Original Article

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Thai Version of the Modified Yale Food Addiction Scale 2.0: Cultural Adaptation, Reliability, and Validity

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Abstract:

Objective: This study aimed to adapt the Thai version of the modified Yale Food Addiction Scale 2.0 (mYFAS-TH 2.0), taking cross-cultural considerations into account.

Material and Methods: The mYFAS 2.0 was translated into Thai, resulting in the mYFAS-TH 2.0. In total, 530 participants from the Northeast of Thailand completed the Thai version of the mYFAS 2.0 (mYFAS-TH 2.0). Its psychometric properties, including content validity, were investigated using the index of item-objective congruence (IOC). Internal consistency reliability was investigated using Kuder-Richardson 20 (KR-20), and convergent validity was investigated by confirmatory factor analysis.

Results: The mYFAS-TH 2.0 demonstrated strong content validity, with IOC values ranging from 0.67 to 1.00. The internal consistency reliability was robust, as indicated by a KR-20 score of 0.82 (95% confidence interval [CI]: 0.751 to 0.879). Furthermore, the mYFAS-TH 2.0 exhibited good convergent validity, as evidenced by standardized factor loadings between 0.360 and 0.741 (p-value<0.05).

Conclusion: The mYFAS-TH 2.0 exhibits acceptable content validity and reliability. The findings support the use of the mYFAS-TH 2.0 in clinical settings in the Thai population.

Keywords: convergent validity, food addiction, internal consistency reliability, the mYFAS-TH 2.0

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Introduction

Food addiction is a disorder characterized by addictive-like eating behaviors among individuals susceptible to palatable foods that are high in sugar and fat[1,2]. The sugar content in these foods elicits dopamine release in the nucleus accumbens of the brain's mesolimbic reward system[3,4], leading to feeling of pleasure[3]. When dopamine levels in the reward system decrease, withdrawal symptoms and negative feelings occur, much like in drug addiction[5].

Food addiction is a direct cause of a number of serious diseases, typically obesity[6]. Obesity has emerged as a critical public health issue in Thailand, with a high prevalence rate of 40.9%[7]. Several factors contribute to obesity, including sedentary lifestyles, overconsumption of calorie-dense foods[8,9], and excessive food intake[10]. Lifestyle modification, exercise, caloric restriction, and counseling are common treatment interventions for obesity. However, these interventions often require a long-term commitment and sustained effort, leading to low treatment success rates[11–14]. Bariatric surgery is considered a final option for severe obesity, although it carries a risk of postoperative eating disorders, including binge eating, night eating syndrome, bulimia nervosa, and malnutrition[15].

The Yale Food Addiction Scale (YFAS) questionnaire is a validated tool for assessing food addiction[16]. The YFAS and YFAS 2.0 questionnaires, developed by Gearhardt and colleagues, are based on the diagnostic criteria for substance use disorder outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and Fifth Edition (DSM-5), respectively[17,18]. The psychometric properties of YFAS 2.0 reflect enhanced understanding of food addiction. The results of functional magnetic resonance imaging studies in individuals with food addiction have been shown to be correlated with YFAS 2.0 scores (r=0.57)[19], indicating that the YFAS 2.0 has sufficient validity and reliability for diagnosing food addiction. To facilitate clinical applications, Schulte and Gearhardt developed the modified YFAS 2.0 (mYFAS 2.0), which exhibits psychometric properties comparable to the full YFAS 2.0 version[20]. The mYFAS 2.0 contains fewer items than the YFAS 2.0, making it less time-consuming. The mYFAS 2.0 has been translated into various languages[21–23]. Although the Thai version has been cross-culturally adapted, the correlation of the items with the food addiction construct has not been evaluated. This is critical for evaluating the psychometric properties of the questionnaire[24]. Therefore, the objective of this study was to adapt the Thai version of the mYFAS 2.0 (mYFAS-TH 2.0) and evaluate its psychometric properties, including content validity, reliability, and convergent validity.

Material and Methods

This study was approved by the Mae Fah Luang University Research Ethics Committee (EC. 20169-25) in accordance with the 1975 Helsinki Declaration.

