

EFFECTS OF NUTRITIONAL PROGRAM ON ADOLESCENT'S EATING BEHAVIOR AMONG FEMALE PREPARATORY SCHOOLS IN SULAIMANI CITY-KURDISTAN REGION OF IRAQ.

¹Livyar Latif Ahmed *,² Haitham Issa Bahoo Albanna *³ Samir Younis Lafi & ⁴Raza Mahmood Abdulla Salih.

¹ College of Nursing, University of Sulaimani, Sulaimani, Kurdistan Region-Iraq

² College of Medicine, Hawler Medical University, Kurdistan Region-Iraq

³ College of Nursing, University of Raparin, Kurdistan Region-Iraq

⁴ College of Commerce, University of Sulaimani, Kurdistan Region-Iraq

* Corresponding author: Assistant Lecturer: Livyar Latif Ahmed,

Email Address: livyar.ahmed@univsul.edu.iq

Abstract:

Obesity and its consequences have become a pandemic all around the world. Obesity related to eating behavior disorder is mostly found among the youth. It is estimated that 30.5% and 60.3% of both adolescents and adults are suffering from obesity respectively. Due to its significant health-related problems (physical and psychological) it may put the public health on a greater challenge (Nagata et al., 2018). The aim of this study is to find the effects of nutritional program on adolescent eating behavior among female preparatory schools in Sulaimani city. Among 5 female schools, 360 students were assessed their Body Mass Index. 146 of them were either obese or overweight, and then 90 students participated in the current study. The sample split into 45 adolescent female student for case group and 45 for control. Both groups underwent pre- and post-test and educational program applied for 12 weeks duration. The result shows that the mean of BMI decreased from 27.41 Kg/m² to 24.54 Kg/m² after the program (p < 0.001), while the mean of dietary behavior score increased significantly from 33.96 to 39.56 (p < 0.001). While among control group no difference was found in both nutritional parameters and dietary score.

Key words: adolescent, overweight and obesity, emotional and behavior, nutritional program.

Introduction:

Obesity and its consequences have become a pandemic all around the world. One of the common causes of obesity is the individual's eating behavior which is not completely comprehended yet and psychological management is needed to manage excessive body weight. Individuals with extra body weight even they want to limit food intake but they are unable to control over eating in many times (Ciria, Watson, Vadillo and Luque, 2021).

Overweight and obesity increased notably in the last 20 years in all ages especially among adolescents. It leads to developing many non-communicable diseases in adolescent and it could be persistent to adulthood (Sedibe et al., 2018).

Obesity related to eating behavior disorder is mostly found among the youth. It is estimated that 30.5% and 60.3% of both adolescents and adults are suffering from obesity respectively. Due to its significant health-related problems (physical and psychological) it may put the public health on a greater challenge (Nagata et al., 2018). The most common negative eating behavior among adolescents is overeating due to emotional factors. It is identified that eating emotionally is one of the obesogenic factors that leads to overweight and obesity. Between 15-43% of healthy adolescents are found to be emotionally eating (Boutelle et al., 2018).

Excessive food intake as a result of negative emotional response is confirmed to be a normal body response to manage unpleasant psychological distress especially when the individual suffers from stress or anxiety (Wilson et al., 2015). Academic achievement among adolescent students in the last stage of preparatory schools can put the students under stress and unstable psychological response in which later leads to unhealthy eating behavior and then increase their body weight (Chamberlin et al., 2018). This study aims to assess the effects of nutritional program on adolescent's eating behavior among preparatory schools in Sulaimani city.

Methodology and methods:

Design of the study: Quasi-experimental study was applied in the current study (pre and post-test) were carried out for both intervention and non-intervention group to test the effects of nutritional program on obese adolescent's eating behavior among female preparatory schools.

Study sample:

Among 37 female preparatory schools, 5 schools selected randomly to be included in this study. From the selected schools 90 overweight and obese students included in this current study. The students split into 45 students as a case and 45 students as a control.

Sampling and data collection:

The data collected among 5 public female preparatory schools. Students enrolled in 12th stage in literally branch (last stage of preparatory school) were selected. Students with inclusion criteria have been included and before collecting the data consent in the form of writing was taken from the sample.

