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Factors Influencing Food Addiction: A Cross-Sectional Survey of University Students in Jordan

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Abstract: Background: Food Addiction (FA) reflects an overdependence on certain foods, similar to substance addiction. This study aimed to explore factors influencing FA among university students in Jordan and identify its associations with body mass index, stress, and various sociodemographic factors. **Method:** A cross-sectional study was conducted via an online questionnaire distributed to university students across Jordan between January and March 2021. A total of 300 students participated. A survey using the Yale FA Scale (YFAS) to assess FA and the Perceived Stress Scale (PSS-10) to measure stress was used. Data was analyzed using both univariate and multivariate logistic regression to identify predictors of FA. **Results:** This study included 300 students with a median age of 21 years (IQR = 4 years). The majority were female (n = 232, 77.3%), and about one-third of the participants were overweight or obese (n = 99, 34.0%). The overall prevalence of FA was 14.3% (n = 43), with a 95% CI of 10.4%-18.2%. The prevalence of food addiction (FA) symptoms was notable, with 92% (n = 276) reporting a persistent desire or repeated unsuccessful attempts to quit. Tolerance symptoms were observed in 48.7% (n = 146) of participants, and the least common symptom was clinically significant impairment or distress caused by food consumption (16.3%, n = 49). FA symptoms were significantly more common in the FA group compared to those without FA (No-FA). Key factors associated with FA included higher BMI (OR: 2.342, 95% CI: 1.116-4.919, p=0.025) and increased perceived stress (OR: 1.115, 95% CI: 1.061-1.171, p<0.001). **Conclusion:** FA was reported among Jordanian university students, with being overweight or obese, and having stress being the most significant factors associated with FA. Providing educational campaigns on stress management strategies and weight management plans is critical to reducing the prevalence of FA and improving university students' overall well-being.

Keywords: Food addiction; University students; Prevalence; Predictors; Jordan.

Introduction

Obesity is considered a public health concern in Jordan, with approximately 36.1% of men and 48.2% of women of the population currently categorized as obese [1]. Previous studies have found a correlation between being overweight or obese and FA (FA) [2-4]. Notably, framing obesity in the context of FA reduces the stigma associated with it [5]. In addition, other factors have been linked to FA; including psychological distress [6], eating disorders [7], and binge eating [8]. The term "FA" is defined as losing control over food consumption, particularly foods that are palatable and high in energy [9]. Frequent consumption of highly palatable foods causes FA, which leads to intense activation in the reward circuitry similar to addictive drugs [10].

FA is diagnosed based on the seven diagnostic criteria of substance dependence according to the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV) [11]. The prevalence of FA varies, ranging from 5.4% among the general healthy population [2], to as high as 53.7% among post-bariatric surgery patients [12].

The Yale FA Scale (YFAS) is a tool designed specifically to assess FA [13]. It was developed in 2009 by modeling all of the DSM-IV for substance dependence to eating behavior. The YFAS uses two scoring options including FA symptom score and diagnosis. Previous research has shown that the YFAS has psychometric properties including adequate internal consistency (original validation study α = 0.86), and convergent, discriminant, and incremental validity [13, 14].

Previous literature mentioned that emotional and psychological factors play a major role in understanding eating behavior and the increased desirability of highly palatable foods [15]. Eating often serves as a form of self-medication in response to negative emotional states [16], thus, eating behavior is significantly influenced by stress [15]. FA and emotions have also shown significant associations to inability to handle negative emotions

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[17]. Therefore, investigating the relationship between stress and FA is important for developing effective management plans, to reduce stress. Despite the unhealthy lifestyle adopted by university students, there is limited information available regarding the prevalence of FA in this population. Thus, this study aimed to explore factors influencing FA among university students in Jordan.

Materials and Methods

2.1 Study design and data collection

A cross-sectional study utilizing web-based survey was used to explore factors influencing FA among Jordanian university students between January and March of 2021 using a convenience sampling method. A link to the Google Form survey was distributed through various social networking platforms groups on Facebook, WhatsApp, Twitter, and Instagram in Jordan. The inclusion criteria included: Current university students and those willing to participate.

