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**Article** in *Anadolu Psikiyatri Dergisi* · April 2015

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**Psychometric properties of the Turkish version of the Yale Food Addiction Scale among bariatric surgery patients**

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**ABSTRACT**

**Objective:** The aim of this study was to examine validity and reliability of Turkish version of Yale Food Addiction Scale (YFAS) among Turkish bariatric surgery patients. **Methods:** The YFAS scale was administered to obese patients (n=171) who were seeking or underwent bariatric surgery. Construct validity of the scale was evaluated with factor analysis and reliability was evaluated with item-total score correlation and repeatability were tested by intraclass correlation (ICC) analysis between test-retest results. **Results:** Internal consistency was found adequate Kuder-Richardson Formula 20 coefficient (KR-20) 0.822, and Cronbach's alpha 0.859 for the entire 25-item YFAS. As Bartlett's Test of Sphericity was significant, the factor model developed in the present study was decided appropriate. Factor analysis extracted six factor in Turkish YFAS that explained for 67.51% of the total variance. Item total correlation coefficients of scale ranged from 0.214-0.666. **Conclusion:** Our findings support the use of the Turkish YFAS as a reliable measure of food addiction among bariatric surgery patients. (*Anatolian Journal of Psychiatry* 2015; 16(Special issue.1):44-53)

**Key words:** obesity surgery, food addiction, Yale Food Addiction Scale, validity, reliability

**Bariatrik cerrahi hasta grubunda Yale Yeme Bağımlılığı Ölçeği Türkçe sürümünün psikometrik özellikleri**

**ÖZET**

**Amaç:** Bu araştırmanın amacı Yale Yeme Bağımlılığı Ölçeğinin Türk bariatrik cerrahi hasta grubunda geçerlilik ve güvenilirliğini incelemektir. **Yöntem:** Bariatrik cerrahi arayışında olan obez hastalara (s=171) Yale Yeme Bağımlılığı Ölçeği uygulandı. Ölçeğin yapı geçerliliği faktör analizi ile, güvenilirliği madde toplam puan korelasyonu ile, tekrarlanabilirliği ise test-tekrar test sonuçları arasında sınıf içi korelasyon katsayısı hesaplanılarak değerlendirildi. **Bulgular:** Yirmi beş maddeli ölçeğin Kuder-Richardson Formula-20 katsayısı ile hesaplanan iç tutarlılığı (KR-20=0.822) ve Cronbach alfa (0.859) değerleri yeterli bulundu. Bartlett's Sphericity Testine göre geliştirilen faktör yapısının anlamlı olduğu kararına varıldı. Faktör analizine göre altı belirgin faktör olarak kümelenen bu yapı total varyansın %67.51'ini açıklıyordu. Ölçeğin madde toplam korelasyonları 0.214-0.666 arasında idi. **Sonuç:** Bulgularımız Yale Yeme Bağımlılığı Ölçeği'nin Türkçe formunun bariatrik cerrahi hasta grubunda yeme bağımlılığını ölçmede güvenilir bir araç olduğunu göstermektedir. (*Anadolu Psikiyatri Derg* 2015; 16(Özel sayı.1):44-53)

**Anahtar sözcükler:** Obezite cerrahisi, yeme bağımlılığı, Yale Yeme Bağımlılığı Ölçeği, geçerlilik, güvenilirlik

**INTRODUCTION**

The number of the patients who seek the treat-

ment for obesity are rises in proportion to the heightened to obesity prevalence.<sup>1</sup> Bariatric surgery methods have been gaining popularity

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Received: August 11<sup>th</sup> 2014, Accepted: December 2<sup>nd</sup> 2014, doi: 10.5455/apd.174345

since other methods such as dieting, exercise, behavioral treatment, pharmacotherapy have failed to the effective treatment of weight loss. Bariatric surgery appeal to patients because they offer a quick solution and dramatic changes can be perceived soon after the surgery. Besides that with bariatric surgery comorbid conditions, psychosocial functionality and quality of life improve as well.<sup>2</sup> But in some of cases, these surgical procedures may fail in terms of weight loss, and some patients can regain their weight. Therefore, it is important to identify factors associated with negative outcome to reduce the failure of bariatric surgery.

