

Quality of life, self and life metaphors, and hedonic hunger among obese and overweight adultsSamira Rabiei^{1*}, Somayeh Sadat Mckian²

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Abstract

Background and objective: Psychological health is as important as physical health. Obesity is a multifactorial disease that affects both these aspects of health. Despite serious effects of psychological factors on obesity, relationship between obesity and psychological aspects is less obvious. The current study aimed to investigate association of overweight and obesity with metaphors, quality of life, and hedonic hunger as some psychosocial factors related to body weight.

Subjects and method: This cross-sectional study was conducted on 40 overweight and obese staff of Shahid Beheshti university of Medical Sciences (SBMU) aged 35-60 years. Data on anthropometric measurements, self/life metaphors, impact of weight on quality of life, hedonic hunger score, dietary intake and physical activity were collected.

Results and conclusion: In the current research, 55% of participants were women. Self-metaphor and physical part of Impact of Weight on Quality of Life (IWQOL) questionnaire in obese participants were significantly higher than those with overweight ($P < 0.05$). There is no difference between hedonic score of obese and overweight persons. The mean \pm SD of total score of IWQOL and its subscales including physical, self-esteem, sexual and social, in the fourth quartile of hedonic score was higher than the first one, significantly ($p < 0.05$). There are important insights on the specific psychological aspects of obesity. It seems necessary to reinforce attention to phenotype of obesity, beyond energy intake and consumption to meet psychological and physical health.

Keywords: General health, Hedonic hunger, Metaphors, Obesity, Overweight, Quality of life

1. Introduction

The obesity pandemic is a major contributing factor to the global burden of chronic disease. By continuing this trend, it is projected that 2.7 billion and over 1 billion adults will be overweight and obese by 2025 [1]. Obesity leads to some life-threatening conditions such as hypertension, cardiovascular diseases, diabetes, sleep apnea, some type of malignancies and respiratory failure.

It also makes serious social and psychological implications like reduction in self-esteem [2-4]. Obese people are stigmatized in the context of personal relationships. The quality of life in obese people is usually poor [5]. Despite serious effects of psychological factors on obesity, relationship between obesity and psychological aspects is less obvious. Obesity is a complicated phenomenon which is consisting of multiple factors. Thus, understanding

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obesity is outside the reach of one field only. The body has also functions as the source for metaphors. The metaphor is based on the perception of physical realities like sounds, vision, tactility, etc. [6]. Physical and neurological processes are foundations of metaphors that introduce them as the relationship between mind and language [7]. An obese person's metaphors of "self" and "life" are representation of cognition of the person about his/her body [8]. Metaphors help people to better represent those concepts related to body [9]. Using metaphors, obese people can explain more realistically self- image of their body [10]. Assessment of the impact of weight on quality of life has been considered recently [11]. Quality of life has been used to refer to physical, psychological, and social domains of health [12]. It is well known that weight has important effects on different aspects of quality of life [13]. In addition to mentioned influencing factors on obesity, it seems that hedonic hunger system may also have an important role on development of obesity. According to this system, dietary patterns may be affected by food hedonic. It means that people may consume food not only for homeostatic requirements to energy, but also for pleasure of food, regardless of to be full [14]. There are some evidences showing that the activity of reward center is higher in the brain of individuals who have higher intend to eating [15]. It may increase the risk of obesity [16]. Therefore, food is consumed not only for survive, but also for its pleasure and hedonic [17]. According to the study conducted by Rabiei, et al. on 140 Iranian women, hedonic hunger in obese women lead to unhealthy food choices. It can develop obesity, consequently. It also showed that obese women enjoy eating, more than non-obese women [18]. Since obesity is a multifactorial phenomenon, all effective aspects should be considered for its management. Therefore, we should focus on all contributing factors to overcome obesity epidemic. Exploring how obese adults experience these aspects of life, may be a valuable key to treat this epidemic. Therefore, the current

study aimed to investigate the association of overweight and obesity with self/life metaphors, quality of life, and hedonic hunger as some psychosocial factors related to bode weight.

