










Influence of Gender on the Relationship Between Eating Behaviors, Age and BMI in People in Benghazi, Benghazi, Libya

Hanan Mohammed Abdella* , Ali Ateia Elmabsout , Amani Abdullatif , Noor Farag ,
Najah Elmansory , Mona Emaaisy , Aya Hamad 
Department of Nutrition, Faculty of Public Health, University of Benghazi, Benghazi, Libya

Article Information

Suggested Citation:

Abdella, H.M., Elmabsout, A.A., Abdullatif, A., Farag, N., Elmansory, N., Emaaisy, M., and Hamad, A. (2023). Influence of Gender on the Relationship Between Eating Behaviors, Age and BMI in People in Benghazi, Benghazi, Libya. *European Journal of Theoretical and Applied Sciences*, 1(2), 57-65.

DOI: [10.59324/ejtas.2023.1\(2\).05](https://doi.org/10.59324/ejtas.2023.1(2).05)

* Corresponding author:

Hanan Mohammed Abdella

Abstract:

Obesity is recognized as one of the major nutrition related disorders around the world. Eating behaviours affect caloric intake and are implicated in the development of obesity. Three types of eating behaviours (cognitive restraint (CR), emotional eating (EE) and uncontrolled eating (UE)) have been studied for associations with obesity in various populations. The aim of the present work was to investigate the interactions between eating behavior and age and to determine the influence of gender on this relationship. This study was conducted on 351 volunteers from Benghazi University students and staff, eating behaviours were measured using the revised three-factor eating questionnaire (TFEQ-R18). Anthropometric measurements for all participants included in this study were measured and BMI was calculated. The finding of this study showed that the age was (26.12 ± 7.749), BMI (23.99 ± 5.003), Cognitive

Restraint (15.83 ± 3.662), Emotional Eating (6.74 ± 2.028), and Uncontrolled Eating (20.83 ± 4.338). The study found positive relationship between age and cognitive restraint ($r = 0.110^*$, $p = 0.039$) and between age and emotional eating ($r = 0.123^*$, $p = 0.021$). However, relationships were stronger only in women, the study also found a positive relationship between BMI and cognitive restraint ($r = 0.184^{**}$, $p < .01$), emotional eating ($r = 0.217^{**}$, $p < .01$) and uncontrolled eating ($r = 0.260^{**}$, $p < .01$) for the whole sample. But when we split the population by sex the relationships were significant only in women. The results of this study show age was associated with cognitive restraint and emotional eating only in female. BMI was positively correlated with three factor eating score, when the sample divided by sex, the association were significant only in women.

Keywords: eating behaviors, BMI, cognitive restraint, emotional eating.

Introduction

Obesity is recognized as one of the major nutrition related disorders around the world. The prevalence of obesity has increased dramatically; the number of overweight and obese people has been evaluated estimated to be 1.35 billion and 573 million respectively by 2030. Obesity is the leading cause of many chronic

diseases like diabetes, high blood pressure, hyperlipidemia and chronic heart diseases; it is also associated with decreased quality of life, reduced overall life expectancy and increased cost of health care services (Huang & Hu, 2015). The significance of diet in controlling and management of obesity has increased attracted much consideration from public health specialists (Qi, 2014).

This work is licensed under a Creative Commons Attribution 4.0 International License. The license permits unrestricted use, distribution, and reproduction in any medium, on the condition that users give exact credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if they made any changes.



The WHO states that the major causes of obesity are twofold: 1) an increasing prevalence of inactive lifestyles in combination with 2) a rise in a diet that contains too much sugar, fat and salt (WHO, 2006).

The present western environment is particularly obesogenic with the easy accessibility of high calorie, palatable food, and the absence of physical activity (Berthoud & Morrison, 2008). It is thought that there are several related causes involved in the development of overweight and obesity including genetic, metabolic, environmental, and socio-cultural aspects but also the individual eating behaviors (Renner et al., 2012).