Study tools:

A modified questionnaire was used to estimate eating behavior among the participants. The used questionnaire consists of socio-demographic information of the participants (age, family income, parent's level of education, parent's occupation, Body Mass Index (BMI)) as a first part of the questionnaire. For the second part a modified standard questionnaire that developed by (Hunot et al., 2016) and released by Department of Epidemiology and Public Health, University College London, London, United Kingdom. 12 questions about eating behavior "1- I love food, 2- I enjoy a wide variety of foods, 3- I often feel hungry, 4- I eat more when I am annoyed, 5- I eat more when I am worried, 6- I eat more when I am angry, 7- I eat more when I am upset, 8- I am always thinking about food, 9- If I miss a meal I get irritated, 10- I often feel so hungry that I have to eat something right away, 11- When I see or smell food that I like, it makes me want to eat, 12- I often finish my meals quickly" were coded as the followings: (disagree=1, neutral= 2 and disagree= 3). Wilcoxon signed rank test was used for reliability and the result found no significant difference between pre-posttest.

Procedure of data collection:

Among the five selected schools, BMI of 360 students were measured to identify overweight and obese students. Depending on the inclusion criteria 90 students were selected. Among overweight and obese students, 45 students for the intervention and 45 for non-intervention group were selected randomly.

For explaining the aim and objectives of the research, the researcher contacted the principals of the five schools in order to make a time management with the students for data collection. The detail of the program was given to the participants including time and place where the program of 12 weeks educational sessions is taking place.

Ethical considerations:

The current research was ethically approved by ethical committee of University of Sulaimani both Medical and Nursing college issue no.7, on 9/1/2020.

A permission letter was obtained from General Education Directorate in Sulaimani City with issue no. 5810 on 28/6/2020 data collection from female preparatory schools in Sulaimani city. The objectives of the study were explained to the participant then the students consented verbally the right of withdrawal from the research was offered. Participant's right, data protection and confidentiality were highly considered.

Criteria of Inclusion and exclusion:

Overweight and obese students in stage 12th in female schools were included those students whose BMI \geq 40 (morbid obese) along with students had a specific disease or taking medication that caused an increase in body weight were excluded.

Result:

For data analysis, Statistical Package for Social Sciences (SPSS, version 25), Fisher's exact test and Chi square were used to compare the proportions. For comparing the scores medians Wilcoxon signed rank test was used.

The sample size of the participants was 90 students were split into two groups of intervention and non-intervention groups (45 students each). The program applied on intervention group only.

Most of the participants in both groups were aged 18 years old 88.8% among case and 75.5% among control group while only 11.1% and 20% of the case and control group were 17 years old respectively, as seen in Table 1. The income of most of participants in case group was sufficient by 48.8% and 66.6% among control group. The majority of mother's level of education was from basic school in both case and control group as 48.8 % and 51.1% orderly, compared with 4.4 % of mothers in case group and 6.7% in control group graduated from college. The student's father education level from basic and institutions was higher in control group compared to case group. The proportion of obesity among control group was 31.1% and 8.9% among case group.

Table 1: socio-demographic characteristics of the participants:

| | | Intervention | | Non intervention | |
|--------------------------|--------------------|--------------|---------|------------------|---------|
| | | No. | (%) | No. | (%) |
| Age | 17 | 5 | (11.1) | 9 | (20) |
| | 18 | 40 | (88.8) | 34 | (75.5) |
| Income | Sufficient | 22 | (48.8) | 30 | (66.6) |
| | Barely sufficient | 19 | (42.2) | 17 | (37.7) |
| | Insufficient | 3 | (6.6) | 1 | (2.2) |
| Mother's education | Illiterate | 11 | (24.4) | 6 | (13.3) |
| | Basic school | 22 | (48.8) | 23 | (51.1) |
| | Preparatory school | 4 | (8.9) | 4 | (8.9) |
| | Institute | 6 | (13.3) | 5 | (11.1) |
| | College | 2 | (4.4) | 3 | (6.7) |
| Father's education | Illiterate | 3 | (6.6) | 4 | (8.8) |
| | Basic school | 28 | (62.3) | 10 | (22.2) |
| | Preparatory school | 7 | (15.5) | 16 | (35.5) |
| | Institute | 5 | (11.1) | 9 | (20) |
| | College | 4 | (8.9) | 4 | (8.9) |
| BMI (Kg/m ²) | 25-29 | 41 | (91.1) | 31 | (68.9) |
| | ≥ 30 | 4 | (8.9) | 14 | (31.1) |
| Waist circumference (cm) | < 80 | 8 | (17.8) | 8 | (17.8) |
| | ≥ 80 | 37 | (82.2) | 37 | (82.2) |
| Total | | 45 | (100.0) | 45 | (100.0) |

