnic distribution of the sample was: 98.6% Asian (*n*=409), 1% White (*n*=4), 0.2% Black (*n*=1), and 0.2% Multiracial (*n*=1). The mean age and body mass index (BMI) of participants was 32.01 (*SD*=7.93) years, and 24.25 (*SD*=4.99) kg/m^2, respectively. Of the total sample, 53.5% of participants were within the "healthy" weight range, 8.6% were in the underweight range, 26.2% were within the overweight range, and 11.7% were in the obesity category. The majority of participants (*n*=238; 55.7%) had attended college, 33.3% attended more than college, 7% attended some college or obtained an associates degree, and 4.1% attended high school or less. This study received approval from the University Institutional Review Board and all participants provided electronic informed consent prior to participation.

Measures

Participants completed self-report measures assessing demographic information, eating patterns and lifestyle behaviors. Participants reported their current weight and height, which was used to calculate BMI (kg/m^2). All measures were completed in English.

Yale Food Addiction Scale

The Yale Food Addiction Scale (YFAS) (Gearhardt, *et al.*, 2009) is a 25-item self-report measure of food addiction. Items were developed in correspondence with substance-dependence criteria from *DSM-IV-TR* and symptoms are assessed with respect to the consumption of certain foods such as sweets, starches, salty snacks, fatty foods, and sugary drinks. Symptoms are assessed with respect to the past 12 months. The YFAS offers two scoring methods: 1) dimensional total of endorsed symptoms, and 2) a dichotomous assessment of food addiction "diagnosis" which is met when at least three symptoms and clinically significant impairment or distress are endorsed (Gearhardt, *et al.*, 2009). Psychometrically, the YFAS has a one-factor structure with adequate internal consistency (α =.86), convergent validity, and incremental validity in predicting binge-eating (Gearhardt, Boswell, *et al.*, 2014; Gearhardt, *et al.*, 2009). A Cronbach's alpha of .93 was obtained in the present study.

Eating Disorder Examination-Questionnaire

The Eating Disorder Examination Questionnaire (EDE-Q) provides a measure of the range and severity of eating-disorder psychopathology during the past 28 days. An abbreviated version (behavioral symptoms plus seven items comprising three CFA-established factors or subscales) used in this study has demonstrated strong psychometric properties that are significantly superior to those for the original EDE-Q in both non-clinical (Grilo, Reas, Hopwood, & Crosby, 2015; Machado, Grilo, & Crosby, 2017) and clinical groups (Machado *et al.,* 2017). Subscales include Restraint, Overvaluation of shape and weight, and Dissatisfaction with shape and weight. Frequency of objective binge-eating episodes,

characterized as eating an unusually large amount of food while feeling a subjective sense of loss-of-control, was also assessed. Cronbach's alpha for the EDE-Q subscales in this study ranged from .84 to .87.

Medical Outcomes Study Short Form Health Survey

The Medical Outcomes Study Short Form Health Survey – 12 item version (SF-12) is a brief version of the SF-36 (Ware & Sherbourne, 1992), and a widely-used measure of health-related quality of life, including two summary scores: physical and mental health. The SF-12 has been psychometrically assessed and validated across ethnicities (Gandek, *et al.*, 1998). Internal consistency statistics reported among a sample of individuals from Northern India (a =.68-.80) suggest it is appropriate for use in Indian samples (Wind, Joshi, Kleber, & Komproe, 2013).

Patient Health Questionnaire

The Patient Health Questionnaire (PHQ-2) (Kroenke, Spitzer, & Williams, 2003) is a brief version of the PHQ-9 (Spitzer, Kroenke, & Williams, 1999) that assesses the frequency of depressive mood and anhedonia over the past two weeks. Comprised of the first two items of the PHQ-9 ("feeling down, depressed, or hopeless" and "little interest or pleasure in doing things"), the PHQ-2 decreases screening burden for depression due to its brevity and ease of scoring. The PHQ-2 total score ranges from 0–6; a cut-point of 3 indicates the need for further depression screening (Kroenke, *et al.*, 2003).