2. Subjects and methods

2.1. Study design

This descriptive-analytical cross-sectional study was performed on 40 overweight and obese staff of Shahid Beheshti university of Medical Sciences (SBMU) aged 35 to 60 years in order to convenience sampling. Before collecting the data, objectives of the study and the necessary points were explained to the volunteers who meet our inclusion criteria. After signing the informed consent form, they entered the study. The present study was approved by Ethics Committee of Institute and Faculty of Nutrition Sciences and Food Technology of Shahid Beheshti university of Medical Sciences (ethics code: IR.SBMU.NNFTRI.REC.1400.003).

The criteria for entering the study was included to: having BMI > 25 kg/m², having at least diploma educational level, not being pregnant or having any plan or program for getting pregnant, not being an athlete, not being on any kind of diet, not having a plan for weight loss surgery, not using any kind of medicine which may have any effect on weight or appetite (such as multivitamin/mineral, fat burners, hormone drugs), not having a history of any kind of surgeries related to weight loss, and not having any kind of mental disorders which needs immediate cure (such as Binge eating and bulimia nervosa). The participants referred to nutrition and diet therapy clinic of SBMU on the pre-appointed day. General information including sex, age, marital status, education level, occupation, and smoking status in the past month were collected from all participants.

2.2. Anthropometric assessment

Anthropometric measurements were performed by an expert nutritionist. Weight was measured by Beurer digital scale with a minimum of clothing with an accuracy of 0.1 kg, and height was measured by a tape measure without shoes and using a meter fixed to the

wall with an accuracy of 0.1 cm. Waist measurement was performed by a tape meter with an accuracy of 0.5 cm in the lowest measurable environment and at the end of natural exhale, according to World Health Organization protocol. If measurement of minimum waist circumference was not easy due to obesity, circumference of the last vertebrae was measured because the minimum waist circumference in those people is in this area.

2.3. Psychological assessment

2.3.1. Impact of weight on quality of life

Impact of Weight on Quality of Life (IWQOL) questionnaire is a tool for gathering data to assess the quality of life in obese people. IWQOL was the first instrument specifically developed in this regard. The Persian version of IWQOL-Lite has been shown high reliability and validity (Cronbach coefficient: 0.84-0.97) [19]. IWQOL-Lite consists of 31 questions in five scales including Physical Function (11 items), Self-Esteem (7 items), Sexual Life (4 items), Public Distress (5 items), and Work (4 items) [11]. Likert scale with score of 5 for “always”, 4 for “often”, 3 for “sometimes”, 2 for “seldom”, and 1 for “never” was used. The scores ranged from 0 to 155, in which higher scores represented poorer quality of life [11].

2.3.2. Self and life metaphors

Osgood semantic differential (SD) questionnaire is a tool for data collection to assess “self” and “life metaphors”. At first, concept of metaphor is described for the participants and SD questionnaire is completed by the interviewer for each participant. Then, quality control will re-examine, and in case of a problem, the questionnaires will be completed again. Osgood et al. proposed the SD questionnaire as a way to measure the meaning of concepts [20]. Their technique consisted of getting ratings for a number of attitude objects on a long list of bipolar scales. For instance, for his intercultural study, Osgood used a list of 100 attitude objects rated on about 60 bipolar scales (different scales were used in different countries). Many adjectives for the

scales were collected through pilot studies in different countries, and the best adjectives were selected on the basis of their frequency, diversity, and independence. Those ratings were then subjected to factor analyses. They consistently observed that the scales related to evaluation (e.g., positive–negative, good–bad, and true–false) loaded on the first factor. The second and third factors were interpreted as potency (e.g., hard–soft, strong–weak, and heavy–light), and activity (e.g., active–passive, fast–slow, and hot–cold) [20]. This SD technique has been applied to a wide variety of attitude objects and in different cultures [21].