Researches show that bariatric surgery candidates have higher number of psychopathology than other obese people who seek other sorts of treatments and people belonging general community.<sup>3</sup> There are an increasing number of researches in the recent years about the role of the food addiction in the etiology of obesity and its predictive role in the treatment of obesity.<sup>4,5</sup>

Food addiction is a term characterized by the excessive food consumption which is related to bulimia nervosa, eating disorders, and the like. It has been argued that binge eating disorder (BED), and eating disorders such as bulimia nervosa which accompany it, overlap with many of the diagnostic criteria of drug addiction.<sup>6</sup> The behaviors of BED patients such as 'substance taken in larger amount and for a longer period than intended', 'failure of attempting to consume less', and 'continuing to eat despite physical and psychological problems' overlap with the criteria of addiction.<sup>7,8</sup> Due to the failure of various methods for losing weight in the treatment of obesity, bariatric surgery is being preferred which is more immediate and more permanent in the long run. However, food addiction as a predictor of bariatric surgery results is subject to discussion.<sup>9</sup> Along with this, whether the food addiction is a valid phenomenon is subject to discussion as well.<sup>10,11</sup>

Due to this necessity, in order to evaluate the food addiction precisely, Yale Food Addiction Scale has been developed by Gearhardt and his colleagues.<sup>12</sup> YFAS is a scale which is adapted from the drug addiction diagnostic criteria, and its single factor validity has been shown among university students and obese samples.<sup>13</sup> Internal consistency of the YFAS was found with an  $\alpha=0.86$  for that English version. It has also been shown that YFAS is a reliable and valid scale both for bariatric surgery patients, and non-clinical patients.<sup>14,15</sup> The Turkish adaptation of

the scale was performed by Bayraktar and his colleagues.<sup>16</sup> However the scale's reliability and validity among bariatric surgery patients has yet to be studied. Therefore, we aimed to evaluate the reliability and validity of YFAS in Turkish language among bariatric surgery patients in this study.

## METHODS

The research was conducted on 171 patients who applied to Bezmialem Vakıf University between 2011 and 2013, were suitable for the study, and agreed to participate preoperatively. Eligible participants completed a Turkish YFAS in which their food addiction symptoms were assessed. The third (n=144) and sixth month (n=57) postoperative evaluations of these patients were analyzed in this study. The study was approved by the ethical review board of the medical faculty, Bezmialem Vakıf University. Informed consent was obtained from participants prior to study participation. Then, participants completed the YFAS and other questionnaires which is related to examine effect of bariatric surgery on food addiction. Only results of the YFAS validity and reliability analysis are presented here.

## Measurements

**Yale Food Addiction Scale:** The YFAS measures symptoms of food addiction and its Turkish version was used in the current study.<sup>12,16</sup> This 25-item instrument contains different scoring options (dichotomous and frequency scoring) to indicate experience of addictive eating behavior. (We modified the time within the symptoms occur from past 12 months to past months.) The score can be generated by summing up the questions under each substance dependence criterion (e.g. Tolerance, Withdrawal, Use Despite Negative Consequence, Clinical Significance, etc.) If the score for the criterion is  $>1$ , then the criterion has been met and is scored as 1. If the score=0, then the criteria has not been met. To score the continuous version of the scale, add up all of the scores for each of the criterion. Food addiction is diagnosed if at least three symptoms that produced a clinically significant impairment or distress as assessed with two extra items are present. These three items are not scored, but they are primers for other questions.

## Statistical analysis

Factor structure, internal consistency, and item

statistics were analysed. The Kaiser-Meyer-Olkin (KMO) test was used to measure the sampling adequacy. The KMO values was (0.734) which was greater than 0.05. So, it was conclude that the sample was sufficient for applying the factor analysis in the present study. Bartlett's Test of Sphericity was used to measure the correlation matrix, to know whether it was an identity matrix or not. As Bartlett's Test of Sphericity was significant, the factor model developed in the present study was appropriate. Exploratory factor analysis technique with varimax rotation was conducted to study dimensionality of the 25 specific YFAS items for categorization into symptom groups as a construct validity. If the variable have factor loading more than 0.6, it indicates that the factor extract sufficient variance from the variables.

The reliability of YFAS overall, and for the identified subscales within this study, was computed

with Cronbach's  $\alpha$  and Kuder Richardson 20 a measure of internal consistency. The test-retest reliability of the instrument was evaluated by computing interclass correlation among patients who completed the YFAS a second time. In all the statistical calculations, SPSS (version 11.5, SPSS Inc, Chicago, IL) was used. P values smaller than 0.05 considered statistically significant.

