



Examining Food Addiction and Acculturation Among a Hispanic Bariatric Surgery–Seeking Participant Group

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Abstract

Objective This study examined food addiction (FA) and acculturation among a Hispanic bariatric surgery–seeking sample.

Setting University hospital.

Method Four hundred forty-four ($n = 215$ English-speaking; $n = 229$ Spanish-speaking) Hispanic adults seeking bariatric surgery completed established self-report measures examining food addiction and acculturation.

Results 35.8% met criteria for FA, which was significantly associated with acculturation level to the USA. Participants who endorsed greater acculturation also endorsed a significantly higher level of FA symptoms compared with those who endorsed less acculturation. Acculturation level was significantly associated with FA and BMI.

Conclusions FA rate in this bariatric surgery–seeking Hispanic patient group is similar to rates reported among bariatric candidates of varying ethnic backgrounds. Our results suggest a relationship between FA symptom expression and acculturation to the USA. Improving understanding of the onset and progression of severity of FA symptoms may have clinical implications for Hispanic patients seeking bariatric surgery.

Keywords Acculturation · Bariatric surgery · Hispanic · Food addiction

Introduction

The highest rates of food addiction (FA) have been consistently reported among patients with obesity who are seeking bariatric surgery [1]. Among this clinical group, FA is associated with psychopathology including disordered eating, negative mood, objective measures of health, and other addictive-like

symptoms [2–5]. A leading FA theory suggests that some individuals are susceptible to a patterned addictive response to palatable foods, resulting in problematic eating behavior [6, 7].

The continued scientific interest in FA has guided research efforts to examine cross-cultural presentations of FA symptomology [8–10]. To date, the majority of studies examining FA have been conducted in the USA with relatively homogeneous participant groups comprised of white, non-Hispanic women [11], which highlights the current dearth of research with ethnically heterogeneous samples. A recent systematic review examining FA specifically in bariatric surgery patient populations acknowledged these homogeneous sample limitations [1]. Notably, many of these studies were cross-sectional and measured FA pre-operatively. According to another systematic review, the prevalence of FA in participants with overweight or obesity (33%) is 4 to 5 times greater when compared with the median prevalence of FA in the general population (6.8%) [12]. While reported rates of FA across bariatric surgery samples do have variance, overall, they share a similarity in consistently citing higher rates among these patients compared with non-clinical, non-obese populations. Such findings warrant exploring how FA rates among bariatric patients present cross-culturally.

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A recent US census reported that 50.5 million self-identified Hispanic individuals live in the USA [13], and obesity rates within this population are rising. Overall, Hispanics in the USA carry a disproportionate burden of obesity at an age-adjusted rate of 42.6% [14]. When examined by gender, Hispanic women have a higher rate of obesity at 46.9% compared with their male counterparts at 37.9% [14]. Hispanic populations in the USA are diverse; within-population weight discrepancies exist based on numerous variables, including language preference and socioeconomic status [15]. Moreover, the complexities of acculturation, defined as the way in which individuals adopt the attitudes, values, customs, beliefs, and behaviors of another culture, are an important consideration with regard to changes in eating behaviors [16]. Some research suggests that acculturation poses a risk factor for the adoption of unhealthy behaviors. Level of acculturation is associated with indicators of poorer physical and mental health including increased rates of risky health behaviors such as smoking, alcohol use, and weight gain [16–20]. A qualitative study conducted with Hispanic women after immigrating to the USA revealed themes related to the acculturation process which might contribute to weight gain, including increased stress, sedentary lifestyle, sense of isolation, and a greater consumption of soda and convenience foods high in sugar, salt, and fat [20].

