



Validation of the Chilean version of the Yale food addiction scale 2.0 in a non-clinical sample

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Abstract

Aims The aim was to translate and culturally adapt the Yale Food Addiction Scale 2.0 (YFAS 2.0) to the Chilean population, evaluate its psychometric properties in a non-clinical sample, and assess the correlations between symptoms count of food addiction (FA) with demographic and anthropometric variables.

Methods and participants We evaluated 301 participants (59.1% women) with a mean age of 29.7 ± 12.4 years recruited from two universities and two businesses (non-clinical sample). The Chilean YFAS 2.0 was administered, and anthropometric measurements were carried out. The internal consistency of the items was estimated, and factor structure was tested by confirmatory factor analysis. Test–retest reliability was also examined. The correlations between symptoms count of FA and weight, waist circumference (WC), Body Mass Index (BMI), percentage of body fat (BF%), and lean mass were evaluated.

Results The Chilean YFAS 2.0 presented good internal consistency, and confirmatory factor analysis supported the one-factor structure, in accordance with the original version. The ICC indicated excellent test–retest reliability. The prevalence of FA was 10.3%, and the symptom count of FA was 2.1 ± 2.8 . A small positive correlation between WC, BMI, and BF % and FA symptom count was found.

Conclusion The Chilean YFAS 2.0 may be a useful tool to investigate FA in Chile.

Level of evidence Level V, cross-sectional descriptive study.

Keywords Yale food addiction scale 2.0 · Validation · Factor analysis · Food addiction

Introduction

Chile is one of the Latin American countries with the highest rates of non-communicable chronic diseases associated with the consumption of foods and beverages high in critical

nutrients (salt/sodium, sugar, saturated fats, and trans fats) and sedentary lifestyles, such as hypertension, obesity, or diabetes [1]. These diseases affect the quality of life and life expectancy and are related to health complications and mortality. In addition, they have a high cost of treatment for the health system [2]. There is particular concern about the high levels of overweight/obesity (74% in the adult population) [3]. These data have led to consider obesity a public health problem.

There is evidence that overconsumption of highly processed foods/beverages (i.e., refined carbohydrates and/or added fats), one of the main causes of obesity, could be explained, at least in part, by the presence of food addiction (FA) [4–7]. The construct of FA refers to the idea that the consumption of hyperpalatable, highly processed foods activate an addiction-like response in vulnerable individuals, which can lead to excessive intake [8, 9]. While FA is not currently recognized as an official diagnosis, the Yale Food Addiction Scale (YFAS) operationalizes the construct by applying the substance use disorder diagnostic criteria, from

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the Diagnostic and Statistical Manual of Mental Disorders to the intake of hyperpalatable, highly processed foods [10]. Other versions of the YFAS are available. The modified version of the YFAS (mYFAS) was developed for use in large epidemiologic cohorts by adapting the validated YFAS to a core of 9 questionnaire items [11]. Similarly, the modified Yale Food Addiction Scale 2.0 (mYFAS 2.0) is an abbreviated, 13-item version of the Yale Food Addiction Scale 2.0 (YFAS 2.0) [12]. The modified versions of the YFAS perform similarly on psychometric indicators as the full versions of the scale and are useful brief assessment tools for food addiction. The YFAS 2.0 demonstrates excellent psychometric properties [8] and has been validated in different countries, including Spain, Italy, Denmark, Malaysia, France, Germany, China, and Portugal [13–20]. The YFAS 2.0 has not been validated in Chile or other Spanish-speaking Latin American countries.

A strong association between FA as measured by the YFAS and weight status has been reported, with a greater likelihood of FA diagnosis in individuals with obesity [9, 21, 22]. A systematic review indicated that FA prevalence was double in participants with $BMI \geq 25$ compared to those with lower BMIs (24.9% and 11.1%, respectively) [23].

Considering the significant public health problem that overweight and obesity represent for Chilean population and the strong association described between FA and obesity [9, 21], the current study aimed to translate the YFAS 2.0 to local Spanish and culturally adapt it to the Chilean population and to evaluate its psychometric properties in a non-clinical sample. In addition, to explore the prevalence of FA and evaluate the associations of FA with demographic and anthropometric variables in a non-clinical sample.