The epidemic of obesity combined with poor accomplishment of practical weight reduction interventions has encouraged the call for further research to decide feasible treatment alternatives (Byrne et al., 2006). A deep understanding of the etiology of weight increase is a clinical necessity (Llewellyn et al., 2014).

This study aimed to study the eating behaviors of people in Benghazi, the main two objectives for this study are:

- to investigate the interactions between eating behavior and age and to determine the influence of gender on this relationship;
- to investigate the interactions between eating behaviour and body mass index BMI and to determine the influence of gender on this relationship.

Methodology

Participants

Participants for this study were recruited from Benghazi University students and staff. Researchers meet the participants and explained the study objectives for them, after that, the volunteers who agreed to take part in this study answered the questionnaire and anthropometric measurement were taken, a total of 351 participants (274 women and 77 men) were included in this study.

Anthropometry

Anthropometric measurements for all participants included in this study were measured as follows.

Height

Height was measured using a measuring tape. Participants were asked to stand tall with shoulder flat against the wall, a flat object (a book) was used to make firm contact with the top of the participant's head. A mark under the object (the book) where its lands was creating, after that a tape measure was used to determine the height from the floor to the mark. then the height was recorded to the nearest 0.1 cm.

Weight

Weight was measured to the nearest 0.1 kg using a digital scale. Subjects wore light clothing, removed their shoes and jewelry and were told to remove anything from their pockets while being weighed.

Body mass index (BMI)

BMI was calculated as weight in kilograms divided by the square of height in metres. Table 1 shows the international definitions of generalized and central obesity.

Eating Behaviours

Eating behaviours were measured using the Three-Factor Eating Questionnaire R18.

The Three-Factor Eating Questionnaire-R18 is a shortened version of the original 51-item TFEQ (Stunkard & Messick, 1985). The questionnaire measures three different aspects of eating behaviour: (a) restrained eating (b) uncontrolled eating and (c) emotional eating. The questionnaire comprises of 18 items that are measured on a 4-point response scale (definitely true: 4, mostly true: 3, mostly false: 2, definitely false: 1) and items scores are summated into subscale scores: CR, UE and EE. Restraint of cognitive (the ability of control the intake of food in order to maintain the weight) by 6 items (Q1; Q9; Q10; Q15; Q16; Q18), Emotional eating (eating in response to negative feelings) by 3 items (Q2; Q4; Q8) and Uncontrolled eating (loss control while eating which make it hard to

stop) by 9 items (Q3; Q5; Q6; Q7; Q11; Q12; Q13; Q14; Q17) items or questions in each categories, the highest score in one of these domain prescribes your behavior when eating.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS software version (2023), IBM) was used for the statistical analysis with significance accepted if $p < 0.05$. Factor analysis with Spearman's rho (ρ) applied to measure the strength and direction of association between the age and each of the three factors CR, EE and UE (see Table 3) and between the BMI and each of the three factors CR, EE and UE (see Table 4).

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2 - 1)}$$

In the formula, ρ the Spearman's rank correlation coefficient, d_i difference between the two ranks, n number of observations. the Mann-Whitney U test was used to compare whether there is a different in the dependent variable (CR, EE and UE) for two independent groups (males and females).

Results

Descriptive Statistic

The descriptive statistics for the primary variables for the overall sample and by sex are shown in Table 1. Figure 1 shows distribution the sample by gender 78% was female and 22 % was male.

Table 1 shows that men have higher mean BMI, emotional eating and uncontrolled eating than female, however, there no significant differences between them.

Table 1. Descriptive Statistics for Primary Variables for Overall Sample (by Gender)

Variables	Total Mean \pm SD (n = 351)	Male Mean \pm SD (n = 77)	Female Mean \pm SD (n=274)
Age	26.12 \pm 7.749	26.68 \pm 9.328	25.96 \pm 7.256
BMI	23.99 \pm 5.003	24.34 \pm 4.205	23.9 \pm 5.209
Cognitive Restraint	15.83 \pm 3.662	15.73 \pm 4.002	15.85 \pm 3.567
Emotional Eating	6.74 \pm 2.028	6.84 \pm 2.090	6.72 \pm 2.013
Uncontrolled Eating	20.83 \pm 4.338	21.42 \pm 4.767	20.66 \pm 4.204