2.3.3. Hedonic hunger assessment

To access hedonic scores, participants completed a self-administrative 21-item hedonic hunger questionnaire (PFS-21) [22]. Persian version of this questionnaire has shown acceptable reliability and validity (Cronbach coefficient: 0.78-0.89 for reliability, and 0.88-0.93 for validity) [23]. The higher score of this questionnaire, the higher tendency to food hedonic intake. PFS-21 grouped into 3 domains according to food proximity: 1) food readily available in the environment but not physically present (“food available”), 2) food present but not tasted (“food present”), and 3) food tasted but not consumed (“food tasted”). For each item, the subjects had to score their reactions on a 5-level scale: 1 = I do not agree at all, 2 = I agree a little, 3 = I agree somewhat, 4 = I agree, and 5 = I strongly agree.

2.4. Dietary assessment

To evaluate the food intake of individuals, a three non-consecutive day food recall questionnaire was used and the questionnaire was filled out in person for three days a week. Participants were asked about all the meals and snacks eating during a day. The dietary intake data were then converted to daily grams of food intake using household measures [24]. Nutritionist IV software was used for dietary intake analysis (calorie, carbohydrate, protein, and fat intake). Database of this software is built upon the Nutrient Database Bank for Standard Reference from the US Department of Agriculture and other sources. The database was

modified according to the existing national Iranian food composition table developed by the Iranian National Institute of Nutrition and Food Technology.

2.5. Physical activity assessment

The International Physical Activity Questionnaire (IPAQ) was used to assess physical activity of the participants. The Persian version of this questionnaire was validated by Vashghani et al. According to their study, this questionnaire has acceptable validity and reliability (0.33 and 0.7, respectively). The IPAQ used in the present study is the long interview-administered version (27 items) which covers four domains of physical activity including occupational (7 items), transportation (6 items), household/gardening (6 items), and leisure-time activities (6 items). The questionnaire included two questions about the time spent on sitting as an indicator of sedentary behavior. The number of days per week and the time spent on walking per day as well as intermediate and vigorous activities from all four domains were recorded. The IPAQ data are converted to metabolic equivalent scores by multiplying the number of minutes dedicated to each activity class by the specific MET score for that activity [25].

2.6. Statistical analysis

SPSS software version 21 was used for statistical analysis of data. To determine normality of data, we used Kolmogorov-Smirnov test. Distribution of qualitative variables was examined based on chi-square test. T-test was used to compare metaphors score, IWQOL scores, and hedonic scores between overweight and obese participants. One-way analysis of variance was used to compare metaphors score and IWQOL scores among quartiles of hedonic scores. In all tests, P <0.05 was considered as a significant level.

3. Results and discussion

Totally, data of 40 individuals from both sexes were analyzed (the participation rate was 100%). More than half of the participants were women (55%). Table 1 shows the frequency of sex, marital status, educational level, occupation, and smoking status separately in overweight and obese individuals. There was not any significant difference between overweight and obese participants in term of these general characteristics. Furthermore, mean ±SD of age, calorie, and physical activity level did not have any significant difference between overweight and obese participants. On the other hand, no significant difference between overweight and obese participants in term of macronutrients intake was observed (Data are not shown).

Table1- General characteristics of the participants

	Frequency (%)		P-value
	Overweight	Obese	
Sex (%)			
Female	8 (36.4)	14 (63.6)	0.42
male	4 (22.2)	14 (77.8)	
Marital status (%)			
single	2 (25)	6 (75)	0.65
married	10 (31.3)	22 (68.8)	
Educational level (%)			
Diploma or under diploma	2 (10)	18 (90)	0.1
Bachelor and master of science	8 (50)	8 (50)	
PhD	2 (50)	2 (50)	
Occupation (%)			
worker	0	4 (100)	0.4
employee	12 (33.3)	24 (66.7)	

Smoking status (%)			
Yes	0	2 (100)	0.7
No	12 (31.6)	26 (68.4)	
Age (year)*	54.2 ±7.39	46 ±9.59	0.1
Total calorie intake (kcal)*	1634.16 ±286	1673.07 ±814.71	0.45
Physical activity (MET/min/week)	2927.5 ±1520.03	2297.82 ±1772.67	0.91

* Values are shown as mean ±SD

Table 2 shows mean ±SD of metaphors (self and life), impact of weight on quality of life (total and subscales), and hedonic scores according to BMI categories. According to the result of T-test, self-metaphor and physical part of IWQOL in obese participants were significantly higher than those in

overweight individuals ($P < 0.05$). Life metaphors, IWQOL as total and its subscales including self-esteem, sexual, social, and work parts did not have any significant difference between obese and overweight participants.