Methods

Procedures

A cross-sectional study was conducted with a non-probabilistic sample in two cities of Chile, from August to October 2022. Students were recruited to participate in a study on the different causes of overweight and obesity from two universities, one in Santiago and one in Valparaíso. In addition, administrative workers were recruited to participate in this study from two companies in Santiago. A total of 301 subjects participated in this non-clinical sample (61.5% students; 38.5% administrative workers). The inclusion criteria were that participants had to be over 18 years of age, who were not on medication for weight loss because of the effects on appetite inhibition. Participants who presented any limitation, either language or cognitive ability, that prevented self-administration of the questionnaire were excluded from the study. In addition, pregnant or breastfeeding women were

excluded. The university students were invited to participate while walking near the measurement area installed on both campuses. In the case of companies, human resources departments were contacted, who agreed to set up a room for measurements. They sent an invitation email to their employees. Those who wanted to participate came to the measurement room voluntarily. In both cases, the participants were told that participation in the study was voluntary, without financial compensation, but that they would obtain their anthropometric measurements.

Measures

Participants were asked to provide basic demographic information, including gender, age, education level, employment status, marital status, and if they were currently undergoing psychological treatment. Weight and height were measured using a SECA[®] brand scale (0.1 kg precision) and a height rod (0.1 cm precision). The nutritional status was determined by calculating the Body Mass Index (BMI). It was classified according to the criteria of the World Health Organization as low weight ($BMI \leq 18.5$), normal nutritional status ($BMI 18.5-24.9 \text{ kg/m}^2$), overweight ($BMI 25.0-29.9 \text{ kg/m}^2$), or obesity ($BMI \geq 30 \text{ kg/m}^2$) [24]. Waist circumference (WC) was measured using a flexible tape at the midpoint between the iliac crest and the last rib. The participant remained standing with the arms next to the body and the trunk free of clothing. The measurement was made with the abdomen relaxed at the end of expiration [25]. The InBody[®] Bioelectrical Impedance Analysis (BIA) was used to measure body composition, determining the percentage of body fat mass (%BF) and fat-free mass (FFM) [26]. Trained and standardized evaluators performed the measurements. The privacy of the participants was protected during the anthropometric measurements.

Translation and adaptation of the YFAS 2.0 for a Chilean population

The YFAS 2.0 is a 35-item self-report scale scored on an eight-level Likert scale (from 0 = never to 7 = every day), designed by Gearhardt et al. [27] to assess FA symptoms over the previous 12 months, based on 11 diagnostic criteria for substance-related and addictive disorders proposed in the DSM-5 [10]. These scores produce two measurements: (a) a continuous symptoms count score that reflects the number of fulfilled diagnostic criteria (ranging from 0 to 11) and (b) a food addiction threshold based on the number of symptoms (at least 2) and self-reported clinically significant impairment or distress. This final measurement allows the dichotomous classification of FA (FA vs No FA). Based on the revised DSM-5 taxonomy, the YFAS 2.0 also provides severity cutoffs for patients surpassing the threshold for food

addiction: mild (2–3 symptoms), moderate (4–5 symptoms), and severe (6–11 symptoms).

The YFAS 2.0 translation and culturally adapted procedure was conducted by the primary author. The translation was conceptual and not literal. The language used was natural and acceptable to be understood by Chilean adults. The blind back translation was performed to verify conceptual equivalence between the translated version and the original scale. This process was carried out by a bilingual professional with excellent command of the Spanish language but a native English speaker. To reduce information bias, the professional had no prior knowledge of the scale. Subsequently, an independent professional, native English speaker and fluent in Spanish, verified the similarity between the reverse translation and the original English version. A comparison was then made between the two versions. In this process, some differences were found in the use of the past tense. A judgment was carried out by a panel of five experts (three clinical psychologists who work in eating disorders, a psychologist PhD in Population Health, and a nutritionist specializing in eating disorders in adults). The objective of the panel was to detect expressions or concepts that were not appropriate for understanding the scale and to detect any discrepancy between the original scale and the translated one. Small modifications were introduced mainly in the verb tenses of some items. Then, a pilot test of the scale translated into Chilean Spanish was carried out in a convenience sample of 15 adults with different educational levels. Participants completed the scale in approximately 9 min. According to this administration, the wording of the three questions #6, #11, and #14 caused comprehension difficulties and were revised for clarity. Two adjacent questions had very similar content (#31: I tried to reduce or not eat certain types of foods but was unsuccessful; and #32: I tried and failed to reduce or stop eating certain types of foods), which caused confusion. Therefore, the order of these questions was altered so that they were not asked immediately after each other. The final Chilean YFAS 2.0 maintained the 35 questions of the original YFAS 2.0 (see Supplementary material).