Fisher's exact test and Chi square

It is evident in Table 2 that, at the start of the study, the proportion of people in the control group, who agreed that they have bad eating behavior, was significantly higher than those of the intervention group as follows: enjoying a wide variety of foods ($p = 0.021$), eating more when they are worried ($p = 0.001$), eating more when they are angry ($p < 0.001$), eating more when they are upset ($p < 0.001$), always thinking about food ($p < 0.001$), getting irritated when missing a meal ($p < 0.001$), eagerness to eat after seeing or smelling liked food ($p = 0.003$), and finishing meals quickly (0.041). No significant difference was detected between the two groups regarding the other items present in the table.

Table 2: Eating behavior of study groups at the beginning of the program.

| | | Intervention | | No intervention | | p |
|---------------------------------|----------|--------------|--------|-----------------|--------|--------|
| | | No. | (%) | No. | (%) | |
| I love food | Disagree | 4 | (8.9) | 3 | (6.7) | 0.205* |
| | Neutral | 10 | (22.2) | 4 | (8.9) | |
| | Agree | 31 | (68.9) | 38 | (84.4) | |
| I enjoy a wide variety of foods | Disagree | 4 | (8.9) | 0 | (0.0) | 0.021* |
| | Neutral | 11 | (24.4) | 5 | (11.1) | |
| | Agree | 30 | (66.7) | 40 | (88.9) | |
| I often feel hunger | Disagree | 8 | (17.8) | 4 | (8.9) | 0.145 |
| | Neutral | 18 | (40.0) | 13 | (28.9) | |
| | Agree | 19 | (42.2) | 28 | (62.2) | |
| I eat more when I am annoyed | Disagree | 12 | (26.7) | 8 | (17.8) | 0.107 |
| | Neutral | 15 | (33.3) | 9 | (20.0) | |
| | Agree | 18 | (40.0) | 28 | (62.2) | |
| I eat more when I am worried | Disagree | 12 | (26.7) | 4 | (8.9) | |
| | Neutral | 18 | (40.0) | 8 | (17.8) | |

| | | | | | | |
|---|----------|----|---------|----|---------|---------|
| | Agree | 15 | (33.3) | 33 | (73.3) | 0.001 |
| I eat more when I am angry | Disagree | 16 | (35.6) | 7 | (15.6) | < 0.001 |
| | Neutral | 22 | (48.9) | 13 | (28.9) | |
| | Agree | 7 | (15.6) | 25 | (55.6) | |
| I eat more when I am upset | Disagree | 15 | (33.3) | 2 | (4.4) | < 0.001 |
| | Neutral | 19 | (42.2) | 17 | (37.8) | |
| | Agree | 11 | (24.4) | 26 | (57.8) | |
| I am always thinking about food | Disagree | 10 | (22.2) | 1 | (2.2) | < 0.001 |
| | Neutral | 18 | (40.0) | 8 | (17.8) | |
| | Agree | 17 | (37.8) | 36 | (80.0) | |
| I get irritated if I missed a meal | Disagree | 18 | (40.0) | 1 | (2.2) | < 0.001 |
| | Neutral | 11 | (24.4) | 20 | (44.4) | |
| | Agree | 16 | (35.6) | 24 | (53.3) | |
| I often feel so hungry so I have to eat something quickly | Disagree | 7 | (15.6) | 1 | (2.2) | 0.057* |
| | Neutral | 12 | (26.7) | 10 | (22.2) | |
| | Agree | 26 | (57.8) | 34 | (75.6) | |
| When I see or smell food that I like, it makes me to eat | Disagree | 6 | (13.3) | 0 | (0.0) | 0.003* |
| | Neutral | 9 | (20.0) | 3 | (6.7) | |
| | Agree | 30 | (66.7) | 42 | (93.3) | |
| I often finish my meals quickly | Disagree | 8 | (17.8) | 1 | (2.2) | 0.041* |
| | Neutral | 11 | (24.4) | 10 | (22.2) | |
| | Agree | 26 | (57.8) | 34 | (75.6) | |
| | Total | 45 | (100.0) | 45 | (100.0) | |