Table 2- Association of BMI with metaphors, IWQOL and hedonic score

	Overweight	Obesity	P-value
Self-metaphor	84.5 ±21.15	102.64 ±8.7	0.01*
Life-metaphor	62.5 ±14.74	68 ±6.88	0.26
IWOQL (physical part)	13.66 ±1.75	25.35 ±10.43	0.01*
IWOQL (self-esteem part)	9.5 ±3.56	12.14 ±7.01	0.39
IWOQL (sexual part)	5 ±2.23	6.36 ±4.71	0.55
IWOQL (social part)	5.5 ±0.83	8.28 ±5.42	0.23
IWOQL (work part)	4 ±0	6 ±3.63	0.20
IWQOL (total)	38.2 ±7.59	59.36 ±30.2	0.15
Hedonic score	48.5 ±17.02	56.5 ±21.7	0.43

* Significant difference between overweight and obese individuals

** Values are shown as mean ±SD

Table 3 shows mean ±SD of metaphors (self and life) and IWQOL (as total and subscales) among quartiles of hedonic score. As shown, mean ±SD of total score of IWQOL, in addition to subscales of physical, self-esteem, sexual and social in the fourth quartile of hedonic score was higher than the first one, significantly ($p < 0.05$). Total score of IWQOL, self-esteem and sexual part in the third

quartile of hedonic score were significantly higher than the first one ($p < 0.05$). IWQOL (as total) and sexual subscale in the second quartile of hedonic score was higher than the first quartile, significantly ($p < 0.05$). The self and life metaphors did not have any significant difference among quartiles of hedonic score.

Table 3- Association of quartiles of hedonic score with metaphors and IWQOL subscales

	First quartile	Second quartile	Third quartile	Fourth quartile	P-value
Self-metaphor	94.6 ±14.4	92.6 ±26.8	98.6 ±2.8	103 ±11.5	0.3
Life-metaphor	72.8 ±6.6	60.8 ±9.5	66.8 ±11.3	65 ±10	0.3
IWOQL (physical part)	14.6 ±2.3	21 ±6.5	21 ±8.7	30.6 ±14.5*	0.01
IWOQL (self-esteem part)	8.4 ±1.9	11.8 ±5.5	8.6 ±2.6*	16.6 ±9.2*	0.04

IWOQL (sexual part)	4 ±0	4.5 ±1*	4.5 ±1*	10.7 ±6.2*	0.01
IWOQL (social part)	5.4 ±0.5	5.6 ±0.8	6.2 ±2.1	12.6 ±7.3*	0.01
IWOQL (work part)	4.4 ±0.5	4 ±0	5.4 ±2.6	7.8 ±5.4	0.07
IWQOL (total)	37.5 ±4.1	45.5 ±7.14*	42.5 ±12.6*	85.5 ±38.3*	0.01

* Significant difference with the first quartile by LSD posthoc test

** Values are shown as mean ±SD

This study showed important insights in specific psychological aspects of obesity such as life style, self and life metaphor as one biological aspect. Quantitative findings from the current study complement those of a recently published study examining relationship between lifestyle and obesity. Rahimi et al. showed that lifestyle alterations including physical activity and diet can lead to significant improvement in abdominal obesity [26]. Furthermore, quality of life of obese individuals is an important issue that should be included in weight management treatment and research. Farabi et al. suggested that quality of life is weaker in people with metabolically unhealthy obesity than those with metabolically healthy obesity [27]. Our findings showed that quality of life in part of physical activity is weaker in obese individuals comparing with those who are overweight. This finding agrees partly with findings of Jia and Lubetkin in which obese individuals had significantly weaker health related quality of life than those who had normal weight and such lower scores were seen even for persons without any chronic diseases known to be linked to obesity [28]. An important association exists between obesity and psychological illness that impacts all aspects of an individual's quality of life. This association can begin early in the developmental trajectory and we do not yet completely understand all the mechanisms linking obesity and psychological disorders [29].