## RESULTS

A total of 171 participants completed the YFAS. Participants had a mean age of male  $36.13 \pm 10.10$  years and a mean Body Mass Index (BMI) of  $27.21 \pm 7.15 \text{ kg/m}^2$ . The sample consist of 130 women (72.6%) and 41 men (27.4%). Endorsement rates of specific food addiction symptoms are presented in Table 1.

In total, 144 surveys have been evaluated in the

**Table 1.** Descriptive results of the YFAS subscores

	n	%
Persistent desire or repeated unsuccessful attempts to quit	114	79
Tolerance	79	55
Important social, occupational, or recreational activities given up or reduced	31	22
Use continues despite knowledge of adverse consequences	29	20
Substance taken in larger amount and for longer period than intended	24	17
Use causes clinically significant impairment or distress	18	13
Characteristic withdrawal symptoms; substance taken to relieve withdrawal	13	9
Much time/activity to obtain, use, recover	11	8

study. As three items out of 25 in the YFAS were primer, it was not included in the analysis. Item six was also excluded from the study since the factorial load of the 'I find myself eating certain foods the whole day' is low and has a total correlation of -0.029. All but one items had factor loadings  $>0.50$ . Internal consistency-Cronbach's alpha was 0.859.

Result shows that the six component factors have more than 0.05 loading thus they were considered as factors. Explanatory factor analysis identified six significant factors (Kuder-Richardson Formula 20 coefficient, KR-20, of internal consistency=0.822) for entire 25-item YFAS. Upon factor analysis, the results of the analysis were placed under 6 components and the lowest factor load was 0.219 whereas 67.514% of the variants were explained. The

distribution of the items according to highest factorial loads are as in the table below (Table 2). The factor loads of items vary between 0.219 and 0.730. Item-total correlation is varying between 0.214 and 0.666 (Table3.)

Fifty-seven eligible YFAS score were obtained through test and re-test (excluding preoperative cases) with intervals of minimum three and maximum six months. It is found that the answers that participants were giving did not show any significant differences between the test and re-test ( $p>0.05$ ). During test and re-test; item 2, item 5, item 14, item 20, item 24, and item 25 did not show significant statistical correlation ( $p>0.05$ ). Correlations were significant for the other items ( $p<0.05$ ). Results for all subscale of the test showed no significant differences either ( $p>0.05$ ). For the dichotomous results of the test

**Table 2.** Factorial structure of the Turkish YFAS

Eigenvalue	Item	Factor load	Variance extracted (%)	Cronbach's alpha
Factor 1 (6.385)	item 17	0.771	15.227	0.778
	item 18	0.724		
	item 19	0.686		
	item 20	0.655		
	item 21	0.583		
	item 23	0.520		
	item 15	0.418		
Factor 2 (2.088)	item 8	0.855	12.055	0.799
	item 9	0.844		
	item 5	0.493		
	item 3	0.468		
Factor 3 (1.694)	item 4	0.901	11.804	0.738
	item 16	0.731		
	item 7	0.542		
Factor 4 (1.468)	item 10	0.800	11.028	0.749
	item 11	0.795		
Factor 5 (1.342)	item 12	0.819	9.087	0.733
	item 13	0.731		
	item 14	0.534		
Factor 6 (1.202)	item 2	0.818	8.313	0.611
	item 1	0.816		
Total variance	67.51%			

with regards of test and re-test, shows no significant difference between evaluations which is done within 3rd and 6th month postoperatively ( $p>0.05$ ).

## DISCUSSION

It has been proposed that foods might have an addictive features as seen in alcohol and other substances. Indeed, in some people can not be controlled against food cravings and their excessive eating habits, despite physical, psychological, and the social harmful consequences they continued of binge eating behavior is similar to behavior observed in addiction. Researches show that there are a number of problems with the food intake regulation especially in obese people. At this point, researches had focused on the question of the situation conceptualized as eating addiction was associated with individual's own or feature of food. It has been stated that eating addiction is more similar with drug addiction than behavioral addictions such as pathological gambling. This understanding required existence of an addictive substance which can