*By Fisher's exact test. The other p values were calculated by the Chi square test.

Almost all of the participants of the case group had either positive or neutral eating behavior towards the bad food habits at the end of the study, while the reverse is correct regarding the control (no intervention) group. All the differences were significant ($p < 0.001$) as shown in Table 3.

Table 3: Eating behavior of study groups at the end of the program.

| | | Intervention | | No intervention | | Total | | P |
|---------------------------------|----------|--------------|--------|-----------------|--------|-------|--------|---------|
| | | No. | (%) | No. | (%) | No. | (%) | |
| I love food | Disagree | 30 | (66.7) | 3 | (6.7) | 33 | (36.7) | < 0.001 |
| | Neutral | 15 | (33.3) | 4 | (8.9) | 19 | (21.1) | |
| | Agree | 0 | (0.0) | 38 | (84.4) | 38 | (42.2) | |
| I enjoy a wide variety of foods | Disagree | 20 | (44.4) | 0 | (0.0) | 20 | (22.2) | < 0.001 |
| | Neutral | 22 | (48.9) | 2 | (4.4) | 24 | (26.7) | |
| | Agree | 3 | (6.7) | 43 | (95.6) | 46 | (51.1) | |
| I often feel hunger | Disagree | 26 | (57.8) | 4 | (8.9) | 30 | (33.3) | < 0.001 |
| | Neutral | 19 | (42.2) | 10 | (22.2) | 29 | (32.2) | |
| | Agree | 0 | (0.0) | 31 | (68.9) | 31 | (34.4) | |
| I eat more when I am annoyed | Disagree | 16 | (35.6) | 5 | (11.1) | 21 | (23.3) | < 0.001 |
| | Neutral | 28 | (62.2) | 13 | (28.9) | 41 | (45.6) | |
| | Agree | 1 | (2.2) | 27 | (60.0) | 28 | (31.1) | |
| I eat more when I am worried | Disagree | 23 | (51.1) | 3 | (6.7) | 26 | (28.9) | < 0.001 |
| | Neutral | 22 | (48.9) | 10 | (22.2) | 32 | (35.6) | |
| | Agree | 0 | (0.0) | 32 | (71.1) | 32 | (35.6) | |
| I eat more when I am angry | Disagree | 26 | (57.8) | 8 | (17.8) | 34 | (37.8) | |