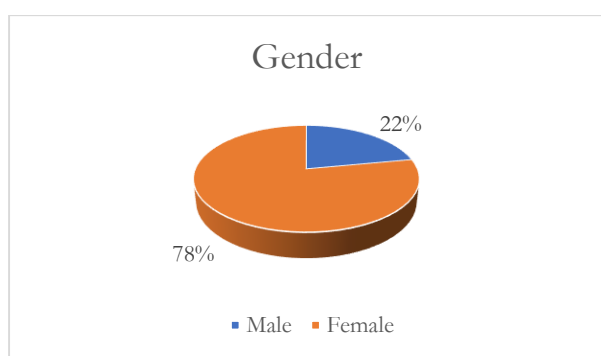


Figure 1. Distribution of the Sample (by Gender)

The BMI Values of Total Sample and by Gender

The BMI values of total sample and by gender categorized in the Table 2.

Table 2 observes that most of the participants 53.8% were having normal weight and 85 participants 24.22% were overweight, while 11.4% of the population were obese and 10.5% participants were underweight.

Relationships Between Age and Eating Behaviours

Correlations between age and eating behaviours have been calculated and categorized for the overall population and by gender in Table 3.

Table 3 shows that there is a positive relationship between age and cognitive restraint ($r = 0.110^*$) and between age and emotional eating

($r = 0.123^*$) for the whole sample. But when exploring the differences between men and women, table 4.3 shows that in women there is a positive relationship between age and cognitive restraint ($r = 0.149^*$) and a strong positive relationship between age and emotional eating ($r = 0.190^{**}$), in contrast to men where these relationships are not seen.

Table 2. The BMI Values of Total Sample and by Gender

BMI Level	N (%)	Male N(%)	Female N(%)
Underweight	37 (10.5%)	4(10.8%)	33(89%)
Normal weight	189 (53.8%)	39(79.4%)	150(20,6%)
Overweight	85 (24.22%)	26(30.6%)	59(69.4%)
Obese	40 (11.4%)	8(20%)	32(80%)

Table 3. Relationships Between Age and Eating Behaviours

Eating Behaviours	Age		
	Total (n=351)	Male (n=77)	Female (n=274)
Cognitive Restraint	$r = 0.110^*$ $p = 0.039$	$r = 0.012$ $p = 0.919$	$r = 0.149^*$ $p = 0.013$
Emotional Eating	$r = 0.123^*$ $p = 0.021$	$r = -0.097$ $p = 0.403$	$r = 0.190^{**}$ $p = 0.002$
Uncontrolled Eating	$r = -0.006$ $p = 0.911$	$r = -0.077$ $p = 0.505$	$r = 0.018$ $p = 0.766$

Note. Correlations of primary variables for total sample $N = 351$, among women $N = 274$, and correlations of primary variables among men $N = 77$. All significance tests were two-tailed ($*p < .05$; $**p < .01$).

Table 4. Relationships Between BMI and Eating Behaviours

Eating Behaviours	BMI		
	Total (n=351)	Male (n=77)	Female (n=274)
Cognitive Restraint	$r = 0.184^{**}$ $p = 0.001$	$r = 0.208$ $p = 0.070$	$r = 0.178^{**}$ $p = 0.003$
Emotional Eating	$r = 0.217^{**}$ $p = 0.000$	$r = 0.174$ $p = 0.131$	$r = 0.222^{**}$ $p = 0.000$
Uncontrolled Eating	$r = 0.260^{**}$ $p = 0.000$	$r = 0.068$ $p = 0.557$	$r = 0.298^{**}$ $p = 0.000$

Note. Correlations of primary variables for total sample $N = 351$, among women $N = 274$, and correlations of primary variables among men $N = 77$. All significance tests were two-tailed ($*p < .05$; $**p < .01$).