Statistical analysis

Analyses were conducted using Stata version 16.0 (Stata-Corp LLC, College Station, TX, USA) and MPlus software (Muthén & Muthén version 8, April 2017, CA, USA) for confirmatory factor analysis (CFA). The distribution of quantitative variables was evaluated by histograms and the Kolmogorov–Smirnov test. Statistical significance was accepted at $p < 0.05$. The sample characteristics were represented with absolute values, percentages for qualitative variables and mean \pm SD for continuous variables.

As in the original article, clinically significant impairment/distress was not included in the psychometric properties and factor structure analysis as they reflect clinical significance of the full syndrome rather than indicators of individual criteria [27]. CFA was conducted based on the tetrachoric correlations among the 11 diagnostic criteria to compare a 1-factor and a 2-factor (dependence and abuse) model. The comparative fit index (CFI), Tucker–Lewis index (TLI), Standardized Root Mean Square Residual (SRMR) and the Root Mean Square Error of Approximation (RMSEA) were used to evaluate the model. Given that all items were dichotomous, Kuder–Richardson alpha (KR-20) and McDonald's ω [28] were used to assess the internal consistency of the Chilean version of YFAS 2.0. The following cutoffs were used as indicators of excellent validity and reliability of the psychometric model: KR-20 internal reliability coefficient > 0.7 , McDonald's $\omega > 0.7$, CFI > 0.90 , TLI > 0.90 and RMSEA < 0.08 [29, 30].

To evaluate the test–retest reliability of the Chilean YFAS 2.0 the scale was administered 7 to 10 days apart between the first and second application. The 88 participants who answered the retest corresponded to 29% of the sample. Of these participants, 63.6% were female, students (62.5%), single (90.0%), obese (22.7%), and 6.8% had FA in the first application. There were no significant differences in the variables of interest in this study between participants who responded to the retest and those who did not respond (all p values > 0.05). The test–retest correlation coefficient (intra-class correlation coefficient, ICC) was used to evaluate the test–retest reliability. The values of ICC were interpreted as follows: > 0.75 was excellent, between 0.40 and 0.75 was fair to good, and < 0.40 was poor. To detect demographic differences, anthropometric and body composition measurements between the subjects with or without FA, χ^2 , Fisher's Exact, or T-Student test was used, depending on the type of variable. Spearman correlations between symptom count of FA and anthropometric and body composition measurements were evaluated.

Ethics

The study protocol followed the Helsinki Declaration and was approved by the Ethics Committee of Universidad del Desarrollo—Facultad de Medicina—CAS. All participants provided electronic informed consent to participate in the study.

Results

In our study, the largest proportion of participants were female (59%), mainly university students (87%), and single (85%). The median age was 29.7 ± 12.4 . More than 50% of the sample was in a weight status of overweight or obese.

Table 1 Demographic characteristics and anthropometric measurements in a non-clinical sample (n=301)

Variables		%(n)
Gender	Female	59.1 (178)
	Male	40.9 (123)
Age (years), M ± SD		29.7 ± 12.4
Educational level	Primary or less	0.0 (0)
	Secondary	13.0 (39)
	University	87.0 (262)
Employment situation	Unemployed	9.6 (29)
	Employed	38.6 (116)
	University Students	51.8 (156)
Marital status	Single	85.0 (256)
	Married	11.6 (35)
	Divorced	2.7 (8)
	Widowed	0.7(2)
Current psychological treatment	No	78.4 (236)
	Yes	21.6 (65)
Weight Status	Normal weight	46.2 (139)
	Overweight	34.9 (105)
	Obesity	18.9 (57)
Anthropometric measures, M ± SD	Weight (kg)	71.2 ± 14.1
	BMI (kg/m ²)	25.8 ± 4.3
	WC (cm)	84.9 ± 12.5
	Body fat (%)	32.7 ± 9.7
	Lean mass (kg)	26.3 ± 6.6

BMI Body Mass Index, WC Waist Circumference

Other demographic and anthropometric characteristics of the study sample are presented in Table 1.