| | | | | | | | | |
|--|----------|----|---------|----|---------|----|---------|---------|
| | Neutral | 19 | (42.2) | 12 | (26.7) | 31 | (34.4) | |
| | Agree | 0 | (0.0) | 25 | (55.6) | 25 | (27.8) | < 0.001 |
| I eat more when I am upset | Disagree | 16 | (35.6) | 3 | (6.7) | 19 | (21.1) | |
| | Neutral | 29 | (64.4) | 11 | (24.4) | 40 | (44.4) | |
| | Agree | 0 | (0.0) | 31 | (68.9) | 31 | (34.4) | < 0.001 |
| I am always thinking about food | Disagree | 20 | (44.4) | 2 | (4.4) | 22 | (24.4) | |
| | Neutral | 25 | (55.6) | 8 | (17.8) | 33 | (36.7) | |
| | Agree | 0 | (0.0) | 35 | (77.8) | 35 | (38.9) | < 0.001 |
| If I miss a meal I get irritated | Disagree | 17 | (37.8) | 4 | (8.9) | 21 | (23.3) | |
| | Neutral | 27 | (60.0) | 17 | (37.8) | 44 | (48.9) | |
| | Agree | 1 | (2.2) | 24 | (53.3) | 25 | (27.8) | < 0.001 |
| I often feel so hungry that I have to eat something right away | Disagree | 17 | (37.8) | 2 | (4.4) | 19 | (21.1) | |
| | Neutral | 28 | (62.2) | 6 | (13.3) | 34 | (37.8) | |
| | Agree | 0 | (0.0) | 37 | (82.2) | 37 | (41.1) | <0.001 |
| When I see or smell food that I like, it makes me want to eat | Disagree | 14 | (31.1) | 0 | (0.0) | 14 | (15.6) | |
| | Neutral | 30 | (66.7) | 3 | (6.7) | 33 | (36.7) | |
| | Agree | 1 | (2.2) | 42 | (93.3) | 43 | (47.8) | < 0.001 |
| I often finish my meals quickly | Disagree | 26 | (57.8) | 0 | (0.0) | 26 | (28.9) | |
| | Neutral | 18 | (40.0) | 10 | (22.2) | 28 | (31.1) | |
| | Agree | 1 | (2.2) | 35 | (77.8) | 36 | (40.0) | < 0.001 |
| | Total | 45 | (100.0) | 45 | (100.0) | 90 | (100.0) | |

*By Fisher's exact test

Table 4 indicates the change in BMI of both groups, among case group the mean of BMI decreased from 27.41 Kg/m² to 24.54 Kg/m² after the program (p < 0.001). While the mean of dietary behavior score increased significantly from 33.96 to 39.56 (p < 0.001).

In the control group, table 4 shows that there were no significant differences detected between the mean of the parameters measured before and after the intervention. The BMI (p = 0.180) and the p value of dietary behavior is 0.031. **Table 4: Nutritional parameters and dietary scores before and after the intervention in each of the study groups.**

| | Pre-intervention | | | Post-intervention | | | P* |
|------------------------------|------------------|---------|--------|-------------------|---------|--------|---------|
| | Mean | (±SD) | Median | Mean | (±SD) | Median | |
| Intervention group | | | | | | | |
| BMI (Kg/m ²) | 27.41 | (±1.96) | 27.06 | 24.54 | (±1.94) | 24.38 | < 0.001 |
| Dietary behavior score | 33.96 | (±4.66) | 35.00 | 39.56 | (±1.94) | 39.00 | < 0.001 |
| No intervention group | | | | | | | |
| BMI (Kg/m ²) | 28.84 | (±3.29) | 28.38 | 28.87 | (±3.27) | 28.38 | 0.180 |
| Dietary behavior score | 29.89 | (±2.89) | 30.00 | 29.02 | (±3.62) | 29.00 | 0.031 |

*By Wilcoxon signed rank test

Discussion:

From the results of the data analysis it is clear that at the beginning of the program the majority of the students were not having a healthy eating behavior. They were overeating under different psychological effects such as (eating more when they are worried, angry, upset, getting irritated and they were always thinking about food). (Berg et al., 2015) after recoding the answer of fifty obese people of rating and recording eating episode for two weeks they stated that eating episode (overeating) happens when the individual is under tension. Another study done by (Neseliler et al., 2017) Pre and post final exam experiment of a functional magnetic resonance imaging (fMRI) for 22 undergraduate students done then they summarized that brain can demonstrate a silent stimulant to activate high calorie consumption during academic stress period. Several studies found the link between psychological effects such as stress and losing of self-eating control they further explained that Human cognitive function can be damaged when there is a chemical change in brain due to uncontrollable stress (Arnsten, 2015), (Maier, Makwana and Hare, 2015). Adolescent is the period in which they are able to choose their type of food and the way of life style independently for the first time in their life despite this they also identified as a group that consume poor quality of food, high density food such as junk food, saturated food and sugar refined foods and they consequently will be at a

higher at risk of obesity (Reichelt and Rank, 2017). With this in mind, the combination between this sensitive period of life and psychological reflex of worries, upset, and angry during student life will encourage students to adapt unhealthy eating behavior and put them on the risk of being overweight and obese.