be detected in the obvious way, and affect the brain with neurochemical pathways. These factors are the food in the eating addiction. Indeed, in studies with rats have been shown that high fat and high sugary processed foods lead to neural changes similar to the addiction.<sup>17</sup> Especially when rats are exposed to sucrose solution and processed foods, they began to binge eating within weeks and they exhibit behaviors observed in drug addiction such as tolerance, withdrawal and craving.<sup>18</sup> In other similar animal studies, eating, and compulsive style food consumption observed in obese rats can not be prevented despite the implementation of punishment. This is consistent with the drug addiction diagnostic criteria that despite the harmful effects of the substance to maintain consumption.<sup>17</sup> In human studies have been shown that delicious food lead to increased dopamine in the mesolimbic region to similarly as a result of the receipt of many addictive substances.<sup>19</sup> Furthermore, obesity is associated with a decrease in dopamine D2 receptors. This relationship is available in the dependent individuals. This explains to trend toward greater

**Table 3.** Factorial load and item statistics of YFAS

Item number	Item	Factorial load	Mean±SD	Item-total correlation
1	I find that when I start eating certain foods, I end up eating much more than planned.	0.349	0.049±0.216	0.294
2	I find myself continuing to consume certain foods even though I am no longer hungry.	0.357	0.069±0.255	0.285
3	I eat to the point where I feel physically ill.	0.701	0.111±0.315	0.611
4	Not eating certain types of food or cutting down on certain types of food is something I worry about.	0.555	0.021±0.143	0.398
5	I spend a lot of time feeling sluggish or fatigued from overeating.	0.627	0.035±0.184	0.521
6	I find myself constantly eating certain foods throughout the day.	-0.043	0.007±0.083	-0.029
7	I find that when certain foods are not available. I will go out of my way to obtain them.	0.600	0.049±0.216	0.497
8	There have been times when I consumed certain foods so often or in such large quantities that I started to eat food instead of working, spending time with my family or friends, or engaging in other important activities or recreational activities I enjoy.	0.635	0.076±0.267	0.518
9	There have been times when I consumed certain foods so often or in such large quantities that I spent time dealing with negative feelings from overeating instead of working, spending time with my family or friends, or engaging in other important activities or recreational activities I enjoy.	0.684	0.076±0.267	0.563
10	There have been times when I avoided professional or social situations where certain foods were available, because I was afraid I would overeat.	0.479	0.139±0.347	0.454
11	There have been times when I avoided professional or social situations because I was not able to consume certain foods there.	0.526	0.118±0.324	0.438
12	I have had withdrawal symptoms such as agitation, anxiety, or other physical symptoms when I cut down or stopped eating certain foods.	0.516	0.035±0.184	0.408
13	I have consumed certain foods to prevent feelings of anxiety, agitation, or other physical symptoms that were developing.	0.577	0.049±0.216	0.465
14	I have found that I have elevated desire for or urges to consume certain foods when I cut down or stop eating them.	0.607	0.069±0.255	0.532
15	My behavior with respect to food and eating causes significant distress.	0.730	0.118±0.324	0.666
16	I experience significant problems in my ability to function effectively because of food and eating.	0.655	0.042±0.201	0.512
19	I kept consuming the same types of food or the same amount of food even though I was having emotional and/or physical problems.	0.493	0.201±0.402	0.434
20	Over time, I have found that I need to eat more and more to get the feeling I want, such as reduced negative emotions or increased pleasure.	0.504	0.174±0.380	0.459
21	I have found that eating the same amount of food does not reduce my negative emotions or increase pleasurable feelings the way it used to.	0.334	0.514±0.502	0.338
22	I want to cut down or stop eating certain kinds of food.	0.219	0.528±0.501	0.236
24	I have been successful at cutting down or not eating these kinds of food.	0.351	0.243±0.430	0.227
25	How many times in the past year did you try to cut down or stop eating certain foods altogether?	0.272	0.403±0.492	0.214

Note: Items 17, 18, and 23 are primers and are not scored. The 6th item too was excluded as its correlation was low.

consumption of delicious food to get the same pleasure observed in obese individuals. This is supported by the presence of a relationship between the level of reward sensation caused by the ingestion of delicious food and the degree of dopamine release.<sup>20</sup> In experimental studies of the sensitivity of awards, it was found that more activity showed in the region of the brain associated with reward in obese individuals than normal.<sup>21,22</sup>