Table 2 shows a confirmatory factor analysis (CFA) for the Chilean version of YFAS 2.0 in a non-clinical sample. The 1-factor model had adequate fit indices where CFI=0.988, TLI=0.985, SRMR=0.063, RMSEA=0.040, with all factor loadings greater than 0.69. Consistently with the YFAS 2.0 validation study (25), we retained a 1-factor solution because the 2-factor model did not result in a markedly improved fit (CFI=0.988, TLI=0.984, SRMR=0.062, RMSEA=0.041). In addition, factor 1 and factor 2 in the 2-factor model were highly correlated ($r=0.96$, $p<0.001$). The Kuder–Richardson alpha for the unidimensional model was 0.85, and McDonald's ω was 0.88, which suggested satisfactory internal consistency reliability, and the ICC (0.96) for the test–retest of the Yale 2.0 Chilean version was excellent.

The prevalence of FA was 10.3%, and the median symptom count was 2.1 ± 2.8 . Regarding the severity of FA, 0.3% met the mild criteria, 2.0% met the moderate criteria, and 8.0% met the severe threshold. The most frequently reported symptoms were: 28.2% “consumed food in larger quantities or for a longer period than planned”; 27.9% “withdrawal”; and 24.3% “persistent desire or unsuccessful efforts to cut down or control consumption of certain foods” (Table 3).

Table 4 shows demographic and anthropometric characteristics according to No FA or FA. There were no significant differences in any demographic or anthropometric variables by FA status.

Table 2 Factor loadings for the 1- and 2-factor structures of the Chilean version of the Yale Food Addiction Scale 2.0 (confirmatory factor analyses) in a non-clinical sample (n=301)

	One-factor Structure ^a	Two-factor Structure ^b	
	Factor 1 Loadings	Factor 1 Loadings	Factor 2 Loadings
Food consumed in larger quantities or over a longer period than intended	0.69*	0.69*	
Persistent desire or unsuccessful efforts to cut down or control consumption of certain foods	0.85*	0.86*	
Considerable time spent to obtain, consume, or recover from effects of food	0.81*	0.81*	
Giving up important social, occupational, or recreational activities because of food consumption	0.77*	0.77*	
Continuing to eat certain foods despite physical or psychological problems	0.91*	0.91*	
Tolerance	0.85*	0.85*	
Withdrawal	0.73*	0.73*	
Continued use despite social or interpersonal problems	0.68*		0.70*
Failure to fulfill major role obligations	0.77*		0.79*
Eating certain foods in physically hazardous situations	0.75*		0.77*
Craving or a strong desire or urge to eat certain food	0.81*	0.81*	

^aThis 1-factor model was significant with the corresponding fit indices: $\chi^2=65.468$, df (degrees of freedom)=44; χ^2 (CMIN)/ $df=1.49$, $p<0.05$; Comparative Fit Index (CFI)=0.988; Tucker Lewis Index (TLI)=0.985; Standardized Root Mean Square Residual (SRMR)=0.063; Root Mean Square Error of Approximation (RMSEA)=0.040 (0.017–0.059)

^bThis 2-factor model (factor 1 = 7 DSM-IV-TR dependence criteria plus craving; factor 2: 3 former DSM-IV-TR criteria of abuse recently added in the DSM-5) was significant with the corresponding fit indices: $\chi^2=64.863$, $df=43$; χ^2 (CMIN)/ $df=1.51$; $p<0.05$; CFI=0.988; TLI=0.984; SRMR=0.062; RMSEA=0.041 (0.018–0.060); Factor 1 and factor 2 were significantly correlated ($r=0.96$, $p<0.001$). * $p<0.001$