Statistical Analyses

We used SPSS 24.0 version to analyze these data. Bivariate correlations were used to examine the association between the YFAS symptom score and demographics (e.g., age), BMI, eating-disorder psychopathology (i.e., EDE-Q: brief version), and measures of health-related quality of life and depression (i.e., SF-12, PHQ-2). Independent samples *t*-tests were conducted to compare participants who met the clinical threshold of food addiction on the YFAS (FA group) to those without (no-FA Group) for all continuous variables (e.g., age, BMI) and chi-square analyses were used to compare the groups on sex. Cohen's d was computed for effect sizes.

Results

The YFAS food addiction symptom mean was 3.53 (*SD*=1.90) and 32.5% (*n*=120) of the sample met the clinical threshold for FA. YFAS symptom scores were analyzed dimensionally and categorically with respect to demographic variables. Of the participants who met criteria for FA, 70 (58.3%) identified as male and 49 (40.8%) identified as female, and 1 (.8%) identified as "other." There were significant sex differences in the number of FA symptoms endorsed when comparing men to women, with women reporting a greater total number of symptoms on the YFAS (*M*=5.51, *SD*=1.26) than men (*M*=4.99, *SD*=1.27), *t*(117)= −2.23, *p*=.03. Independent samples *t*-tests were conducted to assess for group differences between participants who met criteria for FA and those who did not. There were no significant differences found between the FA and no-FA groups for age, BMI or years of education (all *p* values >.05). YFAS symptom scores were also not significantly associated

with age ($r= -.04$, $p=.44$), BMI ($r=.03$, $p=.58$), or years of education ($r=.003$, $p=.95$). Chi square tests revealed no significant differences for food addiction diagnosis by sex, χ^2 (2, $N=369$) = 4.01, $p=.14$.

Frequencies of the seven symptoms on the YFAS were examined. Across all participants, YFAS symptoms were endorsed with the following frequencies: 28.2% ($n=104$) reported consuming more than intended; 88.3% ($n=326$) reported an inability to cut down or stop eating; 60.7% ($n=224$) reported reduced participation in important activities; 59.3% ($n=219$) reported tolerance symptoms; 42.3% (n =156) reported continued use despite consequences; 39.0% ($n=144$) reported "withdrawal" symptoms; 34.7% ($n=128$) reported they spent a great deal of time obtaining food, eating throughout the day, or recovering from overeating; and 32.8% ($n=121$) reported clinical impairment. Of the participants who met the clinical threshold of food addiction, 10 participants (9.0%) had a BMI in the underweight category, 64 participants (57.7%) had a BMI in the "healthy" weight category, 24 participants (21.6%) had a BMI in the overweight category, and 13 participants (11.7%) had a BMI in the obesity category.

The YFAS symptom score was also examined in relation to clinical features. Table 1 summarizes descriptives and statistical tests on the YFAS. When analyzed dimensionally, the YFAS was significantly correlated with depression as assessed by the PHQ-2, and both mental and physical subscales on the SF-12. Participants who met the clinical threshold for FA on the YFAS had significantly higher depression scores as measured by the PHQ-2 than participants who did not meet the FA threshold. The effect size for this analysis ($d=.93$) was found to exceed Cohen's parameter for a large effect (d .80). Similarly, participants in the FA group reported significantly poorer SF-12 mental and physical scores compared to the no-FA group. The effect sizes for these analyses as measured by Cohen's d were medium.

The YFAS was also significantly correlated with the following features of eating-disorder psychopathology as measured by the brief version of the EDE-Q: restraint, overvaluation of weight and shape, dissatisfaction with weight and shape, and binge eating frequency (**Table 1).** When comparing participants with and without FA, categorically, participants with FA endorsed significantly greater overvaluation of weight and shape, binge eating frequency, and dissatisfaction with weight and shape. Effect sizes measured by Cohen's d indicated small effects for these analyses. The two groups did not significantly differ in EDE-Q restraint or BMI.