Moreover another eating behavior leading to obesity is the speed of eating. In this study students also reported that they finishing their meal quickly and this problem is well-known to be related to obesity. A questionnaire distributed among 50,037 children and adolescents between 7-17 years old regarding speed of eating (fast, medium and slow eating), they found that (7.2%, 10.0% and 15.9%) have general obesity and (16.1%, 21.8%, and 29.4%) have central obesity.

The result of this study confirmed that there is positive relation between fast eating and central obesity, positive eating speed reduction can treat adolescent obesity effectively due to reduction in size of food consumption (Zeng et al., 2018) and (Ford et al., 2009).

At end of the program the positive response of the participants in the interventional group to the program represent that the program had significant effects on changing adolescent student's behavior as they have positive and neutral behavior toward healthy eating behavior while no change was found among non-interventional group.

A study done by (Wang, Stewart, Chang and Shi, 2015), concluded that nutritional educational program was also effective in changing unhealthy eating behavior and because of that nutrition education program is crucial among adolescent students. The same previous study also found that students spend more time at school; a great amount of food is available at schools as well as the influence of parents regarding eating behavior will decrease so that the nutrition education program has notable effects on adolescents for performing a healthy eating behavior. Many studies have substantiated results of a positive effects of nutritional program on improving eating attitude and behavior on adolescent students (Moitra, Madan and Verma, 2021), (Bailey, Drummond and Ward, 2019) (Vaitkeviciute, Ball and Harris, 2014) Another study done by (Shriver et al., 2020), this multi-method longitudinal among 17 years old adolescents discussed the positive influence of emotional adjustment reduces body weight through correcting unhealthy eating behavior.

In this study after a short period of 12 weeks educational program a significant reduction in BMI, and great improvement in eating behavior was found among adolescent female students. The mean of BMI decreased from 27.06 to 24.38 Kg/m². In contrast among non-intervention group no change in BMI was detected.

A study done by (Boutelle et al., 2018) after implementing a nutritional program called PEER (Preventing Emotional Eating Routines) also noted a significant reduction in BMI (BMI z- score) of adolescents who completed PEER program,

A pilot study done in 2015 after implementing of standard behavioral weight loss treatment (SBT) and enhanced behavioral treatment (EBT), among African American women who ate foods emotionally, they found a significant reduction of body weight only after 20 weeks of their program (Goldbacher et al., 2015)

Among 156 obese adolescents; they targeted a psychological aspect of those admitted at German rehabilitation clinic, they also stated that emotional adjustment of adolescents led to a successful reduction in BMI (Reinelt, Petermann, Bauer and Bauer, 2020).

Conclusion:

In brief nutritional education program has an important effect on improving daily eating behavior of female adolescent students as well as it also has a significant effect on decreasing body weight. It is agreed that adolescence is a sensitive life period and they also have academic stress with different hormonal changes, these can make psychological, emotional, cognitive and behavior instability for the students, so that an educational program regarding nutrition is a must among preparatory schools for managing and preventing obesity among youth

References:

Arnsten, A., 2015. Stress weakens prefrontal networks: molecular insults to higher cognition. *Nature Neuroscience*, 18(10), pp.1376-1385.

Bailey, C., Drummond, M. and Ward, P., 2019. Food literacy programmes in secondary schools: a systematic literature review and narrative synthesis of quantitative and qualitative evidence. *Public Health Nutrition*, 22(15), pp.2891-2913.

Berg, K., Crosby, R., Cao, L., Crow, S., Engel, S., Wonderlich, S. and Peterson, C., 2015. Negative affect prior to and following overeating-only, loss of control eating-only, and binge eating episodes in obese adults. *International Journal of Eating Disorders*, 48(6), pp.641-653.