The ethnic obesity disparity observed across the USA is likely comprised of numerous psychosocial mechanisms contributing to the rising obesity rates among Hispanic populations. Moreover, cultural sensitivity is not yet fully understood in the context of FA expression. Ivezaj et al. (2018) examined FA and clinical correlates among a group of Spanish-speaking Latino/as residing in the USA and found that 17.9% met clinical threshold for FA. Participants with FA in this study also endorsed greater eating psychopathology, and poorer overall mental health [9]. Taken together, there is a natural progression from these findings to examine the way in which acculturation might influence FA presentation among Hispanics seeking bariatric surgery for the treatment of obesity. Exposure to the obesogenic US environment, amplified by stressors associated with immigration, likely contributes to the documented positive correlation between acculturation and the rising rates of obesity among Hispanic individuals living in the USA [16–20]. These factors might also theoretically contribute to the higher rates of FA among pre-surgical bariatric patients [1], but currently, there is limited research exploring the relationships between these variables.

Eating behaviors and preferences differ across cultures and countries; thus, examining the relationship between FA and acculturation level provides important preliminary data on the cultural conceptualization of FA in a clinical Hispanic patient group. The present study was designed to add to the current literature by (1) characterizing the rate and frequency of FA symptoms among Hispanic bariatric surgery-seeking patients

because of the limited research conducted in this patient group and (2) examining the relationship between FA and acculturation status within this ethnic group. We hypothesized that participants with greater acculturation level to the USA would endorse greater FA severity and have higher body mass index (BMI).

Methods

Participants

Participants ($N = 444$) were recruited from two New York City Bariatric Surgery Centers of Excellence at their initial bariatric program clinic visit between May 2015 and March 2016. Each study site was staffed with researchers who spoke English or Spanish, or were bilingual. Inclusion criteria required self-identification as Hispanic, 18 to 65 years of age, and literacy in either English or Spanish at the 8th-grade reading level or above. Patients presenting with $BMI \geq 40$, a $BMI \geq 35$ with an obesity-related comorbid medical problem, or $BMI 30.0$ to 34.9 with diabetes and/or metabolic syndrome were considered candidates for bariatric surgery [21]. Exclusion criteria were minimal including current substance dependence and severe psychiatric illness.

All patients presenting to the bariatric surgery clinic to initiate the pre-surgical process were screened for eligibility by research staff, in addition to completing other routine pre-surgical appointments the same day. When an individual met inclusion criteria, research staff explained the scope of the study including that participation would be voluntary and confidential, and would not influence their eligibility for bariatric surgery or any other medical care. Informed consent was obtained from all individual participants included in the study. A total of 653 participants consented to the study, and 464 returned completed study measures reflecting a 71.06% response rate. The data was thoroughly reviewed for missing or aberrant response patterns, and 20 cases were excluded because the percentage of missing data was greater than the maximum threshold of 20% [22]. The majority of participants were female ($n = 371$; 83.5%), and language preference was fairly equal with 48.4% ($n = 215$) indicating English and 51.6% ($n = 229$) indicating Spanish. Participant mean age and BMI were 37.3 years ($SD = 11.0$) and 42.9 kg/m^2 ($SD = 7.3$), respectively.

Measures

Participants completed self-report measures assessing demographic information, FA, and acculturation level. Measures were completed in either English or Spanish depending on the participant's language preference. Body weight was measured using a standard hospital

digital scale. Height was measured to the nearest 0.25 in. using a stadiometer. Shoes and heavy outer clothing were removed before measurements were taken. Each participants' BMI was calculated using these objective measurements.

The *Yale Food Addiction Scale (YFAS) 2.0* [7] is a 35-item self-report questionnaire that adapted the 11 symptoms of substance dependence (as per the DSM-5) to assess addictive-like eating behaviors. Items have eight frequency response options that range from “Never” to “Every Day.” The YFAS 2.0 offers two scoring options: (1) a continuous “symptom” count that reflects the number of diagnostic criteria met by the participants and (2) a “diagnosis” of FA based on the number of symptoms and clinically significant impairment or distress. To reflect severity of addictive-like eating, established cut-offs were used: mild (2 to 3 symptoms), moderate (4 to 5 symptoms), or severe (6 or more symptoms). The Spanish version of the YFAS 2.0 used in this study was independently translated and back translated by two bilingual Spanish and English-speaking clinicians. Internal consistency in this sample was excellent across the total sample ($\alpha = .962$) and the English-speaking ($\alpha = .960$) and Spanish-speaking versions ($\alpha = .962$). Table 1 depicts additional reliability statistics further suggesting that the measure is appropriate for use with this patient group.