Cultural ideals and practices of dieting in Iran and the west are buttressed by a pervasive medicalization of weight that introduced the terms "overweight" and "obese". These terms convey clinical and moral judgment that a person is over the "appropriate" weight. In recent years, medicali-

zation of obesity has been widely discussed [30]. In the process of perception, we always deal with metaphors as they are based on concepts and cognition. Use of metaphors in treatment is a strategy to help behavior change facilitation during therapy sessions. Metaphors portray a psychological means for analyzing the participant's feelings and attitude about fatness. Mostly for describing life style, we use a phrase or word. For example, a person whose image of self, image of life, and conclusion about behavior could be summarized as "I am fat and weak", "life is like a swamp", must be described as a negative metaphor. Some research showed that there is a direct relationship between their attitude to self and life, and to overweight and obesity. The more negative attitude in individuals will result in more difficulty to control their weights and subsequently they gain weight [8]. Abdollahi et al. conducted research on how metaphoric statement indicates individuals' comprehension of health issues in 2019, and they aimed to assess if individuals' metaphorical expression of either self or their own lives is related to their dietary pattern. Their investigation determined that diet high in starch and sugar as well as hydrogenated fats is associated with negative narration of individuals' embodied experience about themselves and their own lives [10]. The current study showed self-metaphors are more positive in obese participants comparing with those who are overweight. It indicates there are other variables that involve in creating self-metaphor, not just mere weight and people with obesity can have positive feelings about themselves. As a matter of fact, language frames or positions our relationship to obesity circulates through society. In current findings, social aspects of life, job, life history conceptualized more positive metaphors for people who experience more overweight. Importantly, medical claims about

health risks of being overweight and/or obese are commonly associated with moral and aesthetic judgments of what a fat body represents, such as laziness, a lack of control, ugliness, and asexuality [31]. When fatness is regarded through a medical lens, "extra" weight or fat is a medical concern that must be addressed through medical means.

As an object of knowledge, fatness has been defined and produced by medical discourse and it has in practice become the only possible way of talking about fatness. Medical interpretation of fatness has been understood as the only "authoritative" and "objective" view on fatness for a long time, and, consequently, medical experts have been granted a monopoly on "knowledge" of fatness to some extent. Although the medical discourse of fatness has been recently challenged and its limitations have been increasingly pointed out, it can be claimed that medical view of fatness has been considered as the "truth" about fatness [32].

Food and nutrition status are of major factors affecting the quality of life [33]. Furthermore, nutritional habits are among the most important lifestyle changes recommended for individuals, families and societies [34]. Increase in accessing more palatable food may lead to eating more pleasure instead of meeting energy needs. This phenomenon is known as hedonic hunger [35]. According to the study conducted by Rabiei et al., there is a reward center in the brain that its activity in the individuals who have higher intend to eating is higher than others. Therefore, any disorder in this center increases the risk of obesity. According to this description, survival is not the only reason for food intake, but also food pleasure and hedonic issues are important as well. Several research shows hedonic hunger levels are associated with obesity status [36]. Compared with non-obese individuals, severely obese patients have a greater drive to consume hedonically salient and palatable foods, as evidenced by means of PFS that comprises 15 items reflecting the responsiveness to the food environment [37]. There are some studies showing that hedonic score in obese women is significantly

higher than non-obese women [37, 38]. These findings show that obese women enjoy eating, more than non-obese women. There are also some research suggesting that there is low association between restrained and disinhibited eating behaviors and body mass index [39, 40], and there are some research suggesting non-significant relationships between BMI and hedonic hunger [41-43]. This conclusion is somewhat unsurprising. There are some plausible explanations for these findings across studies. One possibility is that hedonic hunger cannot act as an independent variables, but it acts in combination with other psychological factors to predict amount of food intake beyond calorie requirements and subsequent extra weight gain [35].