Discussion

This, to our knowledge, is the first study to examine food addiction in a study group of adults residing in India. The findings indicated that 32.5% of participants met the YFAS-defined clinical level of food addiction, which is higher than observed in recent meta-analytic findings (16.2 to 19.9%) that compiled studies with samples that were predominantly from the United States (Burrows, *et al.*, 2018; Pursey, *et al.*, 2014). Our findings, however, were consistent with a recent study examining South Asian participants using similar research methodology which cite a similar YFAS symptom mean in their sample (Meadows, *et al.*, 2017). Our findings suggest that symptoms of food addiction are

associated with more frequent binge eating and eating-disorder psychopathology, as well as poorer health-related quality of life, and depression; these results are consistent with studies conducted primarily in the United States (Burrows, *et al.*, 2018; Pursey, *et al.*, 2014). In the present study, food addiction was not related to either sex or BMI (when examined dimensionally or categorically). On average, the food addiction group reported lower health-related quality of life, including physical and mental health, however, both groups were within the normal range. These findings add to the relatively unexplored but growing research on eating pathology in non-Western societies by confirming the presence of food addiction, and the relatively higher experience of food addiction among Indians.

Although the percentage of participants meeting the clinical threshold of food addiction in this study was higher than has been observed in previous studies, the overall mean of symptoms reported on the YFAS was similar to past findings (Burrows, *et al.*, 2018; Pursey, *et al.*, 2014). On average, participants in this study endorsed 3.53 out of a possible total of seven symptoms on the YFAS, similar to the mean reported in a recent meta-analysis ($M =$ 3.30), which included a broader population and studies with a greater range of international locations (Burrows, *et al.*, 2018) than a previous meta-analysis ($M = 2.80$) examining the YFAS (Pursey, *et al.*, 2014). The overall mean on the YFAS was also similar to the mean obtained in a prior sample of primarily South Asian participants from India and Pakistan ($M = 3.20$) (Meadows, *et al.*, 2017). South Asian participants were more likely to self-identify as having a "food addiction" and were more likely to endorse nearly all symptoms on the YFAS when compared to White participants and other ethnicities, aside from "repeated failed attempts to quit or cut down despite negative consequences" (Meadows, *et al.*, 2017). Likewise, South Asian participants in their study reported higher scores on the Food Cravings Questionnaire (Meadows, *et al.*, 2017), and previous findings demonstrate that food cravings are associated with food addiction (Gearhardt, Rizk, & Treat, 2014; Meule & Kübler, 2012). In the present study, food addiction diagnosis was common (32.5%) and strongly associated with health-related quality of life and depression. The observed frequency of food addiction was in part due to the number of participants endorsing clinical impairment (32.8%). Taken together, results of the present study and previous research (Meadows, *et al.*, 2017) suggest that individuals in India with food addiction experience clinically significant distress and associated psychopathology. These findings warrant the need for continued cross-cultural examination of food addiction and related sequalae including prospective studies in this South Asian population.

Our findings suggest that food addiction was also related to greater eating-disorder psychopathology, including binge eating and body image dissatisfaction, which is consistent with previous studies of varying cultural groups (Burrows, *et al.*, 2018; Pursey, *et al.*, 2014). Despite the widespread belief that disordered eating behaviors are less prevalent in Asian countries, a recent review highlighted that the differences in disordered eating, dieting, shape and weight concerns as compared to countries in the West are diminishing (Pike & Dunne, 2015). It is hypothesized that this may be in part due to Asian countries becoming more industrialized and globalized (Pike & Dunne, 2015). For instance, it has been suggested that urbanization and socioeconomic status are associated with increased risk of weight dissatisfaction and dieting in India (Mishra & Mukhopadhyay, 2011; Talukdar, 2012). Moreover, past studies directly comparing those in the United States to those in India have

not found significant differences in eating-disorder psychopathology, including body dissatisfaction and frequency of binge-eating episodes (Lal, *et al.*, 2015; Meadows, *et al.*, 2017; Rubin, Gluck, Knoll, Lorence, & Geliebter, 2008). Nonetheless, more research that includes large scale epidemiological studies of cross-cultural comparisons are needed to reduce biases that can arise in meta-analytic comparisons.