The *Short Acculturation Scale for Hispanics (SASH)* is available in both English and Spanish [23] and has been widely validated among Hispanic samples [24]. Answers range on a five-point scale from communicating in “only Spanish” to “only English,” and the unweighted sum of the scale represents the individual's language acculturation scale score. Participants' reported language preference and SASH score determined the language in which they completed the subsequent study measures. The SASH score can be examined both continuously and dichotomously (scores ≤ 2.99 suggest “low acculturation” while scores ranging from 3.00 to 5.00 suggest “high acculturation”) Internal consistency in this sample was excellent ($\alpha = .98$).

Statistical Analyses

SPSS version 24.0 was used to analyze these data. Independent samples *t* tests were conducted to compare participants by language group for all continuous variables (e.g., age, BMI, acculturation). Chi-square analysis was used to compare the two groups by sex and YFAS symptom category. Cohen's *d* was computed as appropriate for effect sizes. Bivariate correlations were used to examine the association between YFAS symptom score, SASH total score, and theoretically related demographic variables. Multiple linear regression was conducted to examine the relative impact of acculturation on FA after adjusting for age which was independently related to FA.

Table 1 Reliability statistics of the 34-item YFAS 2.0

| Item | Item total correlation | Cronbach's alpha if item deleted |
|---------|------------------------|----------------------------------|
| Item 1 | .571 | .961 |
| Item 2 | .621 | .961 |
| Item 3 | .554 | .961 |
| Item 4 | .527 | .962 |
| Item 5 | .641 | .961 |
| Item 6 | .625 | .961 |
| Item 7 | .649 | .961 |
| Item 8 | .636 | .961 |
| Item 9 | .584 | .961 |
| Item 10 | .597 | .961 |
| Item 11 | .640 | .961 |
| Item 12 | .714 | .960 |
| Item 13 | .699 | .960 |
| Item 14 | .614 | .961 |
| Item 15 | .714 | .960 |
| Item 16 | .675 | .961 |
| Item 17 | .640 | .961 |
| Item 18 | .690 | .960 |
| Item 19 | .601 | .961 |
| Item 20 | .647 | .961 |
| Item 21 | .715 | .960 |
| Item 22 | .765 | .960 |
| Item 23 | .720 | .960 |
| Item 24 | .762 | .960 |
| Item 24 | .562 | .961 |
| Item 26 | .646 | .961 |
| Item 27 | .709 | .960 |
| Item 28 | .732 | .960 |
| Item 29 | .646 | .961 |
| Item 30 | .629 | .961 |
| Item 31 | .665 | .961 |
| Item 32 | .650 | .961 |
| Item 33 | .474 | .962 |
| Item 34 | .506 | .962 |

Results

Across the whole participant group, 35.8% ($n = 158$) met the YFAS 2.0 threshold for FA, among which 71.7% ($n = 114$) met threshold for severe symptoms, 15.7% ($n = 25$) for moderate symptoms, and 12.6% ($n = 20$) for mild symptoms. The mean number of YFAS symptoms endorsed across the whole participant sample was 3.88 ($SD = 3.48$). There was no association observed between FA and BMI, $r = .06$, $p = .22$, or FA and years lived in the U.S., $\rho = -.01$, $p = .89$. When examined by sex, there was also no significant difference in FA symptom expression between males ($M = 4.33$, $SD = 3.62$) and females ($M = 3.80$, $SD = 3.46$), $t(442) = 1.20$, $p = .23$. There

was a significant association between age and FA, $r = -.11$, $p < .05$. Frequencies of the 11 substance-related and addictive disorder (SRAD) criterion, in addition to endorsed impairment or distress, are summarized in Table 2 in descending order. Across the whole participant group, the three most prevalent symptoms were continued use of certain foods despite interpersonal problems (52.5%), inability to cut down or quit eating certain foods (51.1%), and endorsed impairment or distress in relation to addictive-like eating patterns (39.0%). The rates across the other categories all fell within a range of 20–40%.