Since all of our participants had BMI higher than normal range, it is not possible to compare hedonic hunger score between obese and non-obese individuals. No significant difference between overweight and obese participants in term of hedonic factor shows that increasing the hedonic trait leads to increased body weight regardless the BMI categorization as overweight or obesity. Furthermore, we may conclude that hedonic hunger in individuals with BMI ≥ 25 kg/m² is negatively associated with different aspects of quality of life. It is consistent with the points mentioned earlier showing the negative effect of weight on quality of life. Thus, assessing hedonic score may consider as a useful indicators of eating patterns that may associate with the increased risk of adverse health and quality of life outcomes, independent of BMI.

4. Conclusion

Since obesity is a multifactorial disease, all effective aspects should be considered for its management. Therefore, we should not focus on just one effective factor to overcome obesity epidemic. A framework supporting a role for life style, metaphors, and hedonic hunger in maintenance and development of obesity has been recognized increasingly. Importantly, this study reinforces the need to phenotype of obesity beyond energy intake and consumption, which could be partially achieved through use of psychometric

measures such as PFS. Further research is needed to clarify whether quality of life differs among subsets of obese persons.

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7. Conflict of Interest

There are no competing interests to be declared.

References

1. Prevalence of obesity. England and Wales: World Obesity Federation; 2022. Available at: <https://www.worldobesity.org/about/about-obesity/prevalence-of-obesity>.
2. Haththotuwa RN, Wijeyaratne CN, Senarath U. Chapter 1- Worldwide epidemic of obesity. In: Mahmood TA, Arulkumaran S, Chervenak FA, editors. Obesity and Obstetrics. 2nd Edition. Elsevier; 2020: 3-8.
3. Puhl R, Brownell K. Bias, discrimination, and obesity. *Obesity research*. 2012; 9(12): 788-805. <https://doi.org/10.1038/oby.2001.108>
4. Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity. *JAMA*. 1999; 282(16): 1523-1529. <https://doi.org/10.1001/jama.282.16.1523>
5. Christiansen B, Borge L, Fagermoen MS. Understanding everyday life of morbidly obese adults-habits and body image. *International Journal of Qualitative Studies on Health and Well-being*. 2012; 7: 17255. <https://doi.org/10.3402/qhw.v7i0.17255>
6. Skarderud F. Eating one's words, part I: 'Concretised metaphors' and reflective function in anorexia nervosa--an interview study. *European Eating Disorder Review*. 2007; 15(3): 163-174. <https://doi.org/10.1002/erv.777>
7. Tendahl M, Raymond W, Gibbs J. Complementary perspectives on metaphor: Cognitive linguistics and relevance theory. *Journal of Pragmatics*. 2008; 40(11): 1823-1864. <https://doi.org/10.1016/j.pragma.2008.02.001>
8. Alimoradi M, Abdollahi M, Vazirijavid R, McKian S, Daneshvar S, Ajami M. Evaluation of metaphors (life and self) of obese and overweight individuals in comparison with normal weight's. *Progress in Nutrition*. 2019; 21(251-260). <https://doi.org/10.23751/pn.v21i1-S.5970>
9. Otto MW. Stories and metaphors in cognitive-behavior therapy. *Cognitive and Behavioral Practice*. 2000; 7(2): 166-172. [https://doi.org/10.1016/S1077-7229\(00\)80027-9](https://doi.org/10.1016/S1077-7229(00)80027-9)
10. Abdollahi M, McKian SSM, Jamhidi S, Esmaeilnezhad Z, Mohammadipoor N, Hashemi B, et al. Fat and sugar rich dietary pattern is associated with negative metaphorical statement in metabolically healthy overweight and obese men and women. *Progress in Nutrition*. 2020; 21(2-S): 113-120. <https://doi.org/10.23751/pn.v21i2-S.6717>
11. Kolotkin RL, Crosby RD, Kosloski KD, Williams GR. Development of a brief measure to assess quality of life in obesity. *Obesity Research*. 2001; 9(2): 102-111. <https://doi.org/10.1038/oby.2001.13>
12. Testa MA, Simonson DC. Assessment of quality-of-life outcomes. *The New England Journal of Medicine*. 1996; 334(13): 835-840. <https://doi.org/10.1056/NEJM199603283341306>
13. Kawachi I. Physical and psychological consequences of weight gain. *The Journal of Clinical Psychiatry*. 1999; 5-9. PMID: 10548135
14. Yeomans MR, Blundell JE, Leshem M. Palatability: response to nutritional need or need-free stimulation of appetite? *The British Journal of Nutrition*. 2004; 92: 3-14. <https://doi.org/10.1079/bjn20041134>
15. Passamonti L, Rowe J, Schwarzbauer C, Ewbank M, von dem Hagen E, Calder A. Personality predicts the brain's response to viewing appetizing foods: the neural