Interestingly, some of the results of our study depart from earlier research. Although endorsement of food addiction, as assessed by the YFAS, was quite common in this study, food addiction was unrelated to BMI when examined both dimensionally and categorically. Past studies have documented that a higher BMI is associated with more symptoms on the YFAS and greater likelihood of food addiction, however, it is important to note that the majority of past studies using the YFAS have been conducted in clinical groups of participants with overweight/obesity (Pursey, *et al.*, 2014). Furthermore, approximately 12% of participants in the current study were in the obesity weight category, and the percentage of participants with obesity who met the clinical threshold for food addiction was nearly identical. The percentage of participants in the obesity weight category, however, is somewhat lower than rates observed from past research—approximately 20% in 2016 (World Health Organization, 2016), and the majority of participants meeting the clinical threshold for food addiction in this study were in the "healthy" or underweight category. Nonetheless, it has been noted that food addiction is experienced across the weight spectrum (Schulte, *et al.,* 2016) and many studies have not identified an association between BMI and YFAS symptoms or diagnoses (Meule & Gearhardt, 2014) leading to the consideration that obesity should not be used as a proxy for food addiction. (Schulte, *et al.,* 2016). Additionally, food addiction in this study was unrelated to sex or age, inconsistent with previous studies of the YFAS (Pursey, *et al.*, 2014), however, women categorized with food addiction reported a greater number of symptoms on the YFAS which is a consistent finding in past research (Pursey, *et al.*, 2014). Our findings might reflect cultural differences in the presentation of food addiction and thus call for longitudinal and epidemiological methodology to examine eating behaviors in the context of a newly industrialized country, such as India.

The Cronbach's alpha for the YFAS in the current study suggests excellent internal consistency of the YFAS in this Indian sample. The construct of food addiction has received little research attention with Indian participants, and it is not yet known how people living in India may perceive or experience the construct of food addiction as measured by the YFAS. It is important to note, however, that a recent study examining "self-perceived" food addiction found that South-Asian individuals were more likely to consider they had an addiction to food when compared to all other ethnicities (i.e., White, African-American, Hispanic, or "other") (Meadows, *et al.*, 2017). Taken together, future studies which examine the psychometric properties of the YFAS in this population are important.

Our findings should be interpreted in light of the study limitations. The cross-sectional study design and convenience sampling approach using self-reported survey data limit the generalizability of results. Questionnaires are susceptible to inattention; however, the online platform used for recruitment in the current study, Mechanical Turk, provides high-quality data and allows for the inclusion of items designed to evaluate participants' attention

(Buhrmester, *et al.*, 2018). Indeed, this platform has growing popularity and acceptance, and has been used in psychiatric research (Mathes, *et al.*, 2018; McCredie & Morey, 2018), including eating research (Burrows, *et al.*, 2017; Gearhardt, Corbin, & Brownell, 2016; Powell, *et al.*, 2017). Moreover, the study design allowed us to examine food addiction among adults residing in India, addressing a significant gap in the literature. Of note, participants in this study had higher levels of education than found in prior studies and findings pertain to those residing in India who spoke English. Findings may not generalize to non-English speaking individuals residing in India or to those with varying education or sociodemographic characteristics. Perhaps surprisingly, roughly half of the participants were male, although this feasibly resulted in greater generalizability and allowed for more adequate exploration of potential gender differences in the YFAS scores as previous studies of the YFAS have been predominately female (Pursey, *et al.*, 2014).

Conclusions

The findings of the present study suggest that YFAS-defined "food addiction" might be common among individuals residing in India. Food addiction in this study was significantly associated with eating-disorder psychopathology, including binge eating, depression, and health-related quality of life, but was not related to BMI or sex. These findings challenge previous notions of disordered eating as a uniquely "Western" problem and highlight the importance of examining eating behaviors, such as addictive-like eating, across cultures.

Acknowledgments

References

American Psychiatric Association (2000). Diagnostic and statistical manual of mental disorders 4th ed. text revision). Washington, DC.