According to the DSM-5, drug addiction is defined as 'despite the significant problems caused by a substance, a cluster of cognitive, behavioral, and physiological symptoms which is caused by continuous use of substances'.<sup>23</sup> Binge eating disorder show remarkable overlap with eating addiction. About half of the individuals with BED and compulsive over-eating behavior have been shown to meet the criteria of eating addiction.<sup>24</sup> In a study by Davis et al., they have shown that BED patients with comorbid eating disorder are more impulsive than BED patients without comorbid eating disorder.<sup>25</sup> The strong relationship between impulsivity and addictive behavior has been shown in many studies.<sup>26,27</sup> In a study, comparing obese women with BED, obese women without eating disorder, and normal weight women, it was found that negative urgency scores were significantly higher in obese women with BED than other groups.<sup>28</sup> These relationships were evaluated that negative urgency force to people addiction style eating, and this situation can lead to obesity. Murphy et al reported that negative urgency scores as a significant predictor for symptoms of food addiction, are also associated with a higher value of BMI.<sup>29</sup> Individuals who tend to act rashly without considering, when upset or feel frustrated are tending to eat dependency style to appease the negative emotions. This situation is considered to tend to consume certain foods to protection from some physical symptoms and feeling such as anxiety, and dysphoria secondary to food deprivation. Although forms of addictive style eating though not seen in all obese individuals, the rate of to meet the criteria for food addiction is three to four times in obese people.<sup>30</sup>

Considering the high rate of food addiction among bariatric surgery patients, the importance of pre-surgical psychiatric assessment for food addiction needs to be stressed. Food addiction can be a problematic especially first two years after bariatric surgery which is shown in the literature weight regain occurs mostly within that time, as well.<sup>31</sup>

A few studies have investigated the construct of food addiction among patients undergoing bariatric surgery. The results of our study are consistent with Bayraktar et al. study regarding their high internal consistency (Cronbach's alpha=0.93) and Item-total correlation ( $r=0.567$  and  $r=0.831$ ).<sup>16</sup> Although the bariatric surgery patients were not included in that study, they demonstrated significant difference between total scores of YFAS in clinical and nonclinical groups.<sup>16</sup> Albayrak et al. has not been a studied comparable factor analysis of YFAS.<sup>16</sup>

Our results indicated that the prevalence of food addiction in bariatric surgery candidates was 57.8%, as ascertained with the YFAS. This was higher than the rate reported by Meule et al. (42%),<sup>14</sup> and is also higher than that reported in the general population (11%),<sup>12</sup> and in patients seeking other treatments for obesity (15.2%-19.6%).<sup>32-34</sup> The results of our study is very similar to the Clarks et al study that investigate validity of YFAS among weight loss surgery population which they report 53.7% met the criteria for pre-surgical food addiction.<sup>15</sup> Studies in the literature have shown that severity of obesity and the frequency of psychopathology and eating disorders were correlated. Our study group was comprised primarily of patients with class III obesity which may be related to our finding of a high rate of food addiction.<sup>3</sup> It should also be noted that other studies has been showed that a nonlinear relation between BMI and rate of food addiction.<sup>32,34</sup>

In the evaluation of YFAS factor analysis, factors which have Eigen values bigger than one, to have a high factorial load, and that for the same variables to have not similar factorial loads was taken to consider. Higher coefficients of reliability and higher value of explained variance of the factors shows us that the Turkish YFAS had a strong factorial structure.

We found different factor structure than previous analyses of the YFAS which have all found typically one factor or at most two. It has been reported that in the study of Gerhardt's these items were gathered under one component but when the contents of the questions were analyzed it was plotted under one factor.<sup>7</sup> In our study, there were groupings under six factors and none were below 0.5. As the contents of the 4 factors in the original study was unreported, its correlation with the present study could not be compared. Although this different finding brings up questions about differences in analytic ap-

proach, we decided that the adapted YFAS with a high enough explained variation and the factorial loads which reflects good construct validity. Internal consistency of the scale was also good and comparable to findings from other studies.<sup>12-15</sup>

It might be considered to remove item #6 because of low psychometric qualities in our samples. This could be explained by the inappropriate translations or higher endorsement rate of the item. The most reported items were 'a desire or repeated failed attempts to reduce or stop consumption' (79%) and 'tolerance' (55%) among our participants. While our findings were similar with regard to desire or unsuccessful

attempt to stop eating, Gerhardt's et al. found only 13.5% had food-related tolerance in their study among college students.<sup>12</sup>