- Boutelle, K., Braden, A., Knatz-Peck, S., Anderson, L. and Rhee, K., 2018. An open trial targeting emotional eating among adolescents with overweight or obesity. *Eating Disorders*, 26(1), pp.79-91.
- Chamberlin, A., Nguyen-Rodriguez, S., Gray, V., Reiboldt, W., Peterson, C. and Spruijt-Metz, D., 2018. Academic-Related Factors and Emotional Eating in Adolescents. *Journal of School Health*, 88(7), pp.493-499.
- Ciria, L., Watson, P., Vadillo, M. and Luque, D., 2021. Is the habit system altered in individuals with obesity? A systematic review. *Neuroscience & Biobehavioral Reviews*, 128, pp.621-632.
- Ford, A., Bergh, C., Sodersten, P., Sabin, M., Hollinghurst, S., Hunt, L. and Shield, J., 2009. Treatment of childhood obesity by retraining eating behaviour: randomised controlled trial. *BMJ*, 340(jan05 1), pp.b5388-b5388.
- Goldbacher, E., La Grotte, C., Komaroff, E., Vander Veur, S. and Foster, G., 2015. An initial evaluation of a weight loss intervention for individuals who engage in emotional eating. *Journal of Behavioral Medicine*, 39(1), pp.139-150.
- Hunot, C., Fildes, A., Croker, H., Llewellyn, C., Wardle, J. and Beeken, R., 2016. Appetitive traits and relationships with BMI in adults: Development of the Adult Eating Behaviour Questionnaire. *Appetite*, 105, pp.356-363.
- Maier, S., Makwana, A. and Hare, T., 2015. Acute Stress Impairs Self-Control in Goal-Directed Choice by Altering Multiple Functional Connections within the Brain's Decision Circuits. *Neuron*, 87(3), pp.621-631.
- Moitra, P., Madan, J. and Verma, P., 2021. Impact of a behaviourally focused nutrition education intervention on attitudes and practices related to eating habits and activity levels in Indian adolescents. *Public Health Nutrition*, 24(9), pp.2715-2726.
- Nagata, J., Garber, A., Tabler, J., Murray, S. and Bibbins-Domingo, K., 2018. Prevalence and Correlates of Disordered Eating Behaviors Among Young Adults with Overweight or Obesity. *Journal of General Internal Medicine*, 33(8), pp.1337-1343.
- Neseliler, S., Tannenbaum, B., Zacchia, M., Larcher, K., Coulter, K., Lamarche, M., Marliss, E., Pruessner, J. and Dagher, A., 2017. Academic stress and personality interact to increase the neural response to high-calorie food cues. *Appetite*, 116, pp.306-314.
- Reichelt, A. and Rank, M., 2017. The impact of junk foods on the adolescent brain. *Birth Defects Research*, 109(20), pp.1649-1658.
- Reinelt, T., Petermann, F., Bauer, F. and Bauer, C., 2020. Emotion regulation strategies predict weight loss during an inpatient obesity treatment for adolescents. *Obesity Science & Practice*, 6(3), pp.293-299.
- Sedibe, M., Pisa, P., Feeley, A., Pedro, T., Kahn, K. and Norris, S., 2018. Dietary Habits and Eating Practices and Their Association with Overweight and Obesity in Rural and Urban Black South African Adolescents. *Nutrients*, 10(2), p.145.
- Shriver, L., Dollar, J., Calkins, S., Keane, S., Shanahan, L. and Wideman, L., 2020. Emotional Eating in Adolescence: Effects of Emotion Regulation, Weight Status and Negative Body Image. *Nutrients*, 13(1), p.79.
- Vaitkeviciute, R., Ball, L. and Harris, N., 2014. The relationship between food literacy and dietary intake in adolescents: a systematic review. *Public Health Nutrition*, 18(4), pp.649-658.
- Wang, D., Stewart, D., Chang, C. and Shi, Y., 2015. Effect of a school-based nutrition education program on adolescents' nutrition-related knowledge, attitudes and behaviour in rural areas of China. *Environmental Health and Preventive Medicine*, 20(4), pp.271-278.
- Wilson, S., Darling, K., Fahrenkamp, A., D'Auria, A. and Sato, A., 2015. Predictors of Emotional Eating During Adolescents' Transition to College: Does Body Mass Index Moderate the Association Between Stress and Emotional Eating?. *Journal of American College Health*, 63(3), pp.163-170.
- Zeng, X., Cai, L., Ma, J., Ma, Y., Jing, J. and Chen, Y., 2018. Eating fast is positively associated with general and abdominal obesity among Chinese children: A national survey. *Scientific Reports*, 8(1).