Participants and design

Participants were recruited using random sampling from 5 distinct locations across both urban and rural areas within Chiang Rai Province, Thailand, with an equal number of participants selected from each site. Based on recommendations from previous research regarding sample size for this type of study[25], 550 participants (males and females aged between 18 and 65 years) were recruited, accounting for a 10% dropout rate. All participants were required to be fluent in reading and writing Thai. All participants signed an informed consent form prior to their inclusion in the study. Exclusion criteria included pregnancy, food allergies, and current use of appetite-stimulant medications.

Translation process

The mYFAS 2.0 is a discrete questionnaire (yes=1, no=0) that evaluates eating behaviors over 12 months. The questionnaire comprises 13 items, the first 11 of which are

adapted from the substance use disorders category used to evaluate food addiction symptoms. The last 2 items assess clinically significant distress or impairment associated with food addiction. Diagnostic criteria require at least 2 or more symptoms, along with at least one symptom of distress or impairment. Symptom severity levels of food addiction are classified according to the number of symptoms: mild=2 to 3 symptoms, moderate =4 to 5 symptoms, and severe =6 or more symptoms.

Permission for cross-cultural translation was obtained from Dr. Erica Schulte, one of the developers of the original mYFAS 2.0 version[20]. The cross-cultural translation process adhered to Beaton's guidelines[26]. First, the original mYFAS 2.0 version was translated into Thai by 3 experts. Second, the mYFAS-TH 2.0 was back translated by a bilingual expert blinded to the original English version. Third, a committee comprising the original English author, one Thai researcher, and one bilingual translator compared the differences between the mYFAS-TH 2.0 back-translated English version and the mYFAS 2.0 original version of the questionnaire, resolving discrepancies through consensus. Finally, a pilot test was conducted with 30 participants to test comprehension, and feedback was obtained for further modifications to the final version.

The content validity of the mYFAS-TH 2.0 was assessed by 3 panel experts[27]. The index of item-objective congruence (IOC) was used to measure content validity[28]. Each expert rated each adapted question using a 3-point Likert scale (-1=content opposes objectives, 0=content may not correspond to objectives, +1=content corresponds to objectives). The IOC index ranged from -1 to +1. Items with an IOC value closer to +1 indicated high content validity. If an item had an IOC value below 0.5, the questionnaire was revised, and the translation process was repeated from the back-translation step.

Measurement

Data were collected using an online Google form, which set data validation to prevent missing values, errors, and out-of-range entries. All data were securely stored in a Google sheet with restricted access limited to the data analyst. To ensure data integrity, data management procedures adhered to established guidelines[29].

Statistical analysis

Analyses were conducted using Statistical Package for the Social Sciences (SPSS) 26.0 (IBM Corp., Armonk, NY, USA). CFA was conducted using Mplus version 8.4 (Muthén & Muthén, Los Angeles, CA, USA). The statistical analyses included descriptive statistics, internal consistency, and convergent validity of the mYFAS-TH 2.0.

Kuder–Richardson 20 (KR-20) was used to assess the internal consistency reliability for the dichotomous questionnaire[30]. The KR-20 ranges from 0 to 1. KR-20 values closer to 1 indicate questions have high internal consistency reliability. Item-total reliability (Alpha when item omitted) was used to measure the impact of individual items on the overall internal consistency reliability of the questionnaire (the overall KR-20) by comparing KR-20 after deleting each individual item with the overall KR-20. If the item-total reliability value was lower than the overall KR-20, this indicated the following: The item increased the overall KR-20, it had good internal consistency with the other items, and it contributed positively to the overall reliability of the questionnaire.

To assess the internal consistency reliability of the mYFAS-TH 2.0, KR-20 was conducted using a sample of 65 participants[31]. An overall KR-20 with a 95% confidence interval (95% CI) greater than 0.7 is generally accepted[32]. Item-total reliability values between 0.7 and the overall KR-20 were considered to contribute positively to the internal consistency reliability of the overall KR-20.