Behrend TS, Sharek DJ, Meade AW, & Wiebe EN (2011). The viability of crowdsourcing for survey research. Behav Res Methods, 43, 800–813. [PubMed: 21437749]

Brunault P, Courtois R, Gearhardt AN, Gaillard P, Journiac K, Cathelain S, et al. (2017). Validation of the French version of the DSM-5 Yale Food Addiction Scale in a Nonclinical Sample. Can J Psychiatry, 62(3), 199–210. [PubMed: 28212499]

Buhrmester M, Kwang T, & Gosling SD (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data? Perspect Psychol Sci, 6, 3–5. [PubMed: 26162106]

Buhrmester M, Talaifar S, & Gosling SD (2018). An evaluation of Amazon's Mechanical Turk, its rapid rise, and its effective use. Perspectives on Psychological Science, 13(2), 149–154. [PubMed: 29928846]

Burrows T, Kay-Lambkin F, Pursey K, Skinner J, & Dayas C (2018). Food addiction and associations with mental health symptoms: a systematic review with meta-analysis. J Hum Nutr Diet.

Burrows T, Skinner J, Joyner M, Palmieri J, Vaughan K, & Gearhardt A (2017). Food addiction in children: Associations with obesity, parental food addiction and feeding practices. Eat Behav, 26, 114–120. [PubMed: 28236739]

Chao AM, Shaw JA, Pearl RL, Alamuddin N, Hopkins CM, Bakizada ZM, et al. (2017). Prevalence and psychosocial correlates of food addiction in persons with obesity seeking weight reduction. Compr Psychiatry, 73, 97–104. [PubMed: 27930952]

Chen G, Tang Z, Guo G, Liu X, & Xiao S (2015). The Chinese version of the Yale Food Addiction Scale: An examination of its validation in a sample of female adolescents. Eat Behav, 18, 97–102. [PubMed: 26026613]

de Vries SK, & Meule A (2016). Food addiction and bulimina nervosa: New data based on the Yale Food Addiction Scale 2.0. Eur Eat Disord Rev, 24(6), 518–522. [PubMed: 27578243]

Gandek B, Ware JE, Aaronson NK, Apolone G, Bjorner JB, Brazier JE, et al. (1998). Cross-validation of item selection and scoring for the SF-12 Health Survey in nine countries: results from the IQOLA Project. International Quality of Life Assessment. J Clin Epidemiol, 51(11), 1171–1178. [PubMed: 9817135]

Gearhardt AN, Boswell RG, & White MA (2014). The association of "food addiction" with disordered eating and body mass index. Eat Behav, 15(3), 427–433. [PubMed: 25064294]

Gearhardt AN, Corbin WR, & Brownell KD (2009). Preliminary validation of the Yale Food Addiction Scale. Appetite, 52(2), 430–436. [PubMed: 19121351]

Gearhardt AN, Corbin WR, & Brownell KD (2016). Development of the Yale Food Addiction Scale Version 2.0. Psychol Addict Behav, 30, 113–121. [PubMed: 26866783]

Gearhardt AN, Davis C, Kuschner R, & Brownell KD (2011). The addiction potential of hyperpalatable foods. Curr Drug Abuse Rev, 4(3), 140–145. [PubMed: 21999688]

Gearhardt AN, Rizk MT, & Treat TA (2014). The association of food characteristics and individual differences with ratings of craving and liking. Appetite, 79, 166–173. [PubMed: 24768936]

Gearhardt AN, White MA, Masheb RM, Morgan PT, Crosby RD, & Grilo CM (2012). An examination of the food addiction construct in obese patients with binge eating disorder. Int J Eat Disord, 45(5), 657–663. [PubMed: 22684991]

Grilo CM, Reas DL, Hopwood CJ, & Crosby RD (2015). Factor structure and construct validity of the Eating Disorder Examination-Questionnaire in college students: further support for a modified brief version. Int J Eat Disord, 48(3), 284–289. [PubMed: 25346071]

Gupta MA, Chaturvedi SK, Chandarana PC, & Johnson AM (2001). Weight-related body image concerns among 18–24-year-old women in Canada and India: an empirical comparative study. J Psychosom Res, 50(4), 193–198. [PubMed: 11369024]

Hauser DJ, & Schwarz N (2016). Attentive Turkers: MTurk participants perform better on online attention checks than do subject pool participants. Behav Res Methods, 48, 400–407. [PubMed: 25761395]

Kelly BD (2003). Globalisation and psychiatry. Advances in Psychiatric Treatment, 9(6), 464–470.