Relationships Between BMI and Eating Behaviours

Correlations between BMI and eating behaviours have been calculated and categorized for the overall population and by gender in Table

4. This correlation also could be seen on Figures 2-7. Table 4 shows that there is a strong positive relationship between BMI and cognitive restraint ($r = 0.184^{**}$), emotional eating ($r = 0.217^{**}$) and uncontrolled eating ($r = 0.260^{**}$)

for the whole sample. Also when exploring the differences between men and women, Table 4 shows that in women there is a strong positive relationship between BMI and cognitive restraint ($r=0.178^{**}$), emotional eating ($r=0.222^{**}$) and uncontrolled eating ($r=0.298^{**}$), in contrast to men where there is no relationship.

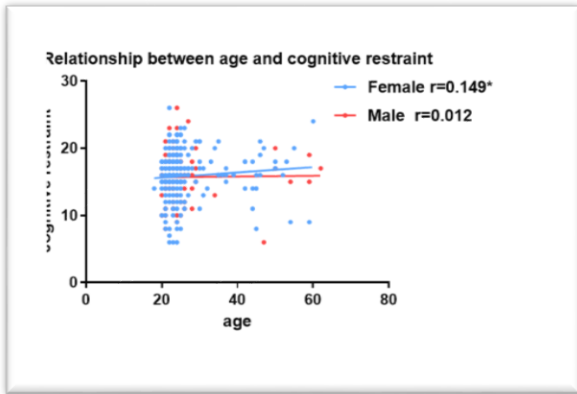


Figure 2. Relationship Between Age and Cognitive Restraint

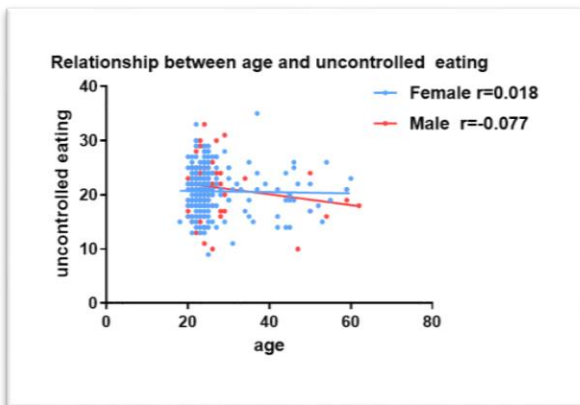


Figure 3. Relationship Between Age and Uncontrolled Eating

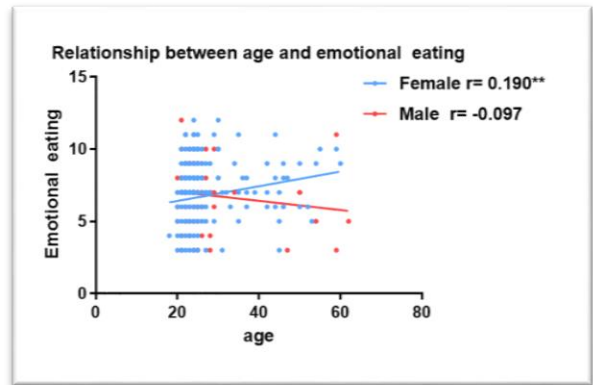


Figure 4. Relationship Between Age and Emotional Eating

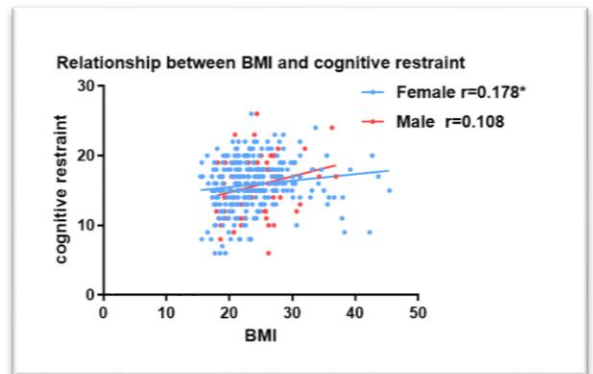


Figure 5. Relationship Between BMI and Cognitive Restraint

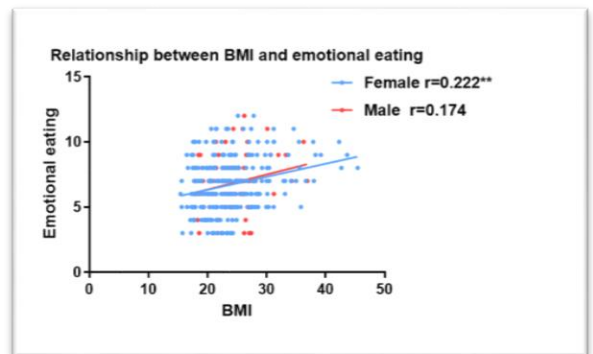


Figure 6. Relationship Between BMI and Emotional Eating

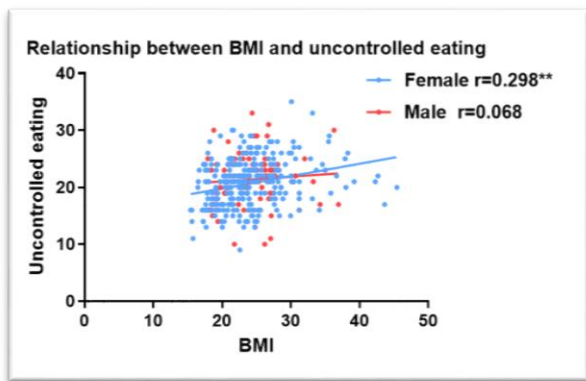


Figure 7. Relationship Between BMI and Cognitive Restraint

Relationships Between BMI and Eating Behaviours Splitting the Population by Their BMI

Table 5 shows that there is a strong positive relationship between BMI and cognitive restraint in normal weight group ($r=0.222^{**}$) and overweight group ($r=0.233^*$), in contrast to underweight or obese sample where there is no relationship. In addition, there is a strong positive relationship between BMI and uncontrolled eating in underweight group and ($r=0.389^*$) and in normal weight group ($r=0.223^{**}$) while there are no relationships in other groups.