As a result, construct validity and reliability of the YFAS has been confirmed in a group of Turkish bariatric surgery patients. The Turkish form of YFAS which was shown to be valid for weight-loss surgery population as in the study of Clark et al. and Meule et al. studies.<sup>14,15</sup> Turkish YFAS is also a useful tool that can be used in researches to investigate food addiction among Turkish bariatric surgery patient groups. The validation of this scale would help to promote and improve quality of research in this field among Turkish population.

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### Yale Food Addiction Scale

This survey asks about your eating habits in the past year. People sometimes have difficulty controlling their intake of certain foods such as: - Sweets like ice cream, chocolate, doughnuts, cookies, cake, candy, ice cream - Starches like white bread, rolls, pasta, and rice - Salty snacks like chips, pretzels, and crackers - Fatty foods like steak, bacon, hamburgers, cheeseburgers, pizza, and French fries - Sugary drinks like soda pop. When the following questions ask about CERTAIN FOODS please think of ANY food similar to those listed in the food group or ANY OTHER foods you have had a problem with in the past year.

#### IN THE PAST 12 MONTHS

0-Never, 1-Once a month, 2-Two-four times a month, 3-Two-three times a week, 4-Four or more times or daily

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. I find that when I start eating certain foods, I end up eating much more than planned  | 0 | 1 | 2 | 3 | 4 |
| 2. I find myself continuing to consume certain foods even though I am no longer hungry  | 0 | 1 | 2 | 3 | 4 |
| 3. I eat to the point where I feel physically ill   | 0 | 1 | 2 | 3 | 4 |
| 4. Not eating certain types of food or cutting down on certain types of food is something I worry about   | 0 | 1 | 2 | 3 | 4 |
| 5. I spend a lot of time feeling sluggish or fatigued from overeating   | 0 | 1 | 2 | 3 | 4 |
| 6. I find myself constantly eating certain foods throughout the day   | 0 | 1 | 2 | 3 | 4 |
| 7. I find that when certain foods are not available, I will go out of my way to obtain them. For example, I will drive to the store to purchase certain foods even though I have other options available to me at home.   | 0 | 1 | 2 | 3 | 4 |
| 8. There have been times when I consumed certain foods so often or in such large quantities that I started to eat food instead of working, spending time with my family or friends, or engaging in other important activities or recreational activities I enjoy.                                       | 0 | 1 | 2 | 3 | 4 |
| 9. There have been times when I consumed certain foods so often or in such large quantities that I spent time dealing with negative feelings from overeating instead of working, spending time with my family or friends, or engaging in other important activities or recreational activities I enjoy. | 0 | 1 | 2 | 3 | 4 |
| 10. There have been times when I avoided professional or social situations where certain foods were available, because I was afraid I would overeat.  | 0 | 1 | 2 | 3 | 4 |
| 11. There have been times when I avoided professional or social situations because I was not able to consume certain foods there.   | 0 | 1 | 2 | 3 | 4 |
| 12. I have had withdrawal symptoms such as agitation, anxiety, or other physical symptoms when I cut down or stopped eating certain foods. (Please do NOT include withdrawal symptoms caused by cutting down on caffeinated beverages such as soda pop, coffee, tea, energy drinks, etc.)               | 0 | 1 | 2 | 3 | 4 |
| 13. I have consumed certain foods to prevent feelings of anxiety, agitation, or other physical symptoms that were developing. (Please do NOT include consumption of caffeinated beverages such as soda pop, coffee, tea, energy drinks, etc.)   | 0 | 1 | 2 | 3 | 4 |
| 14. I have found that I have elevated desire for or urges to consume certain foods when I cut down or stop eating them.   | 0 | 1 | 2 | 3 | 4 |
| 15. My behavior with respect to food and eating causes significant distress.  | 0 | 1 | 2 | 3 | 4 |
| 16. I experience significant problems in my ability to function effectively (daily routine, job/school, social activities, family activities, health difficulties) because of food and eating.  | 0 | 1 | 2 | 3 | 4 |