2.2 Study instrument

The questionnaire was self-administered. The first section included 13 items about Sociodemographic and health information (age, sex, level of education, marital status, and self-reported anthropometric measurement (height and weight) in order to compute their body mass index). The second section included the Arabic version of the YFAS was used, which is a self-report measure that was used to measure a total of seven symptoms of FA behavior and a clinically significant impairment criterion [18]. This questionnaire consisted of 25 items assessing addiction to highly palatable foods. Previous studies have validated and translated the YFAS into Arabic with good internal consistency (Cronbach's alpha 0.89) [18]. The respondents who indicated at least three FA behavior symptoms and fulfilled the clinical significance impairment criterion were considered to have a FA [19]. The last section used the Perceived Stress Scale (PSS-10), which is a popular tool for measuring psychological stress. PSS is a self-reported instrument containing 10 items that assess "how unpredictable, uncontrollable, and overloaded respondents find their lives"[20]. Each item in the PSS is measured using 5-likert points, with values ranging from 0 (never) to 4 (very often). The PSS-10 consists of 6 positive items (1, 2, 3, 6, 9, and 10: Positive factor) and 4 negative items (4, 5, 7 and 8: Negative factor). Negative- items were re-coded during analysis. Total scores range from 0 to 40, with higher scores indicating higher levels of perceived stress [21, 22]. The published internal consistency/reliability measure for the Arabic version of our scale was very good with —Cronbach's alpha of 0.80 [23].

2.3 Ethical Approval

The study protocol was approved by the Institutional Review Board at King Abdullah University Hospital, Jordan University of Science and Technology (REF: 474-2021).. Participation in the study was voluntary, and the purpose of the study was explained before starting the questionnaire. Electronic informed consent of the participants was obtained, and the anonymity of respondents was ensured throughout the study conduct.

2.4 Statistical analysis

Data was analyzed using statistical package for social science (SPSS) version 22 (SPSS Inc., Chicago, IL, USA). Mean and standard deviations were reported for continuous variables and percentages for qualitative variables. Checking data normality was carried out using the Shapiro-Wilk test (with a P-value >0.05 indicating a normally distributed continuous variable). Screening of the factors predicting FA was carried out using univariate and multivariate logistic regression. Following univariate logistic regression analysis, any variables found to be significant on the single predictor level (P-value< 0.250), were entered into the multiple logistic regression analysis to explore significant variables to predict FA among study participants. Variables were selected after checking their multicollinearity, where the Pearson correlation coefficient r<0.9 indicates the absence of multicollinearity between independent variables in regression analysis. P ≤0.05 was considered statistically significant.

Results

This study included 300 students with a median age of 21 years (IQR = 4 years). The majority were female (n = 232, 77.3%). About one-third of the participants were overweight or obese (n = 99, 34.0%), and 30.9% (n = 91) were enrolled in health-related faculties. Most participants were bachelor's degree students (n = 226, 75.3%) and attended public universities (n = 266, 88.7%). Additional socio-demographic details are provided in Table1. In terms of lifestyle, most participants lived with their families (n = 271, 90.3%) and had a sedentary lifestyle (n = 239, 79.7%). About one-third were smokers (n = 93, 31.0%), and 60.0% (n = 180) reported never having been on a diet.

Figure 1 illustrates the prevalence of FA symptoms among participants. The most common symptom was a persistent desire or repeated unsuccessful attempts to quit, reported by 92% of participants (n= 276). Tolerance symptoms were observed in about half of the participants (n= 146, 48.7%), while the least common symptom was clinically significant impairment or distress caused by food consumption (n= 49, 16.3%). According to the YFAS, FA is diagnosed when an individual meet at least three of seven criteria and experiences clinical impairment or distress. In this study, the prevalence of FA was 14.3% (n= 43), (95% CI: 10.4%-18.2%).