Table 3 Food addiction prevalence and symptoms using Chilean YFAS 2.0 in a non-clinical sample ($n=301$)

Characteristics	% (n)
Prevalence FA	10.3 (31)
Mild	0.3 (1)
Moderate	2.0 (6)
Severe	8.0 (24)
Symptoms count, $M \pm SD$	2.1 ± 2.8
Criteria	
Food consumed in larger quantities or over a longer period than intended	28.2 (85)
Persistent desire or unsuccessful efforts to cut down or control consumption of certain foods	24.3 (73)
Considerable time spent to obtain, consume, or recover from effects of food	21.3 (64)
Giving up important social, occupational, or recreational activities because of food consumption	17.6 (53)
Continuing to eat certain foods despite physical or psychological problems	16.0 (48)
Tolerance	12.6 (38)
Withdrawal	27.9 (84)
Continued consumption despite social or interpersonal problems	20.9 (63)
Failure to fulfill major role obligation	10.6 (32)
Use in physically hazardous situations	18.6 (56)
Craving	14.0 (42)
Significant distress in relation to food	11.3 (34)

Table 4 Sociodemographic characteristics and anthropometric measurements according to No Food Addiction or Food Addiction in a non-clinical sample ($n=301$)

Variables		No food addiction $n=270$	Food addiction $n=31$	p value ^a
Gender, % (n)	Female	58.5 (158)	64.5 (20)	0.520
	Male	41.5 (112)	35.5 (11)	
Age, ($M \pm SD$)	Years	29.7 ± 12.2	29.4 ± 14.6	0.874
Educational level, % (n)	Primary or less	0.0 (0)	0.0 (0)	0.262
	Secondary	12.2 (33)	19.4 (6)	
	University	87.8 (237)	80.6 (25)	
Employment situation, % (n)	Unemployed	9.3 (25)	12.9 (4)	0.754
	Employed	38.9 (105)	35.5 (11)	
	University Students	51.8 (140)	51.6 (16)	
Marital status, % (n)	Single	85.2 (230)	83.9 (26)	0.780
	Married	11.5 (31)	12.9 (4)	
	Divorced	2.6 (7)	3.2 (1)	
	Widower	0.7 (2)	0.0 (0)	
Psychological treatment, % (n)	No	79.3 (214)	71.0 (22)	0.288
	Yes	20.7 (58)	29.0 (9)	
Weight Status, % (n)	Normal weight	47.8 (129)	32.3 (10)	0.178
	Overweight	34.4 (93)	38.7 (12)	
	Obesity	17.8 (48)	29.0 (9)	
Anthropometric measures, ($M \pm SD$)	Weight (kg),	70.9 ± 14.1	74.0 ± 14.4	0.268
	BMI (kg/m ²)	25.7 ± 4.2	27.0 ± 5.1	
	WC (cm)	84.4 ± 12.4	88.8 ± 12.8	
	Body fat (%)	32.4 ± 9.6	35.2 ± 10.1	
	Lean mass (kg)	26.3 ± 6.7	26.3 ± 6.3	

^aChi-square, Fisher exact or T-student test depending on the type of variable for the difference of sample; *BMI* Body Mass Index, *WC* waist circumference. In bold type, $p < 0.05$

Table 5 Symptoms count according to demographics characteristics and anthropometric measurements in a non-clinical sample (n = 301)

Variables		Symptoms count (M ± SD)	<i>p</i> value
Gender	Female	2.34 ± 2.90	0.086
	Male	1.79 ± 2.57	
Educational level	Primary or less	N/R	0.448
	Secondary	2.43 ± 3.30	
	University	2.07 ± 2.70	
Employment situation	Unemployed	2.79 ± 3.44	0.157
	Employed	1.82 ± 2.62	
	University Students	2.21 ± 2.75	
Marital status	Single	2.14 ± 2.82	0.084
	Married	1.94 ± 2.37	
	Divorced	1.25 ± 1.75	
	Widower	5.00 ± 7.07	
Psychological treatment	No	1.97 ± 2.64	0.085
	Yes	2.64 ± 3.21	
Weight Status	Normal weight	1.57 ± 2.10 ^a	<0.001
	Overweight	2.32 ± 3.22 ^a	
	Obesity	3.09 ± 3.08 ^b	