Kroenke K, Spitzer RL, & Williams JB (2003). The Patient Health Questionnaire-2: validity of a two-item depression screener. Medical Care, 41(11), 1284–1292. [PubMed: 14583691]

Lal M, Abraham S, Parikh S, & Chhibber K (2015). A comparison of eating disorder patients in India and Australia. Indian J Psychiatry, 57(1), 37–42. [PubMed: 25657455]

Litman L, Robinson J, & Rosenzweig C (2015). The relationship between motivation, monetary compensation, and data quality among US- and India-based workers on Mechnical Turk. Behav Res Methods, 47, 519–528. [PubMed: 24907001]

Long CG, Blundell JE, & Finlayson G (2015). A systematic review of the application and correlates of YFAS-diagnosed 'food addiction' in humans: Are eating-related 'addictions' a cause for concern or empty concepts? Obes Facts, 8(6), 386–401. [PubMed: 26633647]

Machado PPP, Grilo CM, & Crosby RD (2018). Replication of a modified factor structure for the Eating Disorder Examination-Questionnaire: Extension to cinical eating disorder and non-clinical samples in Portugal. Eur Eat Disord Rev, 26(1), 75–80. [PubMed: 29152813]

Mathes BM, Norr AM, Allan NP, Albanese BJ, & Schmidt NB (2018). Cyberchondria: Overlap with health anxiety and unique relations with impairment, quality of life, and service utilization. Psychiatry research, 261, 204–211. [PubMed: 29324396]

McCredie MN, & Morey LC (2018). Who are the turkers? A characterization of MTurk workers using the Personality Assessment Inventory. Assessment, 1073191118760709.

Meadows A, Nolan LJ, & Higgs S (2017). Self-perceived food addiction: Prevalence, predictors, and prognosis. Appetite, 114, 282–298. [PubMed: 28385581]

Meule A, & Gearhardt AN (2014). Food addiction in the light of DSM-5. Nutrients, 6(9), 3653–3671. [PubMed: 25230209]

Meule A, & Kübler A (2012). Food cravings in food addiction: The distinct role of positive reinforcement. Eat Behav, 13(3), 252–255. [PubMed: 22664405]

Mishra SK, & Mukhopadhyay S (2011). Eating and weight concerns among Sikkimese adolescent girls and their biocultural correlates: an exploratory study. Public Health Nutr, 14(5), 853–859. [PubMed: 20854717]

Pike KM, & Dunne PE (2015). The rise of eating disorders in Asia: a review. J Eat Disord, 3, 33. [PubMed: 26388993]

Pike KM, Hoek HW, & Dunne PE (2014). Cultural trends and eating disorders. Curr Opin Psychiatry, 27(6), 436–442. [PubMed: 25211499]

Powell EM, Frankel LA, Umemura T, & Hazen N (2017). The relationship between adult attachment orientation and child self-regulation in eating: The mediating role of persuasive-controlling feeding practices. Eat Behav, 26, 121–128. [PubMed: 28236740]

Pursey KM, Stanwell P, Gearhardt AN, Collins CE, & Burrows TL (2014). The prevalence of food addiction as assessed by the Yale Food Addiction Scale: a systematic review. Nutrients, 6(10), 4552–4590. [PubMed: 25338274]

Raskind IG, Patil SS, Haardörfer R, & Cunningham SA (2018). Unhealthy weight in Indian families: The role of the family environment in the context of the nutrition transition. Population Research and Policy Review, 37(2), 157–180. [PubMed: 29962562]