Results of the present study highlight a distinct pattern of symptom prevalence associated with FA. **Table 2** presents the endorsement rates of seven YFAS symptoms in individuals diagnosed with FA compared to

those without FA (No-FA). Each symptom, except for "repeated unsuccessful attempts to quit," shows a significantly higher prevalence in the FA group, as indicated by p-values less than 0.001. Notably, 83.7% of the FA group reported tolerance, while only 42.8% did in the No-FA group. Similarly, withdrawal symptoms were observed in 74.7% of those with FA versus 15.2% without. Clinically significant impairment was universally observed in the FA group at 100%, starkly contrasting with 2.3% in the No-FA group.

In examining the factors associated with FA among the 300 study participants, key observations were made. BMI was emerged as a significant factor; where participants classified as overweight or obese exhibited a significantly higher likelihood of developing FA compared to those with a normal BMI (OR: 2.342, 95% CI: 1.116-4.919, p=0.025). Furthermore, perceived stress was significantly associated with FA, with increased stress levels correlating with higher odds (OR: 1.115, 95% CI: 1.061-1.171, p<0.001). Other variables analyzed, including age, gender, educational level, personal expenses, living situation, physical activity, smoking, and diet history, did not reveal significant associations with FA in this study. The model fit was found significant with $\chi 2$ (df = 5) = 33.653 at P ≤ 0.001, which indicated that our full model predicts significantly better or more accurately than the null model. The highest correlation between independent variables was 0.598 indicating absence of multicollinearity.

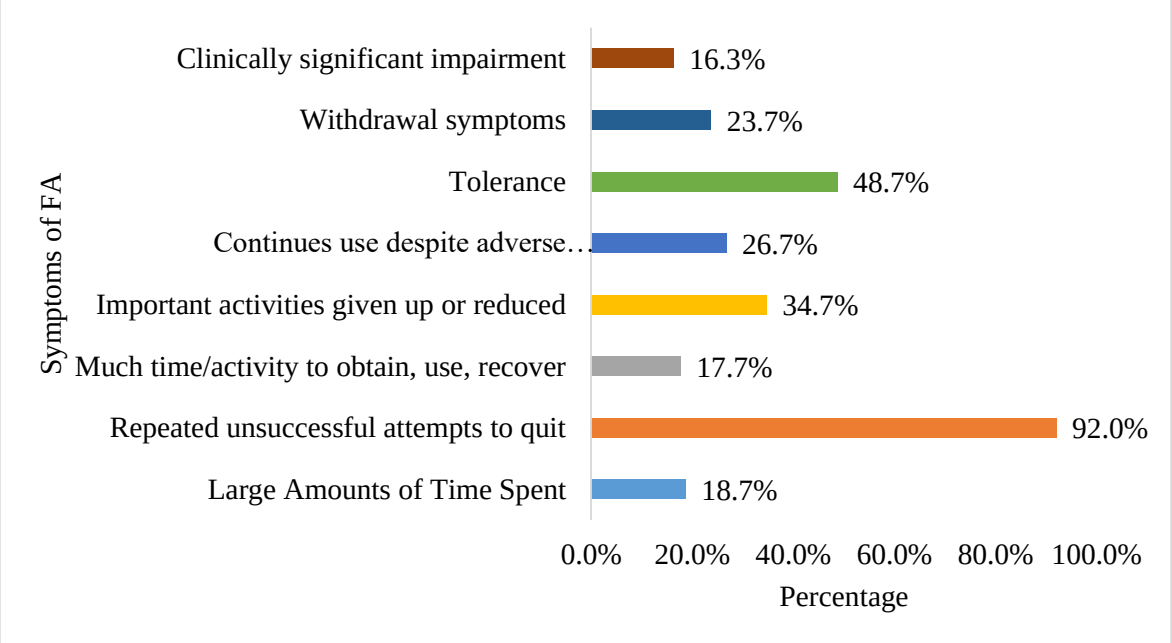

Figure 1: Prevalence of FA symptoms among study participants (n= 300)