N/R Not Reported. T-Student test or ANOVA test. ^{a,b}Different letters represent significant differences ($p < 0.05$), while equal letters represent non-significant statistical differences by multiple comparisons test (Bonferroni test). In bold type, $p < 0.05$

Table 6 Correlations between number of symptoms of Chilean YFAS 2.0 and anthropometric measures in a non-clinical sample

Variables	n	rho	<i>p</i> value
Weight (kg)	281	0.11	0.064
WC (cm)	281	0.12	0.043
BMI (kg/m ²)	281	0.15	0.013
Body fat (%)	273	0.17	0.004
Lean mass (kg)	273	0.00	0.999

BMI Body Mass Index, WC Waist Circumference. In bold type, $p < 0.05$

There were no significant differences between the symptom count and demographic characteristics, but there was a significant difference ($p < 0.001$) according to weight status, with individuals with obesity having higher FA symptoms than individuals with either normal or overweight (Table 5).

A small significant ($p < 0.05$) correlation was observed between symptoms count and WC ($\rho = 0.12$), BMI ($\rho = 0.15$), and BF % ($\rho = 0.17$) (Table 6).

Discussion

The construct of FA indicates that certain foods (hyper-palatable, highly processed, foods) may have an addictive potential, similar to addictive substances like drugs and alcohol [31]. The YFAS 2.0 is a widely used validated measure to evaluate FA based on the diagnostic criteria for substance use disorders [27] and it has been adapted for dozens of other languages and cultures [32]. However, no Chilean version currently exists despite rising rates of obesity and diet-related diseases in the country [3]. To develop a Chilean version of the YFAS 2.0, a strict process of translation, back translation, expert judgment, and piloting was carried out and modifications were made to culturally adapt the scale. In a non-clinical sample, the Chilean version of YFAS 2.0 exhibited good psychometric properties comparable to those obtained in the validation of the original version of the YFAS 2.0 [27]. Specifically, the Chilean YFAS 2.0 had good internal reliability, excellent test-retest reliability, and a single-factor model was supported, which is consistent with the results from validation studies of other language versions of the YFAS 2.0 [13, 17, 33].

In our non-clinical sample, the prevalence of FA was 10.3%, which is similar to the prevalence from other non-clinical samples around the world. For example, 10.0% in the validation study of the German version of YFAS 2.0 (10.0%) [18], 10.3% of Canadian university students [34], and 11.4% in undergraduate participants of a private university in the original study of YFAS [8]. This result is also similar to the prevalence of 14.0% found in non-clinical samples based on a recent systematic review and meta-analysis [32].

The most endorsed FA symptoms were “food consumed in larger quantities or over a longer period than intended”, “withdrawal” and “persistent desire or unsuccessful efforts to cut down or control consumption of certain foods”. The first most endorsed symptom, “food consumed in larger quantities or over a longer period than intended”, refers to consumed more than planned or loss of control [10], which is often the most reported symptom in the FA literature [15, 17, 35]. Loss of control over intake is a relevant mechanism in both substances use disorders and eating-related problems [10], such as binge eating [36]. The second most endorsed symptom, “withdrawal”, refers to characteristic withdrawal symptoms (i.e., negative emotional experiences such as irritability or physical experiences such as headaches after the substance is removed from the system); or substance taken to relieve withdrawal [10]. This symptom was the most endorsed in the original validation study (29.7%) [27] and in a sample of Italian general population (12.5%) [14]. Withdrawal in the context

of highly processed food consumption has been less studied than in addictive drugs use and may be an important area for future research with clinical relevance. The third most endorsed symptom, “persistent desire or unsuccessful efforts to cut down or control the consumption of certain foods”, refers to an inability to cut down or stop [10]. This symptom was endorsed by 25.0% of the sample in the original YFAS 2.0 validation study [27]. This symptom is also common in eating-related problems, and it could be triggered by the availability of hyperpalatable highly processed foods [37].