Table 3 describes participants by language group across key demographic variables, YFAS 2.0 symptom severity thresholds, and the SRAD symptoms. Notably, English-speaking participants endorsed a significantly higher FA total symptom score ($M = 4.47$, $SD = 3.60$) than their Spanish-speaking counterparts ($M = 3.34$, $SD = 3.29$), $t(431) = 3.44$, $p < .01$. Mean BMI was also significantly higher in the English-speaking sample ($M = 44.52$, $SD = 7.75$) compared with the Spanish-speaking sample ($M = 41.57$, $SD = 6.51$), $t = 4.33$ (418), $p < .001$. English speakers ($M = 33.87$, $SD = 10.87$) were significantly younger than Spanish speakers ($M = 40.59$, $SD = 10.12$), $t = -6.74$ (442), $p < .001$. Effect sizes, measured when appropriate by Cohen's d , ranged from small to medium. Chi-square revealed Spanish-speaking participants had a higher rate of mild FA symptoms, while English speakers had a higher rate of severe FA symptoms, $\chi^2 = 13.69$, $p < .05$ (see Table 2). Regarding the frequencies of the 11 symptom categories, chi-square analyses examined differences by language group across each category (see Table 3).

Acculturation using the SASH was examined continuously and dichotomously. Across the total sample, acculturation level was significantly associated with YFAS symptom score, ($r = .15$, $p < .01$), BMI ($r = .24$, $p < .001$), and age ($r = -.27$, $p < .001$). Participants who endorsed greater acculturation also endorsed a significantly higher level of FA symptoms ($M =$

4.28, $SD = 3.53$) compared with those who endorsed lower acculturation ($M = 3.60$, $SD = 3.43$), $t = -2.02$ (437), $p < .05$. Within the English-speaking sample alone, participants who endorsed lower acculturation to the USA had significantly lower BMI ($M = 42.53$, $SD = 5.99$) compared with those who reported higher acculturation ($M = 45.02$, $SD = 8.11$), $t = -1.86$ (211), $p < .05$. Similarly, within the Spanish-speaking sample, those with lower acculturation also had significantly lower BMI ($M = 41.37$, $SD = 6.49$) relative to participants who endorsed higher acculturation ($M = 45.48$, $SD = 5.60$), $t = -1.87$ (224), $p < .05$. To quantify the relative impact of acculturation on FA, a multiple linear regression was conducted with acculturation and age entered as predictor variables. Age did not significantly predict FA in this model ($\beta = -.02$, $p = .12$), but acculturation did significantly predict FA ($\beta = .36$, $p < .05$) and explained 2.7% of the variance ($F(2, 443) = 6.14$, $p < .01$).

Discussion

To our knowledge, this is the first study to examine FA in a US Hispanic bariatric surgery-seeking participant group, of varying acculturation status. The close relationship between culture, food, and eating behaviors warrants a rigorous appraisal of the way in which the FA construct presents between and within cultures. Across our total participant group, 35.8% met YFAS 2.0 criteria for FA. This rate, which falls solidly within the range of rates reported in other studies examining FA among bariatric surgery candidates, suggests that FA prevalence among bariatric surgery-seeking Hispanics in the USA might be similar to the prevalence reported for primarily Caucasian samples [1]. It is also notably higher than the rate of 17.9% observed among a community sample of US-residing Spanish-speaking Latino/as [9]. Taken together, these results support prior research indicating that FA is relatively

Table 2 Endorsement rates of DSM-5 substance-related and addictive disorder (SRAD) diagnostic symptoms ($N = 444$)

| Symptoms | Met criteria |
|---|--------------|
| Continued use despite interpersonal problems | 233 (52.5%) |
| Unable to cut down or quit | 227 (51.1%) |
| Endorsed impairment or distress | 173 (39.0%) |
| Important activities given up | 167 (37.6%) |
| Great deal of time spent recovering | 164 (36.9%) |
| Consumed more food than planned | 156 (35.1%) |
| Withdrawal symptoms | 153 (34.5%) |
| Failure to fulfill roles/obligations | 150 (33.8%) |
| Use in physically hazardous situations | 144 (32.4%) |
| Continued use despite emotional and physical consequences | 143 (32.2%) |
| Cravings | 100 (22.5%) |
| Tolerance increase | 88 (19.8%) |