- basis of a risk factor for overeating. *Journal of Neuroscience*. 2009; 29(1): 43-51.
<https://doi.org/10.1523/JNEUROSCI.4966-08.2009>
16. Stice E, Spoor S, Bohon C, Veldhuizen MG, Small DM. Relation of reward from food intake and anticipated food intake to obesity: a functional magnetic resonance imaging study. *Journal of Abnormal Psychology*. 2008; 117(4): 924-935.
17. Kenny P. Reward mechanisms in obesity: new insights and future directions. *Neuron*. 2011; 69(4): 664-679
<https://doi.org/10.1037/a0013600>
18. Rabiei S, Sedaghat F, Rastmanesh R. The comparison of dietary patterns and hedonic score in obese and non-obese women. *Journal of Ardabil University of Medical Sciences*. 2013; 13(1): 44-58.
19. Fallahzadeh H, Eidy F, Najjarzaded A, Akbarzadeh M. Translation, reliability and validity of Iranian version IWQOL-lite questionair [in Persian]. *Journal of Toloo E Behdasht*. 2017; 16(4): 49-60.
20. Osgood CE, Suci GJ, Tannenbaum PH. *The measurement of meaning*. Oxford, England: Univer. Illinois Press. 1957: 342.
21. Kervyn N, Fiske ST, Yzerbyt VY. Integrating the stereotype content model (warmth and competence) and the Osgood semantic differential (evaluation, potency, and activity). *European Journal of Social Psychology*. 2013; 43(7): 673-681.
<https://doi.org/10.1002/ejsp.1978>
22. Lowe M, Butryn M. Hedonic hunger: a new dimension of appetite? *Physiology & Behavior*. 2007; 91: 432-439.
<https://doi.org/10.1016/j.physbeh.2007.04.006>
23. Ashrafi E, Kachooei M, Ghazaghi M. Investigating the reliability and validity of the power of food scale (PFS). *Knowledge & Research in Applied Psychology*. 2015; 16(3): 113-125.
24. Ghaffarpour M, Houshiar-Rad A, Kianfar H. *The Manual for household measures, cooking yield factors and edible portion of foods*. agriculture science publisher. 1998.
25. Hossein M, Moghaddam BS, Aghdam FB, Jafarabadi MA, Allahverdipour H, Nikookheslat SD, et al., editors. *The Iranian version of international physical activity questionnaire (IPAQ) in Iran: content and construct validity, factor structure, internal consistency and stability*. 2012.
<https://doi.org/10.5829/idosi.wasj.2012.18.08.754>
26. Rahimi GRM, Yousefabadi HA, Niyazi A, Rahimi NM, Alikhajeh Y. Effects of lifestyle intervention on inflammatory markers and waist circumference in overweight/obese adults with metabolic syndrome: A systematic review and meta-analysis of randomized controlled trials. *Biological Research for Nursing*. 2022; 24(1): 94-105.
<https://doi.org/10.1177/10998004211044754>
27. Farabi SS, Smith GI, Schweitzer GG, Stein RI. Do lifestyle factors and quality of life differ in people with metabolically healthy and unhealthy obesity? 2022; 46(10): 1778-1785.
<https://doi.org/10.1038/s41366-022-01180-6>
28. Jia H, Lubetkin EI. The impact of obesity on health-related quality-of-life in the general adult US population. *Journal of Public Health (Oxford, England)*. 2005; 27(2): 156-164.
<https://doi.org/10.1093/pubmed/fdi025>
29. Taylor VH, Forhan M, Vigod SN, McIntyre RS, Morrison KM. The impact of obesity on quality of life. *Best Practice & Research Clinical Endocrinology & Metabolism*. 2013; 27(2): 139-146.
<https://doi.org/10.1016/j.beem.2013.04.004>
30. Salant T, Santry HP. Internet marketing of bariatric surgery: contemporary trends in the medicalization of obesity. *Social Science & Medicine*. 1982. 2006; 62(10): 2445-2457.
31. Colls R. Materialising bodily matter: Intra-action and the embodiment of 'Fat'. *Geoforum*. 2007; 38(2): 353-365.
<https://doi.org/10.1016/j.socscimed.2005.10.021>
32. Harjunen H. *Women and fat : approaches to the social study of fatness*. Jyväskylä Studies in Education, Psychology and Social Research. 2009. ISBN 978-951-39-3757-7 (nid). ISSN 0075-4625
33. Newberry C, Dakin G. Nutrition and weight management in the elderly. *Clinics in Geriatric Medicine*. 2021; 37(1): 131-140.
<https://doi.org/10.1016/j.cger.2020.08.010>
34. Uymaz P, Sarahman Kahraman C, Yabancı Ayhan N. Determination of hedonic hunger in the elderly: case of Turkey. *ASEAN Journal of Psychiatry*. 2021; 22(9): 1-11.