Our study did not find differences in weight status by FA diagnosis. Individual’s BMI also did not differ by FA diagnosis. Previous literature presents mixed results. Some cross-sectional design studies have reported that the likelihood of FA in participants with obesity is higher than in normal-weight participants [38–40]. In contrast, other studies do not observe these differences by weight status [33, 41]. However, there were differences in the FA symptoms count score by weight status. Specifically, individuals with obesity had higher FA symptoms on the Chilean YFAS 2.0 than individuals with overweight or normal-weight status. The FA symptoms count was also positively associated with BMI. Similar results have been reported in the literature [14, 17, 20, 38, 42, 43]. In the current study, the FA symptoms count (relative to the diagnostic scoring option) was more strongly associated with differences in weight status and BMI. It will be important to investigate differences between the two FA scoring options in clinical samples where FA diagnosis and obesity may both be more prevalent. However, the current study suggests that individuals with obesity are more likely to experience symptoms of addiction related to their food intake, which has been associated with poorer quality of life, deficit in emotional regulation [44] and a poorer response to behavioral weight-loss treatment [45]. Future research is needed to see if these associations are also present and clinically relevant in Chilean participants with different characteristics.

The FA symptoms had a positive small correlation with WC and BF%. Our study is the second one, to our knowledge, to investigate the correlation between FA symptom counts with WC, and BF%. In a non-clinical Canadian sample, FA symptoms were significantly correlated with all obesity-related measurements including body weight, waist and hip circumferences, BF%, and trunk fat percentage determined by DXA [46]. This finding has clinical relevance since it provides evidence of an association between FA symptoms and the cardiovascular and metabolic risk associated with fat accumulation at abdominal level, as well as whole body composition [47]. This is also relevant given that elevated WC has clinical significance in predicting mortality risk beyond BMI [48].

Strengths and limitations

Our results should be interpreted taking into account the following limitations. First, the limitations of cross-sectional studies do not allow us to make causal inferences. Second, a convenience non-clinical sample was used and future validation in clinical samples and nationally representative samples are needed to test the generalizability of the findings. However, the current study provides important evidence on the strong psychometric properties of the Chilean YFAS 2.0, to set the foundation for that research. Third, the YFAS 2.0 has commonly been validated against other psychological measures of compulsive eating, but those have not been validated in Chilean population and this will be an important knowledge gap to fill. Fourth, in the current study we do not have participants with potential eating disorder diagnosis. Prior research has found that FA is related to, but distinct from existing eating disorders [49]. However, future research investigating the overlap between FA and eating disorders in Chilean samples will be important.

What is already known on this subject?

FA refers to a condition characterized by addiction in relation to some high-fat and refined carbohydrate foods. Assessed through YFAS 2.0, FA it is associated with reward-related neural dysfunctions, impulsivity, emotional dysregulation, and poor physical and mental health, which validates its clinical relevance.

What does this study adds?

To our knowledge, this is the first study that validates the YFAS 2.0 in the Chilean population. The Chilean version of the YFAS 2.0 has good psychometric properties and is therefore valid for use in food addiction research in the Chilean population. The use of this instrument would provide more evidence of AF in the Chilean population and thus identify individuals who could require targeted treatment for this condition.

Conclusion

Developing countries, like Chile, are in a period of fast transition in their food environment with a prompt increase in the availability and accessibility of hyperpalatable and highly processed foods that may have an addictive potential. However, until now, there were no tools to study the

presence of FA in Chile. The current study showed that the Chilean YFAS 2.0 has adequate psychometric properties, which provides an important tool to advance the research of FA at a crucial time in Chile. Future studies should test the validity of the Chilean version of YFAS 2.0 in a clinical sample, which could experience more significant deterioration in their health related to FA. Furthermore, this study is the first to report prevalence of FA in a non-clinical sample of the Chilean population using YFAS 2.0 and is the second to report a correlation between the number of symptoms and fat accumulation at abdominal level, as well as at global body level. These findings suggest the importance of future research into FA and cardiometabolic health.

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Declarations

Ethics approval and consent to participate The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Universidad del Desarrollo—Facultad de Medicina—CAS (record number 2022/65, dated August 23, 2022).

Consent to participate Informed consent was obtained from all individual participants involved in the study.

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