Table 3 YFAS total score, BMI, age, and rate of FA severity and diagnostic criterion by English ($n = 215$) and Spanish-speaking ($n = 229$) groups

| | English speaking (<i>M, SD</i>) | Spanish speaking (<i>M, SD</i>) | <i>p</i> value | Effect size |
|--|-----------------------------------|-----------------------------------|----------------|-------------|
| YFAS total score ^a | 4.47 (3.60) | 3.34 (3.29) | < .01 | .33 |
| BMI ^a | 44.52 (7.75) | 41.57 (6.51) | < .001 | .41 |
| Age ^a | 33.87 (10.87) | 40.59 (10.12) | < .001 | .64 |
| YFAS severity threshold | <i>n</i> (%) | <i>n</i> (%) | | |
| Mild ^b | 5 (2.3%) | 15 (6.6%) | < .05 | – |
| Moderate ^b | 10 (4.7%) | 15 (6.6%) | ns | – |
| Severe ^b | 70 (32.6%) | 44 (19.2) | < .05 | – |
| SRAD criterion ^b | | | | |
| Continued use despite interpersonal problems | 126 (58.6%) | 107 (46.7%) | < .05 | – |
| Unable to cut down or quit | 119 (55.3%) | 108 (47.2%) | ns | – |
| Endorsed impairment or distress | 89 (41.4%) | 84 (36.7%) | ns | – |
| Important activities given up | 89 (41.4%) | 78 (34.1%) | ns | – |
| Great deal of time spent recovering | 107 (49.8%) | 57 (24.9%) | < .001 | – |
| Consumed more food than planned | 86 (40.0%) | 70 (69.4%) | < .05 | – |
| Withdrawal symptoms | 90 (41.9%) | 63 (27.5%) | < .05 | – |
| Failure to fulfill roles/obligations | 69 (32.1%) | 81 (35.4%) | ns | – |
| Use in physically hazardous situations | 79 (36.7%) | 65 (28.4%) | ns | – |
| Continued use despite consequences | 81 (37.7%) | 62 (27.1%) | < .05 | – |
| Cravings | 60 (27.9%) | 40 (17.5%) | < .05 | – |
| Tolerance increase | 54 (25.1%) | 34 (14.8%) | < .05 | – |

ns not significant

^a independent sample *t*-tests

^b Chi-square

more common among bariatric surgery participant groups compared with non-clinical/non-obese groups, and further suggests that this discrepancy might hold regardless of ethnicity (Hispanic vs non-Hispanic).

In both the English-speaking and Spanish-speaking subgroups, the majority of participants endorsing FA met criteria for severe FA, as opposed to moderate or mild diagnostic categories, although this figure was significantly higher in the English-speaking sample. To meet criteria for FA on the YFAS 2.0, participants must endorse impairment or distress in addition to meeting threshold for two or more SRAD criterion markers. It is possible that participants with greater symptoms of FA were more likely to also endorse the necessary items indicating impairment or distress to meet full criteria, thus offering an explanation for the higher rates observed in the severe FA diagnostic category. A similar pattern, demonstrating a greater prevalence of severe FA compared with moderate or mild FA, was also observed in the initial validation of the YFAS 2.0 [7]. Replication of this pattern in our clinical bariatric surgery-seeking sample speaks to questions raised as to whether less severe FA classifications accurately capture meaningful problematic eating. We posit that this finding may be a result of the lowered threshold diagnostic criteria as per the modifications made to the DSM-5 [7]. Designs of future research

examining FA might consider the sensitivity of the diagnostic thresholds when interpreting research aims and results.

Obesity in the immigrant Hispanic population has a complex framework which is linked to acculturation status, socioeconomic disparities, and food insecurity, particularly in urban communities such as New York City [15]. The acculturation literature suggests that the overall process of adapting to a new culture induces stress, which, in turn, is associated with poorer health and health behaviors, including dietary patterns, food choices, and physical activity level [20, 25]. In this study, participants who endorsed a higher level of acculturation also reported significantly greater FA symptoms compared with participants who endorsed a lower level of acculturation. Acculturation and BMI were positively associated in a small but significant correlation, suggesting that BMI might be at risk of increasing as acculturation to the USA increases. These findings support previous research positing a relationship between weight and Hispanics' level of acculturation to the U.S. [17].