Table 5. Relationships Between BMI and Eating Behaviours Splitting the Population by Their BMI

Eating Behaviours	BMI			
	Under Weight (n=37)	Normal Weight (n=189)	Over Weight (n=85)	Obese (n=40)
Cognitive Restraint	- 0.044	0.222**	0.233*	- 0.115
	0.795	0.002	0.037	0.479
Emotional Eating	0.176	0.141	- 0.063	0.138
	0.297	0.053	0.576	0.397
Uncontrolled Eating	0.389*	0.223**	- 0.026	- 0.165
	0.017	0.002	0.816	0.308

Note. Correlations of primary variables for underweight N=37, normal weight N=189, over weight N=85 and obese group N=40. All significance tests were two-tailed (* $p < .05$; ** $p < .01$).

Discussion

The main objectives of this study was to study the eating behaviours of people in Benghazi and also to examine the relationships between eating behaviours, age and BMI and examine the influence of sex, on these relationships. The TFEQ-R18, were used to study 351 individuals. The data was analysed for the total population as well as split by sex. The Statistical Package for the Social Sciences (SPSS software version (2023), IBM) was used for the statistical analysis with significance accepted if $p < 0.05$. The main findings are as follows.

Age, BMI, TFEQ-R18 Subscales

Results of this study showed that mean scores for BMI and the three subscales of the TFEQ-R18 were consistent with values previously

reported (see Table 1) (Zavattari et al., 2011). Although the results show that men had higher mean score than women in BMI and uncontrolled eating, there were no significant differences between mean scores for BMI, eating behaviours when the group split by sex. This agreed with previous studies which showed approximately equal mean scores for uncontrolled eating (Cappelleri et al., 2009; Lluch et al., 2000). However, El-mani et al. (2021) found significant gender effects on the results in all three factors of TFEQ with generally higher mean scores in females than in males.