#### IN THE PAST 12 MONTHS

0-No, 1-Yes

- |  |   |   |
|--|---|---|
| 17. My food consumption has caused significant psychological problems such as depression, anxiety, self-loathing, or guilt.                      | 0 | 1 |
| 18. My food consumption has caused significant physical problems or made a physical problem worse.   | 0 | 1 |
| 19. I kept consuming the same types of food or the same amount of food even though I was having emotional and/or physical problems.              | 0 | 1 |
| 20. Over time, I have found that I need to eat more and more to get the feeling I want, such as reduced negative emotions or increased pleasure. | 0 | 1 |
| 21. I have found that eating the same amount of food does not reduce my negative emotions or increase pleasurable feelings the way it used to.   | 0 | 1 |
| 22. I want to cut down or stop eating certain kinds of food.   | 0 | 1 |
| 23. I have tried to cut down or stop eating certain kinds of food.   | 0 | 1 |
| 24. I have been successful at cutting down or not eating these kinds of food.  | 0 | 1 |
| 25. How many times in the past year did you try to cut down or stop eating certain foods altogether?   |   |   |

One or fewer times 2 times 3 times 4 times 5 or more times.

Gearhardt AN, Corbin WR, Brownell KD. Preliminary validation of the Yale Food Addiction Scale. *Appetite* 2009; 52:430-436.

### Instruction Sheet for the Yale Food Addiction Scale

The Yale Food Addiction Scale is a measure that has been developed to identify those who are most likely to be exhibiting markers of substance dependence with the consumption of high fat/high sugar foods.

#### Development

The scale questions fall under specific criteria that resemble the symptoms for substance dependence as stated in the Diagnostic and Statistical Manual of Mental Disorders IV-R and operationalized in the Structured Clinical Interview for DSM-IV Axis I Disorders.

- 1) Substance taken in larger amount and for longer period than intended: Questions #1, #2, #3
- 2) Persistent desire or repeated unsuccessful attempts to quit: Questions #4, #22, #24, #25
- 3) Much time/activity to obtain, use, recover: Questions #5, #6, #7
- 4) Important social, occupational, or recreational activities given up or reduced: Questions #8, #9, #10, #11
- 5) Use continues despite knowledge of adverse consequences (e.g., failure to fulfill role obligation, use when physically hazardous): Question #19
- 6) Tolerance (marked increase in amount; marked decrease in effect): Questions #20, #21
- 7) Characteristic withdrawal symptoms; substance taken to relieve withdrawal: Questions #12, #13, #14
- 8) Use causes clinically significant impairment or distress: Questions #15, #16

#### Cut-offs

The following cut-offs were developed for the continuous questions.

0 = criterion not met, 1 = criterion is met

The following questions are scored 0 = (0), 1 = (1): #19, #20, #21, #22

The following question is scored 0 = (1), 1 = (0): #24

The following questions are scored 0 = (0 thru 1), 1 = (2 thru 4): #8, #10, #11

The following questions are scored 0 = (0 thru 2), 1 = (3 & 4): #3, #5, #7, #9, #12, #13, #14, #15, #16

The following questions are scored 0 = (0 thru 3), 1 = (4): #1, #2, #4, #6

The following questions are scored 0 = (0 thru 4), 1 = (5): #25

The following questions are NOT scored, but are primers for other questions: #17, #18, #23

#### Scoring

After computing cut-offs, sum up the questions under each substance dependence criterion (e.g. tolerance, withdrawal, clinical significance, etc.). If the score for the criterion is >1, then the criterion has been met and is scored as 1. If the score=0, then the criteria has not been met.

#### Example:

Tolerance: (#20=1) + (#21=0) = 1, Criterion Met

Withdrawal (#12=0) + (#13=0) + (#14=0) = 0, Criterion Not Met

Given up (#8=1) + (#9=0) + (#10=1) + (#11=1) = 3, Criterion Met and scored as 1

To score the continuous version of the scale, which resembles a symptom count without diagnosis, add up all of the scores for each of the criterion (e.g. tolerance, withdrawal, use despite negative consequence). Do NOT add clinical significance to the score.

This score should range from 0 to 7 (0 symptoms to 7 symptoms.)

To score the dichotomous version, which resembles a diagnosis of substance dependence, compute a variable in which clinical significance must=1 (items 15 or 16=1), and the symptom count must be >3. This should be either a 0 or 1 score (no diagnosis or diagnosis met.)