Contrary to previous research suggesting that FA is more common among women [11], there was no difference in sex in our sample. While we adjusted for unequal sample size regarding sex, these results should still be interpreted with caution given that the majority of our participant group was female. However, from a cultural perspective, this finding does

speak to the potential for cross-cultural variations [26]. In line with Pursey et al.'s (2014) review, Gearhardt et al. (2016) also observed significantly greater addictive-like eating among women compared with men, but their sample was largely comprised of Caucasian participants [7, 11]. Food preferences, cravings, and behaviors are physiologically, culturally, and environmentally driven. For example, prior research assessing chocolate craving between American and Spanish samples reported more frequent cravings in American women compared with men, but this difference was not replicated for Spaniards [26]. Further research is needed to understand similarities and differences of FA presentation among Hispanic individuals. FA was also not associated with BMI in this sample. This is unsurprising as prior studies conducted with bariatric surgery candidates have also failed to identify a relationship between FA and BMI [1]. Given that all participants in this sample were classified as having obesity, it might be that there was not enough variability among BMI to discern significant differences in FA.

Our study was cross-sectional in design, thus precluding any potential causal interpretations of the data. To date, this study is among limited literature exploring the relationship between FA and acculturation among Hispanic participant groups [9]. Findings call for prospective designs to examine any potential prognostic significance of FA and acculturation on surgical outcomes. In particular, future studies that also include disease burden are recommended given the relationship found between FA and objective measures of health such as waist-to-hip adiposity ratio, high cholesterol, and level of physical activity [5]. The acculturation measure in this study relies on language to discern acculturation status. While language is widely accepted as a proxy for acculturation [25], additional factors are also known to influence acculturation, e.g., culturally specific behaviors and knowledge such as music, eating, current events, and years lived in the country, which lends support for multidimensional assessments of acculturation [27]. Despite this, such factors can also be unique to individual preference; in other words, acculturation might only account for a portion of the variance captured in the assessment. The SASH, which uses language to assess acculturation, bypasses the potential confound of individual preferences. It has been widely validated, and further, its use in this study might have prevented additional bias due to ethnic variation among Hispanics who trace their heritage to different countries [24].

Finally, the version of the YFAS 2.0 that we used in this study with 34 items was an earlier version of the finalized, published scale with a total of 35 items. Overall, there is limited research examining the construct of FA among ethnically heterogeneous participants and further steps to psychometrically validate the full YFAS 2.0 among Hispanic individuals are warranted. Reliability statistics offer some preliminary support regarding use of the measure among the present patient

group. Future research is called for to validate the psychometric properties of the full 35-item measure among an independent Hispanic clinical population. It is important to note that Hispanic ethnicity is comprised of numerous cultural backgrounds and therefore, these results provide only a preliminary base from which to build additional research studies that can further examine the psychometric utility of the YFAS 2.0 in patients of Hispanic ethnicity and identify cultural similarities and discrepancies in FA presentation.

Conclusion

FA has been proposed as a potential contributing, but modifiable, risk factor for obesity, which appears to be influenced by biological, behavioral, and psychological factors [28]. The behavioral guidelines and recommendations for bariatric candidates preparing for surgery emphasize the modifiable nature of lifestyle habits such as eating and physical activity patterns. Improving our understanding of FA may have clinical implications in the standard of care for assessing and treating disordered eating, including addictive-like eating, in patients presenting for bariatric surgery. Results from the present research suggest that FA might be common among Hispanic bariatric surgical candidates and, importantly, that those with higher acculturation to the USA might be at higher risk for FA. This study lays preliminary support for further examination of FA among Hispanic individuals in the USA and calls for further research exploring cultural and clinical correlates.

Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Conflict of Interest The authors declare that they have no conflicts of interest.

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