In addition, other studies proposed that women showed more emotional eating than men (Van Strien et al., 2005). Other studies reported significant differences between genders with

females scoring higher on the emotional eating and cognitive restraint scales (Cappelleri et al., 2009; Lluch et al., 2000; Karlsson et al., 2000). Higher restraint scores in women may be related to a tendency for dieting (De Lauzon et al., 2004).

Interaction of Age with Eating Behaviours

Regarding the interaction between age and eating behaviors, this study found that cognitive restraint and emotional eating were associated with age, a strong positive relationships were found between age and cognitive restraint and emotional eating, in contrast with earlier studies Hill et al. (1991), Basdevant et al. (1993), Pelchat (1997) found negative relationships between age and eating behaviours. In addition, Abdella et al. (2019) found a negative relationship between age and eating behavior, which is may due to the population included in this study younger than previous study. When the group were analyzed split by sex the relationships between age and cognitive restraint and emotional eating were strong only in women not in men.

Interactions Between BMI and Eating Behaviors

The data also illustrated that BMI was associated with high eating behaviours (CR, EE, UE), which is similar to other study like with positive Janelle K.C. and Barr S.I. (1995) and Tuschl et al. (1990). Although there are studies that found a negative relationship between BMI and eating behaviours Williamson et al. (1995), Siegel et al. (2000) and Foster et al. (1998). other study denies the existence of a significant correlation between BMI and eating behaviours (Drapeau et al., 2003; Lawson et al., 1995; Provencher et al., 2003, Lindroos et al., 1997; Ali et al., 2021). Similar to relationships between age and eating behaviours. Likewise, uncontrolled eating is strongly connected with obese status (Verzija et al., 2018; Rohrer et al., 2009). When the group were analysed split by sex the relationships between BMI and eating behaviours were strong only in women not in men.

When the group were divided according to their BMI into underweight, normal weight, over weight and obese in table 4.4, a strong positive

relationship between BMI and cognitive restraint in normal weight group and overweight group were found. confirming previous results by Johnson et al who proposed that high cognitive restraint in normal weight individuals increases the risk of overeating tendencies when restraint is relaxed, thus leading to further increases in BMI (Johnson et al., 2012). In addition, there is a strong positive relationship between BMI and uncontrolled eating in underweight group and in normal weight group while there are no relationships in other groups. Splitting the group into four groups make each group has a small number which may be the cause that made the relationships is not significant.

Conclusion

In conclusion, the findings of this study show a strong positive association between age and eating behaviours and between BMI and eating behaviours, when the sample divided by sex, the association were significant only in female. Since it is the first time to conduct a study in eating behaviours in Benghazi, Libya, the sample was 351 persons from university, more studies on eating behaviours, age, sex, BMI and other behaviours related to food intakes and body weight are needed to be conducted in Libya to confirm our findings

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

Abdella, H. M., El Farssi, H. O., Broom, D. R., Hadden, D. A., & Dalton, C. F. (2019). Eating behaviours and food cravings; influence of age, sex, BMI and FTO genotype. *Nutrients*, 11(2), 377. <https://doi.org/10.3390/nu11020377>