Confirmatory factor analysis (CFA) was used to assess the convergent validity of the dichotomous questionnaire. The Kaiser–Meyer–Olkin (KMO) measure and a measure of sampling adequacy (MSA) were employed to evaluate the sample size adequacy for CFA[33,34]. In addition, Bartlett's test of sphericity was conducted to confirm the significance of correlations among the items, which further justified the application of CFA[34]. Pearson's chi-square and likelihood-ratio chi-square divided by the degree of freedom (χ^2/df) were used to evaluate the goodness-of-fit of a structural equation model (SEM). The fitted model demonstrated a satisfactory fit between the SEM and the data, suggesting that the model adequately described the correlation level between the questionnaire items and food addiction constructs. Standardized factor loadings in SEM were used to reflect the strength of the correlation between the questionnaire items and their respective food addiction constructs. The standardized factor loadings of the items provide evidence of the items' ability to measure the food addiction construct, suggesting their utility in diagnosing food addiction symptoms. These loadings ranged from −1 to 1. Items with loading values close to 1 were considered to have a stronger positive correlation with the food addiction symptom. Conversely, loadings close to −1 were considered to have a strong negative correlation. Loadings close to 0 indicated that the item had no correlation with the food addiction symptom. To assess the convergent validity of categorical variables in the mYFAS-TH 2.0. Items 12 and 13 measured the clinical significance of food addiction and were excluded from the factor analysis. The sample size adequacy for the CFA was confirmed using KMO>0.6[33] and MSA>0.5. Significant correlations among the items were confirmed using Bartlett's test of sphericity (p-value<0.05)[34]. The goodness-of-fit of the SEM was evaluated using a nonsignificant Pearson's chi-square (p-value>0.05) and likelihood-ratio chi-square divided by the degree of freedom (χ^2/df<2.0). Given the sample size in this study, standardized factor loading values greater than 0.3 (p-value<0.05) were considered acceptable[34].

Results

Twenty participants were excluded from the data analysis due to incomplete responses or reluctance upon reviewing the questions. Thus, the final sample included 530 participants.

Descriptive statistics

The majority of the participants were female (60.4%), aged 18–29 years, with a median age of 33 years (interquartile range 25 years). The characteristics of the sample are shown in Table 1.

Table 1 Study population

Characteristics	Total (N=530) N (%)/Me[IQR]
Females	323 (60.4)
Age (years)	33 [25]
18–29	223 (42.1)
30–39	83 (15.7)
40–49	98 (18.5)
50–65	126 (23.8)
Me, median; IQR	

IQR=interquartile range

Content validity and reliability analysis

Descriptive characteristics of the mYFAS-TH 2.0 questions are shown in Table 2. The IOC value of all the items ranged from 0.67 to 1.00, demonstrating excellent content validity (IOC>0.5), suggesting that the items can be used to validate food addiction symptoms. The overall KR-20 coefficient was 0.82 (95% CI: 0.751–0.879), which indicated that the mYFAS-TH 2.0 questionnaire has good internal consistency reliability. The item-total reliability (Alpha when the item is omitted) for all items was between 0.7, and the overall KR-20 was 0.82, indicating that all items have good internal consistency with each other.

Table 2 Descriptive characteristics of the mYFAS-TH 2.0. Means, SDs, IOC, and Cronbach's alpha when an item was omitted

Item	Meet criteria	Mean	S.D.	IOC	Alpha when item omitted
1	10 (15.4%)	0.15	0.364	1.0	0.804
2	16 (24.6%)	0.25	0.434	1.0	0.797
3	12 (18.5%)	0.18	0.391	1.0	0.803
4	7 (10.8%)	0.11	0.312	1.0	0.815
5	18 (27.7%)	0.28	0.451	1.0	0.817
6	12 (18.5%)	0.18	0.391	1.0	0.814
7	16 (24.6%)	0.25	0.434	1.0	0.811
8	10 (15.4%)	0.15	0.364	1.0	0.810
9	2 (3.1%)	0.03	0.174	0.67	0.816
10	4 (6.2%)	0.06	0.242	1.0	0.819
11	11 (16.9%)	0.17	0.378	1.0	0.806
12	10 (15.4%)	0.15	0.364	1.0	0.797
13	6 (9.2%)	0.09	0.292	1.0	0.814

mYFAS-TH 2.0=Thai version of the modified Yale Food Addiction Scale 2.0, IOC=item-objective congruence, S.D.=standard deviation