35. Espel-Huynh HM, Muratore AF, Lowe MR. A narrative review of the construct of hedonic hunger and its measurement by the Power of Food Scale. *Obesity Science & Practice*. 2018; 4(3): 238-49.
<https://doi.org/10.1002/osp4.161>
36. Ribeiro G, Camacho M, Santos O, Pontes C, Torres S, Oliveira-Maia AJ. Association between hedonic hunger and body-mass index versus obesity status. *Scientific Reports*. 2018; 8(1): 5857.
<https://doi.org/10.1038/s41598-018-23988-x>
37. Schultes B, Ernst B, Wilms B, Thurnheer M, Hallschmid M. Hedonic hunger is increased in severely obese patients and is reduced after gastric bypass surgery. *The American Journal of Clinical Nutrition*. 2010; 92(2): 277-283.
<https://doi.org/10.3945/ajcn.2009.29007>
38. Egecioglu E, Skibicka KP, Hansson C, Alvarez-Crespo M, Friberg PA, Jerlhag E, et al. Hedonic and incentive signals for body weight control. *Reviews in Endocrine & Metabolic Disorders*. 2011; 12(3): 141-151. <https://doi.org/10.1007/s11154-011-9166-4>
39. Thomas JG, Doshi S, Crosby RD, Lowe MR. Ecological momentary assessment of obesogenic eating behavior: combining person-specific and environmental predictors. *Obesity (Silver Spring, Md)*. 2011; 19(8): 1574-1579.
<https://doi.org/10.1038/oby.2010.335>
40. Vainik U, Neseliler S, Konstabel K, Fellows LK, Dagher A. Eating traits questionnaires as a continuum of a single concept. *Uncontrolled eating*. *Appetite*. 2015; 90: 229-239.
<https://doi.org/10.1016/j.appet.2015.03.004>
41. Werthmann J, Roefs A, Nederkoorn C, Mogg K, Bradley BP, Jansen ATM. Can(not) take my eyes off it: attention bias for food in overweight participants. *Health Psychology*. 2011; 30(5):561-569.
<https://doi.org/10.1037/a0024291>
42. Cappelleri JC, Bushmakina AG, Gerber RA, Leidy NK, Sexton CC, Karlsson J, et al. Evaluating the power of food scale in obese subjects and a general sample of individuals: development and measurement properties. *International Journal of Obesity*. 2009; 33(8): 913-922.
<https://doi.org/10.1038/ijo.2009.107>
43. Burger KS, Sanders AJ, Gilbert JR. Hedonic hunger is related to increased neural and perceptual responses to cues of palatable food and motivation to consume: evidence from 3 independent investigations. *The Journal of Nutrition*. 2016; 146(9): 1807-1812.
<https://doi.org/10.3945/jn.116.231431>