Table 1 Sociodemographic characteristics of the study sample (n= 300)

Characteristics	N (%)	Median (IQR)
Age		**21.0 (4.0)**
Gender		
○ **Male**	**68 (22.7)**	
○ **Female**	**232 (77.3)**	
BMI		
○ **Underweight**	**19 (6.3)**	
○ **Normal**	**182 (60.7)**	
○ **Overweight**	**68 (22.7)**	
○ **Obese**	**31(10.3)**	
Degree		
○ **Bachelor**	**226 (75.3)**	

○ Master	65 (21.7)	
○ PhD	9 (3.0)	
GPA		
○ Acceptable	8 (2.7)	
○ Good	48 (16.0)	
○ Very good	124 (41.3)	
○ Excellent	84 (28.0)	
○ Very excellent	36 (12.0)	
Field of study		
○ Science Faculties	135 (45.0)	
○ Health faculties	91 (30.3)	
○ Humanities Faculties	74 (24.7)	
University		
○ Public	266 (88.7)	
○ Private	34 (11.3)	
Place of residence		
○ North Region	201 (67.0)	
○ Central Region	84 (28.0)	
○ South Region	15 (5.0)	
Personal expenses		
○ ≤ 50 JD	79 (26.3)	
○ 51-100 JD	120 (40.0)	
○ 101-150 JD	49 (16.3)	
○ 151-200 JD	20 (6.7)	
○ >200 JD	32 (10.7)	
Living situation		
○ With family	271 (90.3)	
○ In dorms	13 (4.3)	
○ Alone	16 (5.3)	
Physical activity (weekly)		
○ Sedentary	114 (38.0)	
○ Light activity	125 (41.7)	
○ Moderate activity	45 (15.0)	
○ Active	13 (4.3)	
○ Very active	3 (1.0)	
Smoking		
○ Non-smoker	207 (69.0)	
○ Current smoker	93 (31.0)	
▪ Argileh	58 (19.3)	
▪ Cigarette	26 (8.7)	
▪ Electronic cigarette	9 (3.0	
Diet history		
○ Has never dieted	180 (60.0)	
○ Has dieted for less than 12 months	105 (35.0)	
○ Has dieted for more than 12 months	15 (5.0)	

Table 2: Endorsement rates of YFAS symptoms according to FA (n= 300)

Symptoms	Diagnosis		ρ-value^
	FA (n= 43)	No-FA (n= 257)	

Large Amounts of Time Spent	27 (62.8)	29 (11.3)	<0.001
Repeated unsuccessful attempts to quit	41 (95.3)	235 (91.4)	0.548
Much time/activity to obtain, use, recover	25 (58.1)	28 (10.9)	<0.001
Important activities given up or reduced	28 (65.1)	76 (29.6)	<0.001
Continues use despite adverse consequences	27 (62.8)	53 (20.6)	<0.001
Tolerance	36 (83.7)	110 (42.8)	<0.001
Withdrawal symptoms	32 (74.7)	39 (15.2)	<0.001
Clinically significant impairment	43 (100.0)	6 (2.3)	<0.001

^Using Pearson Chi-square test/Fisher Exact test. FA: food addictive. *significant at 0.05 significance level

Table 3 Factors associated with FA among the study participants (n= 300)