- Ali, H., Amer, S., Salah, N., Elmabsout, A.A. & Elmighrabi, N. (2021). Relationship between nutritional status, academic achievement and IQ test of undergraduate medical students at Benghazi University, Benghazi, Libya. *International Journal of Research Publication and Reviews*, 2(9), 404-424.
- Basdevant, A., Craplet, C. & Guy-Grand, B. (1993). Snacking patterns in obese French women. *Appetite*, 21(1), 17-23. <https://doi.org/10.1006/appe.1993.1033>
- Berthoud, H. & Morrison, C. (2008). The brain, appetite, and obesity. *Annual Review of Psychology*, 59, 55-92. <https://doi.org/10.1146/annurev.psych.59.103006.093551>
- Byrne, N.M., Meerkin, J.D., Laukkanen, R., Ross, R., Fogelholm, M. & Hills, A.P. (2006). Weight loss strategies for obese adults: personalized weight management program vs. Standard care. *Obesity*, 14(10), 1777-1788. <https://doi.org/10.1038/oby.2006.205>
- Cappelleri, J.C., Bushmakin, A.G., Gerber, R.A., Leidy, N.K., Sexton, C.C., Karlsson, J. & Lowe, M.R. (2009). Evaluating the Power of Food Scale in obese subjects and a general sample of individuals: development and measurement properties. *International journal of obesity*, 33(8), 913-922. <https://doi.org/10.1038/ijo.2009.107>
- De Lauzon, B., Romon, M., Deschamps, V., Lafay, L., Borys, J.M., Karlsson, J., Ducimetière, P., Charles, A.M. & Fleurbaix Laventie Ville Sante Study Group (2004). The Three-Factor Eating Questionnaire-R18 is able to distinguish among different eating patterns in a general population. *The Journal of nutrition*, 134, 2372-2380. <https://doi.org/10.1093/jn/134.9.2372>
- Drapeau, V., Provencher, V., Lemieux, S., Després, J.P., Bouchard, C. & Tremblay, A. (2003). Do 6-y changes in eating behaviors predict changes in body weight? Results from the Québec Family Study. *International journal of obesity and related metabolic disorders*, 27(7), 808-14. <https://doi.org/10.1038/sj.ijo.0802303>
- El-mani, S., Elmabsout, A.A., Sheikhi, A., Mansour, R., Bozaid, F.M., Alkadiky, H., Albarghati, H., Benghazy, S. & Jamal, N. (2021). Factors Influencing Weight Loss Attempts and Long Term Weight Loss Maintenance. *International Journal of Health Sciences and Research*, 11(12), 205-216. <https://doi.org/10.52403/ijhsr.20211227>
- Foster, G.D., Wadden, T.A., Swain, R.M., Stunkard, A.J., Platte, P. & Vogt, R.A. (1998). The Eating Inventory in obese women: clinical correlates and relationship to weight loss. *International journal of obesity and related metabolic disorders*, 22(8), 778-85. <https://doi.org/10.1038/sj.ijo.0800659>
- Hill, A.J., Weaver, C.F. & Blundell, J.E. (1991). Food craving, dietary restraint and mood. *Appetite*, 17(3), 187-197. [https://doi.org/10.1016/0195-6663\(91\)90021-j](https://doi.org/10.1016/0195-6663(91)90021-j)
- Huang, T. & Hu, F.B. (2015). Gene-environment interactions and obesity: recent developments and future directions. *BMC Medical Genomics*, 8(1), S2. <https://doi.org/10.1186/1755-8794-8-S1-S2>
- Janelle, K.C. & Barr, S.I. (1995). Nutrient intakes and eating behavior see of vegetarian and nonvegetarian women. *Journal of the American Dietetic Association*, 95(2), 180-189. [https://doi.org/10.1016/s0002-8223\(95\)00045-](https://doi.org/10.1016/s0002-8223(95)00045-)
- Johnson, F., Pratt, M. & Wardle, J. (2012). Dietary restraint and self-regulation in eating behavior. *International journal of obesity*, 36(5), 665. <https://doi.org/10.1038/ijo.2011.156>
- Karlsson, J., Persson, L., Sjöström, L. & Sullivan, M. (2000). Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. *International journal of obesity*, 24(12), 1715-1725. <https://doi.org/10.1038/sj.ijo.0801442>
- Lawson, O.J., Williamson, D.A., Champagne, C.M., DeLany, J.P., Brooks, E.R., Howat, P.M., Wozniak, P.J., Bray, G.A. & Ryan, D.H. (1995). The association of body weight, dietary intake, and energy expenditure with dietary restraint and disinhibition. *Obesity Research*, 3(2), 153-161. <https://doi.org/10.1002/j.1550-8528.1995.tb00131.x>