Convergent validity

The statistical analysis revealed adequate sampling adequacy (KMO=0.816, MSA >0.5). In addition, significant correlations were found among the items (Bartlett's test of sphericity was significant, p-value<0.01), suggesting that the factor analysis statistic was appropriate. The CFA confirmed the fit of the SEM, with a nonsignificant Pearson's chi-square (p-value>0.05) and likelihood ratio chi-square and degree of freedom ratio (χ^2/df <2). This result suggests that the fit of the SEM adequately describes the relationships between the items and the food addiction construct. The single-factor SEM path is shown in Figure 1. The standardized factor loadings of all items exceeded 0.3 (p-value<0.05) (Table 3), providing evidence that each item was significantly correlated with the food addiction construct. This result supports the importance of each item for food addiction diagnosis. Time spent emerged as the most important, and activities given up as the least important.

Discussion

The objective of this study was to adapt the Thai version of the mYFAS-2.0, taking into account cross-cultural considerations (mYFAS-TH), and evaluate its psychometric properties, including content validity, reliability, and convergent validity. The results of the mYFAS-TH cross-cultural translation, together with pilot testing and experts' ratings, confirmed that it has good content validity to evaluate food addiction symptoms (IOC >0.5). Therefore, the questionnaire can be used to collect data from participants reliably. The overall KR-20 was 0.82 (95% CI: 0.751-0.879), indicating good internal consistency of the mYFAS-TH. All items consistently assessed food addiction symptoms. This result is consistent with previous findings on studies of French (0.78 for non-obese, 0.73 for obese), Chinese (0.84), Egyptian (0.836), Iranian (0.77), Brazilian (0.89), and Spanish (0.78) populations[22,35–39]. Although the item-total reliability (Alpha when the item is omitted) values were slightly lower than the overall KR-20, they were within an acceptable range, indicating each item has good internal consistency among the others. Each item contributes to the high overall reliability of the questionnaire. These items share the same objective of evaluating food addiction symptoms. This result is consistent with previous studies conducted in China[35] and the Czech Republic[21]. The

Table 3 CFA of food addiction symptoms, including standardized factor loadings, standard deviations, z-scores, p-values, and ranking

Item: food addiction symptom	Standardized factor loading	S.E.	z	p-value	Rank
3: Time spent	0.741	0.048	15.496	.000	1
2: Unsuccessful in cutting down	0.686	0.051	13.554	.000	2
8: Interpersonal problems	0.639	0.057	11.192	.000	3
7: Withdrawal	0.629	0.054	11.656	.000	4
1: Loss of control	0.577	0.059	9.798	.000	5
10: Dangerous situation	0.577	0.090	6.394	.000	6
5: Aversive consequence	0.567	0.055	10.304	.000	7
9: Impaired daily function	0.539	0.090	5.791	.000	8
11: Craving	0.501	0.064	7.826	.000	9
6: Tolerance	0.490	0.063	7.754	.000	10
4: Activities given up	0.360	0.082	4.390	.000	11

Pearson's chi-square=1134.717, df=2019, p-value=1.000, Likelihood ratio chi-square=570.929, df=2019, p-value=1.000
CFA=confirmatory factor analysis