Parameter	FA [0: No, 1: Yes]			
	OR (95% CI)	P-value#	OR (95% CI)	P-value$
Age (years)	1.012 (0.945-1.084)	0.731	----	----
Gender ○ Female ○ Male	Reference 1.592 (0.778-3.256)	0.203^	2.027 (0.880-4.667)	0.097
Educational level ○ Bachelor ○ Masters/PhD	Reference 1.059 (0.609-2.222)	0.881	----	----
BMI ○ Underweight/normal ○ Overweight/obese	Reference 2.739 (1.421-5.280)	0.003^	2.342 (1.116-4.919)	0.025*
Personal expenses ○ ≤ 100 JD ○ > 100 JD	Reference 0.832 (0.413-1.676)	0.607	----	----
Living situation ○ With family ○ Others^	Reference 1.650 (0.630-4.322)	0.308	----	----
Physical activity (weekly) ○ Sedentary ○ Perform any level of activity	Reference 0.594 (0.310-1.138)	0.116^	0.630 (0.313-1.266)	0.194
Smoking ○ Non-smoker ○ Current smoker	Reference 0.841 (0.411-1.722)	0.636	----	----

Diet history ○ **Has never dieted** ○ **Has ever dieted**	**Reference** **1.700 (0.888-3.252)**	**0.109^**	**1.615 (0.784-3.329)**	**0.194**
Perceived stress score	**1.100 (1.051-1.151)**	**<0.001^**	**1.115 (1.061-1.171)**	**<0.001***

^ In dorms or alone, ^^eligible for entry in multiple logistic regression, # using simple logistic regression, $ using multiple logistic regression, * significant at 0.05 significance level

Discussion

The primary aim of this study was to explore factors influencing FA among university students in Jordan. Results showed that 14.3% of students met the diagnostic criteria for FA. In 2014, a review article estimated the average worldwide prevalence of FA across 25 studies, reporting a prevalence of 19.9% [24]. In another study, using translated versions of YFAS, 15% of Australian adults aged 19-35 years met the criteria for FA diagnosis [25]. An Egyptian study among adolescents found a prevalence of FA at 15.7% [26]. The prevalence of FA among Turkish and Lebanese university students was lower, at 10.4% and 10.1%, respectively [6]. However, a US study among college-aged females found a significantly higher FA prevalence, reaching 31.3% [27].

Consistent with the results reported in a German study [28], the current study found that the most common FA symptom was repeated unsuccessful attempts to quit (92%). When it comes to FA, people may experience compulsive eating behaviors, cravings, and a loss of control, making it difficult to control one's intake or refrain from eating particular foods. This ongoing resistance to cessation despite multiple attempts emphasizes the complexity of FA and the necessity of focused interventions to effectively address this issue.

In the current study, being overweight or obese significantly increased the likelihood of FA. Earlier research has found a significant relationship between obesity and FA [2]. This association can be explained by the fact that a decrease in dopamine D2 receptors and potential leptin resistance are observed in obese individuals, which can result in compulsive eating. The overindulgence in food stimulates the release of endogenous opiates, which in turn increases appetite, leading to FA [2].

Results of the present study demonstrated that stress had the strongest association with FA, as indicated by the highest standardized beta coefficient. A French study on college students found a significant association between FA symptoms and psychological distress from depression, anxiety, and perceived stress [29]. Another study found an association between stress and FA in type 2 diabetes patients [30]. Similarly, chronic stress and poor or inadequate stress coping were positively related to the compulsive eating and FA among adolescents and young people [31]. Most of the time, stress activates the hypothalamic-pituitary-adrenal axis and subsequently increases cortisol levels, which can lead to the desire for highly palatable food high in sugar and fat, which have been proven to have a positive effect on the psychological stress by stimulating the micro-reward systems which are similar to drugs [16]. In addition, students that undergo high academic pressure and this is almost the case with university students may engulf foods as a way of coping with the situation making them candidates for FA. Similarly, the results of this study are consistent with Kalon et al. [15] study, which considered stress as a predictor of FA and revealed that increased levels of stress led to complaint of more FA symptoms than in the low-stress group. Collectively, these studies indicate that targeting stress and the manner in which it is managed might be useful for preventing FA in this sample.