- Lindroos, A.K., Lissner, L., Mathiassen, M.E., Karlsson, J., Sullivan, M., Bengtsson, C. & Sjöström, L. (1997). Dietary intake in relation to restrained eating, disinhibition, and hunger in obese and nonobese Swedish women. *Obesity Research*, 5(3), 175-82. <https://doi.org/10.1002/j.1550-8528.1997.tb00290>
- Llewellyn, C.H., Trzaskowski, M., Van Jaarsveld, C.H., Plomin, R. & Wardle, J. (2014). Satiety mechanisms in genetic risk of obesity. *JAMA pediatrics*, 168(4), 338-344. <https://doi.org/10.1001/jamapediatrics.2013.4944>
- Lluch, A., Herbeth, B., Mejean, L. & Siest, G. (2000). Dietary intakes, eating style and overweight in the Stanislas Family Study. *International journal of obesity*, 24(11), 1493-1499. <https://doi.org/10.1038/sj.ijo.0801425>
- Pelchat, M.L. (1997). Food cravings in young and elderly adults. *Appetite*, 28(2), 103-113. 38 <https://doi.org/10.1006/appe.1996.0063>
- Provencher, V., Drapeau, V., Tremblay, A., Després, J.P. & Lemieux, S. (2003). Eating behaviors and indexes of body composition in men and women from the Québec family study. *Obesity Research*, 11(6):783-92. <https://doi.org/10.1038/oby.2003.109>
- Qi, L. (2014). Personalized nutrition and obesity. *Annals of Medicine*, 46(5), 247-252. <https://doi.org/10.3109/07853890.2014.891802>
- Renner, B., Sproesser, G., Strohbach, S. & Schupp, H.T. (2012). Why we eat what we eat. The Eating Motivation Survey (TEMS). *Appetite*, 59(1), 117-128. <https://doi.org/10.1016/j.appet.2012.04.004>
- Rohrer, J.E., Vickers-Douglas, K.S. & Stroebel, R.J. (2009). Uncontrolled eating and obesity in adult primary care patients. *Obesity research & clinical practice*, 3(2), 115-121. <https://doi.org/10.1016/j.orcp.2009.01.00>
- Siegel, J.M., Yancey, A.K. & McCarthy, W.J. (2000). Overweight and depressive symptoms among African-American women. *Preventive Medicine*, 31, 232-240. <https://doi.org/10.1006/pmed.2000.0712>
- Stunkard, A.J. & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of psychosomatic research*, 29(1), 71-83. [https://doi.org/10.1016/0022-3999\(85\)90010-8](https://doi.org/10.1016/0022-3999(85)90010-8)
- Tuschl, R.J., Platte, P., Laessle, R.G., Stichler, W. & Pirke, K. (1990). Energy expenditure and everyday eating behavior in healthy young women. *The American Journal of Clinical Nutrition*, 52, 81-86. <https://doi.org/10.1093/ajcn/52.1.81>
- Van Strien, T., Engels, R.C., Van Leeuwe, J. & Snoek, H.M. (2005). The Stice model of overeating: tests in clinical and non-clinical samples. *Appetite*, 45(3), 205-213. <https://doi.org/10.1016/j.appet.2005.08.004>
- Verzijl, C.L., Ahlich, E., Schlauch, R.C. & Rancourt, D. (2018). The role of craving in emotional and uncontrolled eating. *Appetite*, 123, 146-151. <https://doi.org/10.1016/j.appet.2017.12.014>
- Williamson, D.A., Lawson, O.J., Brooks, E.R., Wozniak, P.J., Ryan, D.H., Bray, G.A. & Duchmann, E.G. (1995). Association of body mass with dietary restraint and disinhibition. *Appetite*, 25(1), 31-41. <https://doi.org/10.1006/appe.1995.0039>
- World Health Organization (2006). Obesity and overweight. Fact sheet 311. Retrieved from: [https://www.mclveganway.org.uk/Publications/WHO Obesity and overweight.pdf](https://www.mclveganway.org.uk/Publications/WHO%20Obesity%20and%20overweight.pdf)
- Zavattari, P., Loche, A., Pilia, S., Ibba, A., Moi, L., Guzzetti, C., Casini, M.R. & Loche, S. (2011). rs9939609 in the FTO gene is associated with obesity but not with several biochemical parameters in Sardinian obese children. *Annals of Human Genetics*, 75(6), 648-654. <https://doi.org/10.1111/j.1469-1809.2011.00674.x>