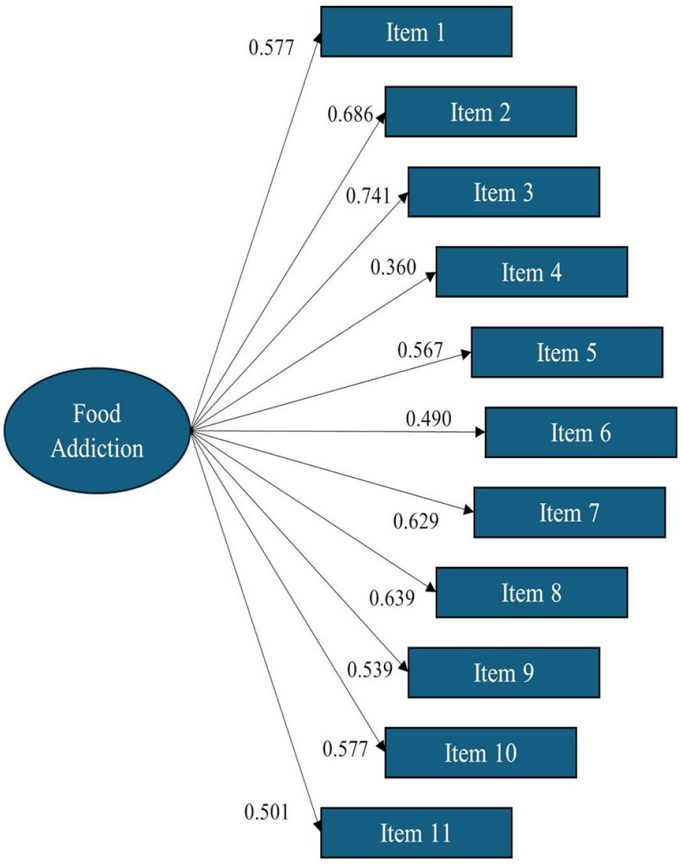

Figure 1 Structural equation model (SEM) and standardized factor loadings of the Thai version of the modified Yale Food Addiction Scale 2.0 (mYFAS-TH 2.0) symptom scores

standardized factor loadings (Table 3) indicated that all the items were significantly correlated with the underlying food addiction construct, suggesting their strong relevance for diagnosing food addiction. This finding points to the success of the cross-cultural translation process and indicates that the scale successfully captures the cultural nuances of food addiction in the Thai population. These findings align with those of previous studies conducted in a large Brazilian sample[38]. Among the 11 items, the time spent item consistently emerged as the most important symptom, aligning with the findings of a previous study conducted in China[35]. Activities given up were consistently identified as the least important item, aligning with findings from studies in China[35], Brazil[38], Spain[39], and France[22].

Several factors may account for the observed differences in KR-20 and standardized factor loadings between the mYFAS-TH 2.0 and other versions. First, the gender distribution of the sample: Females made up 60.4% of the participants in the current study. The KR-20 value in our study was 0.82. Previous research reported female participant distributions ranging from 51.0%[39] to 80.7%[36] and KR-20 values ranging from 0.73[22] to 0.89[38]. This suggests that a higher proportion of female participants may be associated with higher KR-20 values. Second, the sample size (N=530) and characteristics (age range: 18–65 years, general population): Previous studies included larger or smaller sample sizes than this study[38,39]. The samples in these studies were also more homogenous (college students, teenagers, and obese patients), with limited age ranges (Spain: 18–31 years[39], China: 18–20 years[35], Brazil: 17–35 years[38]). Previous studies on the psychometric properties of questionnaires had often been evaluated in limited, specific populations, limiting the generalizability of their findings. In contrast, this study addresses this limitation by utilizing a diverse sample representative of the general population, enhancing the generalizability of the assessment of the questionnaire's psychometric properties. Third, the inclusion and exclusion criteria: Although the inclusion criteria of this study align with those of previous studies, our exclusion criteria specifically focused on eating behaviors and appetite factors that influence salient factors of food addiction.

A limitations of this study are the characteristics of the sample: mainly young adults aged 18–29 years, with a female predominance, restricted to the northern region of Thailand. The characteristics of the sample may limit the generalizability of the findings regarding the psychological properties of the mYFAS-TH 2.0. In addition, the retrospective self-reported nature of the questionnaire over a 12-month period may have introduced recall bias, potentially leading to underreporting or overreporting of their health status. It may have influenced the evaluation of the psychological properties of the mYFAS-TH 2.0. However, these limitations are common in psychological research, and any discrepancy does not invalidate this study.

Conclusion

The mYFAS-TH 2.0 has good content validity, internal consistency, and convergent validity. This study suggests that the psychometric properties of the mYFAS-TH 2.0 are sufficient for clinical use in the Thai population to assess food addiction. The development of the mYFAS-TH 2.0 questionnaire offers a starting point for research on food addiction in a variety of dimensions, such as cross-sectional studies to assess the prevalence of food addiction among various populations or studies to investigate relationships between food addiction and various diseases. The current research could also prove useful for studies on food addiction syndrome classifications in traditional Chinese medicine and experimental studies on integrated treatments (i.e., modern medicine, psychotherapy, and traditional Chinese medicine) for food addiction.

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Conflict of interest

There are no conflicts of interest to declare.

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