The current study has several limitations. The first is using social media and instant messaging applications as a tool for convenience sampling. This sampling method may have led to selection bias, and, as a result, the generalizability of the findings is limited. The second is the sample size, the sample size of 300 provides a reasonable representation, but it may still be insufficient to generalize the findings to all Jordanian university students. Larger sample sizes could provide more robust results and improve the generalizability of the findings. On the other hand, it has certain strengths. Firstly, the study specifically targets university students, that may be particularly vulnerable to FA due to lifestyle changes, academic stress, and new social environments. Secondly, the study highlights the importance of addressing stress and obesity in reducing FA, which may contribute to the development of educational programs and preventive measures aimed at improving student well-being. Despite its limitations, the study lays the groundwork for future research. It underscores the need for longitudinal studies and larger sample sizes to validate and extend the findings.

Conclusion

In conclusion, the present study identified a high prevalence of FA among university students in Jordan, with perceived stress and being overweight or obese emerging as significant predictors of FA. Given these findings, it is crucial to develop targeted interventions that specifically address these factors. Future research should explore longitudinal designs to establish causal relationships between stress, obesity, and FA. Moreover, intervention studies focusing on stress management, healthy eating behaviors, and weight management strategies tailored to university students are necessary to effectively reduce FA prevalence.

Recommendations for future interventions include the implementation of university-wide health promotion programs that integrate mental health services with nutritional counseling. These programs should emphasize coping strategies for stress management, promote physical activity, and foster healthier eating behaviors. Additionally, policy-makers and university administrators should consider creating supportive environments that reduce stressors unique to the academic setting, such as offering flexible deadlines or stress-relief activities during exam periods. Addressing these issues through a comprehensive and multifaceted approach will not only decrease the prevalence of FA but also enhance the overall well-being and academic performance of university students.

Ethics approval and consent to participate

The study protocol was approved by the Institutional Review Board at King Abdullah University Hospital, Jordan University of Science and Technology (REF: 474-2021).

Availability of data and materials

The raw data required to reproduce these findings are available in the body and illustrations of this manuscript.

Author's contribution

The authors confirm contribution to the paper as follows: Idea and Conceptual framework Mukattash, Al Tall and Al Kurdi, Data Collection and Drafting was carried out by AL Kurdi, Abu Saleh and Al-zenati, Data Analysis was carried out by Abu Farha, Manuscript Drafting was carried out by Mukattash and Ajlouny, and Proof reading and editing was carried out by Jarab and Daradkeh.

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Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article

References

1. Ajlouni, K., et al., *An alarmingly high and increasing prevalence of obesity in Jordan.* Epidemiology and Health, 2020. 42.
2. Pedram, P., et al., *FA: its prevalence and significant association with obesity in the general population.* PloS one, 2013. 8(9): p. e74832.
3. Davis, C., et al., *Evidence that 'FA'is a valid phenotype of obesity.* Appetite, 2011. 57(3): p. 711-717.
4. Cocores, J.A. and M.S. Gold, *The Salted FA Hypothesis may explain overeating and the obesity epidemic.* Medical hypotheses, 2009. 73(6): p. 892-899.
5. Latner, J.D., et al., *FA as a causal model of obesity. Effects on stigma, blame, and perceived psychopathology.* Appetite, 2014. 77: p. 79-84.
6. Şanlier, N., D. Türközü, and O. Toka, *Body image, FA, depression, and body mass index in university students.* Ecology of food and nutrition, 2016. 55(6): p. 491-507.
7. Nolan, L.J. and A. Geliebter, *"FA" is associated with night eating severity.* Appetite, 2016. 98: p. 89-94.
8. Koball, A.M., et al., *The relationship among FA, negative mood, and eating-disordered behaviors in patients seeking to have bariatric surgery.* Surgery for Obesity and Related Diseases, 2016. 12(1): p. 165-170.
9. Gearhardt, A., et al., *The addiction potential of hyperpalatable foods. Curr Drug Abuse Rev. 2011; 4: 140–5.* This paper provides compelling evidence that hyperpalatable processed foods—those high in sugar, fat, and salt—act on the brain reward pathways in a similar way to conventional addictive drugs, and foster the same neuro-adaptations and behavioral responses as these drugs.
10. Pérez-Ortiz, J.M., et al., *A high-fat diet combined with food deprivation increases food seeking and the expression of candidate biomarkers of addiction.* Addiction biology, 2017. 22(4): p. 1002-1009.
11. American Psychiatric Association, D. and D. American Psychiatric Association, *Diagnostic and statistical manual*

of mental disorders: DSM-5. Vol. 5. 2013: American psychiatric association Washington, DC.