Rubin B, Gluck ME, Knoll CM, Lorence M, & Geliebter A (2008). Comparison of eating disorders and body image disturbances between Eastern and Western countries. Eat Weight Disord, 13(2), 73–80. [PubMed: 18612255]

Schulte EM, Grilo CM, & Gearhardt AN (2016). Shared and unique mechanisms underlying binge eating disorder and addictive disorders. Clin Psychol Rev, 44, 125–139. [PubMed: 26879210]

Shapiro DN, Chandler J, & Mueller PA (2013). Using Mechanical Turk to study clinical populations. Clinical Psychological Science, 1, 213–220.

Spitzer RL, Kroenke K, & Williams JB (1999). Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. JAMA, 282(18), 1737–1744. [PubMed: 10568646]

Talukdar J (2012). Thin but not skinny: Women negotiating the "never too thin" body ideal in urban India. Women's Studies International Forum, 35(2), 109–118.

Thomas JJ, Lee S, & Becker AE (2016). Updates in the epidemiology of eating disorders in Asia and the Pacific. Current Opinion in Psychiatry, 29(6), 354–362. [PubMed: 27648781]

Ware JE, Jr., & Sherbourne CD (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Medical Care, 30(6), 473–483. [PubMed: 1593914]

Wind TR, Joshi PC, Kleber RJ, & Komproe IH (2013). The Impact of Recurrent Disasters on Mental Health: A Study on Seasonal Floods in Northern India. Prehospital and Disaster Medicine, 28(3), 279–285. [PubMed: 23611652]

Wolz I, Granero R, & Fernandez-Aranda F (2017). A comprehensive model of food addiction in patients with binge-eating symptomatology: The essential role of negative urgency. Compr Psychiatry, 74, 118–124. [PubMed: 28160693]

World Health Organization (2016). Global Health Observatory (GHO) data. Retrieved from http://www.who.int/gho/ncd/risk_factors/overweight/en/

Highlights

- This is the first study examining clinical correlates of FA in India

- FA clinical threshold on YFAS was met by 32.5% of participants

- FA was associated with eating-disorder psychopathology, depression and quality of life

Table 1.

Means and standard deviations of BMI, eating disorder psychopathology, and psychosocial functioning by group and bivariate correlations with YFAS

	Total Sample		Food Addiction	No Food Addiction	Test Statistic	Effect Size
	M (SD)	*YFAS Symptom Score (r)*	*M (SD)*	*M (SD)*	*t-test (t)*	*Cohen's d*
Weight						
BMI	24.31 (5.03)	.03	24.23 (5.16)	24.28 (5.04)	.09	.01
Eating-Related Psychopathology						
EDE-Q Restraint	2.12 (1.74)	.13 *	2.27 (1.51)	2.04 (1.86)	−1.30	.14
EDE-Q Overvaluation	2.72 (1.56)	.14 **	2.93 (1.42)	2.58 (1.61)	−2.10 *	.23
EDE-Q Dissatisfaction	2.44 (1.69)	.27 ***	2.82 (1.56)	2.22 (1.70)	−3.29 ***	.37
Binge-Eating Frequency	3.72 (6.21)	.24 ***	5.02 (5.98)	3.01 (6.24)	−2.94 **	.33
Functioning						
SF-12 Physical	45.78 (8.90)	−.40 ***	40.07 (6.96)	45.05 (8.25)	6.04 ***	−.65
SF-12 Mental	47.07 (10.44)	−.40 ***	41.05 (7.47)	47.78 (9.83)	7.27 ***	−.77
PHQ-2	2.17 (1.63)	.50 ***	3.07 (1.43)	1.70 (1.51)	−8.44 ***	.93

Note. BMI=Body Mass Index; YFAS=Yale Food Addiction Scale; EDE-Q=Eating Disorder Examination-Questionnaire; SF=Short Form Health Survey; PHQ-2=Patient Health Questionnaire for depression (2-items)

*
  $p<.05$

**
  $p<.01$

***
  p .001