12. Clark, S.M. and K.K. Saules, *Validation of the Yale FA Scale among a weight-loss surgery population.* Eating behaviors, 2013. 14(2): p. 216-219.
13. Gearhardt, A.N., W.R. Corbin, and K.D. Brownell, *Preliminary validation of the Yale FA scale.* Appetite, 2009. 52(2): p. 430-436.
14. Gearhardt, A.N., et al., *An examination of the FA construct in obese patients with binge eating disorder.* International Journal of Eating Disorders, 2012. 45(5): p. 657-663.
15. Kalon, E., et al., *Psychological and neurobiological correlates of FA.* International review of neurobiology, 2016. 129: p. 85-110.
16. Davis, C., S. Strachan, and M. Berkson, *Sensitivity to reward: implications for overeating and overweight.* Appetite, 2004. 42(2): p. 131-138.
17. Kozak, A.T., et al., *Are overeating and FA related to distress tolerance? An examination of residents with obesity from a US metropolitan area.* Obesity research & clinical practice, 2017. 11(3): p. 287-298.
18. Hallit, S., et al., *Validation of the Arabic version of the modified Yale FA Scale in the general population in Lebanon.* Journal of Eating Disorders, 2022. 10(1): p. 112.
19. Penzenstadler, L., et al., *Systematic review of FA as measured with the Yale FA Scale: implications for the FA construct.* Current neuropharmacology, 2019. 17(6): p. 526-538.
20. Shapiro, A.J., N.L. Heath, and D. Carsley, *Pilot evaluation of the feasibility and acceptability of StressOFF Strategies: a single-session school-based stress management program for adolescents.* Advances in School Mental Health Promotion, 2016. 9(1): p. 12-28.
21. Cohen, S., T. Kamarck, and R. Mermelstein, *A global measure of perceived stress.* Journal of health and social behavior, 1983: p. 385-396.
22. Cohen, S., *Perceived stress in a probability sample of the United States.* 1988.
23. Almadi, T., et al., *An Arabic version of the Perceived Stress Scale: Translation and validation study.* International journal of nursing studies, 2012. 49(1): p. 84-89.
24. Pursey, K.M., et al., *The prevalence of FA as assessed by the Yale FA Scale: a systematic review.* Nutrients, 2014. 6(10): p. 4552-4590.
25. Pursey, K.M., et al., *Foods and dietary profiles associated with 'FA'in young adults.* Addictive behaviors reports, 2015. 2: p. 41-48.
26. Ahmed, A.Y. and A.M. Sayed, *Prevalence of FA and its relationship to body mass index.* Egyptian Journal of Medical Human Genetics, 2017. 18(3): p. 257-260.
27. Stangl, S.F., *FA and added sugar consumption in college-aged females.* 2015.
28. Meule, A., D. Heckel, and A. Kübler, *Factor structure and item analysis of the Yale FA Scale in obese candidates for bariatric surgery.* European Eating Disorders Review, 2012. 20(5): p. 419-422.
29. Raymond, K.-L., L. Kannis-Dymand, and G.P. Lovell, *A graduated FA classification approach significantly differentiates obesity among people with type 2 diabetes.* Journal of health psychology, 2018. 23(14): p. 1781-1789.
30. Kyrou, I., et al., *Clinical problems caused by obesity.* 2015.
31. Favieri, F., G. Forte, and M. Casagrande, *The executive functions in overweight and obesity: A systematic review of neuropsychological cross-sectional and longitudinal studies.* Frontiers in psychology, 2019. 10: p. 2126.