

Overweight, Obesity and Psychological Correlates in a Moroccan Adolescent Sample

Fatima Fathi¹, Hafsa Choujaa², Zakaria Abidli³, Zineb Serhier⁴, Mohamed Agoub⁵, Rachid Saile⁶

ABSTRACT

Background

Over 18% of children and adolescents worldwide, aged 5-19 years old, are now considered overweight or obese. It is important to note that being overweight or obese can have a negative impact on the self-esteem and mental health of children and adolescents.

Objectives

The purpose of this study was to evaluate the levels of self-esteem, depression and their association with obesity/overweight among a sample of Moroccan adolescents, aged between 12 and 17 years old.

Method

To achieve these aims, a cross-sectional survey was conducted, with a sample of students from 16 middle schools in Casablanca. The criteria for determining overweight and obesity were based on age and gender-specific BMI according to WHO reference standards. The Rosenberg Self-Esteem Scale was used to evaluate self-esteem, and the Beck Inventory for depression assessment.

Results

A sample of 410 adolescents consisted of 51.2% females and 55.1% participants aged between 13-15 years old. In the obesity category, girls had a significantly lower self-esteem score compared to boys. However, in the overweight category, although girls had a lower mean of self-esteem score compared to boys, there were no significant association in self-esteem scores based on Body Mass Index (BMI) categories and eating habits, specifically related to eating meals with family. Additionally, there was no association found between physical activity and self-esteem. However, a strong association was found between depression and both obesity/overweight and low self-esteem.

Conclusion

According to the results, when assessing the outcomes of obese adolescents, it is important to consider the variables of BMI, Rosenberg self-esteem scale, and depression. Therefore, it is recommended to implement psychological and psychiatric interventions in order to minimize these consequences.

Keywords

adolescents ; obesity ; overweight ; self-esteem ; depression.

INTRODUCTION

The World Health Organization (WHO)¹ reported that the global prevalence of obesity has recently increased. In 2016, more than 340 million children and adolescent were found to be overweight or obese, while in 2020, 39 million children less than 5 years suffered from the same problem. WHO has recognized obesity as one of the main dangers to public health as it is linked to various diseases and has a serious impact on mental health¹. Adolescent obesity is a worldwide epidemic that is closely linked to rapid economic development. In 2022, the Centers for Disease Control and Prevention² showed a significant increase in obesity rates among children and adolescents from 2017 to 2020. The prevalence of obesity was 19.7% among children and adolescents aged 2-19 years and affected about 14.7 million children

1. Fatima Fathi, Hassan II University of Casablanca, Faculty of Sciences Ben M'sik, Research Laboratory Biology and Health, Casablanca, Morocco and Mother-child Hospital Abderrahim Harouchi, Ibn Rochd University Hospital centre, Casablanca, Morocco.
2. Hafsa Choujaa, Hassan II University of Casablanca, Faculty of Medicine and Pharmacy, Clinical Neuroscience and Mental Health Laboratory, Casablanca, Morocco.
3. Zakaria Abidli, Hassan II University of Casablanca, Faculty of Medicine and Pharmacy, Clinical Neuroscience and Mental Health Laboratory, Casablanca, Morocco.
4. Zineb Serhier, Hassan II University of Casablanca, Faculty of Medicine and Pharmacy, Clinical Neuroscience and Mental Health Laboratory, Casablanca, Morocco.
5. Mohamed Agoub, Hassan II University of Casablanca, Faculty of Medicine and Pharmacy, Clinical Neuroscience and Mental Health Laboratory, Casablanca, Morocco.
6. Rachid Saile, Hassan II University of Casablanca, Faculty of Sciences Ben M'sik, Research Laboratory Biology and Health, Casablanca, Morocco.

Correspondence

Fatima FATHI : Hassan II University of Casablanca, Faculty of Sciences Ben M'sik, Research Laboratory Biology and Health, Casablanca, Morocco and Mother-child Hospital Abderrahim Harouchi, Ibn Rochd University Hospital centre, Casablanca, Morocco. E-Mail: fatimafathi333@gmail.com

and adolescents². A recent meta-analysis conducted in Türkiye found that the overall overweight rate was 13.3% and the obesity rate was 7.8%³. While in Morocco, and based on recent study, the prevalence of overweight among adolescents was 14.1% and that of obesity was 6.1%⁴. Socioeconomic factors that contribute to obesity have been the subject of much research in recent decades. These factors include the influence of affordable yet nutritious food options⁵, increasing income levels and urbanization⁶, as well as changes in occupational patterns, along with a general increase in sedentary life patterns⁷.

Self-esteem is a great motivator for adolescents. Self-esteem is an overall reflection of an individual's self-worth, incorporates beliefs about oneself in addition to an emotional response to those beliefs⁸. Self-esteem has been shown to have a negative correlation with weight⁹. This means that obese individuals often experience low self-esteem due to the negative perception of obesity in society¹⁰. In addition, low self-esteem is associated with behavioral disorders, and depressive moods, as well as negative and uncontrollable emotions¹¹. In summary, there is ample evidence supporting a strong connection between BMI and self-esteem. It should be noted that the relationship during puberty may differ from the relationship observed at other stages, as it is more likely that BMI influences changes in self-esteem¹². Many studies have identified risk factors for obesity in adolescents: eating habits¹³⁻¹⁴, screen time¹⁵, as well as low physical activity¹⁶. Lower levels of physical activity and increasing sedentary behaviors in children during their childhood contribute to the development of obesity¹⁷.

Depression is a psychological consequence of obesity that has garnered the interest of researchers due to its biological mechanisms and potential for new therapeutic interventions¹⁸. It is characterized by a lack of energy, disinterest in life, feelings of guilt, difficulty concentrating, reduced appetite, thoughts of suicide, decreased activity, impaired cognitive abilities, sleep disorders, and various other biological complications¹⁹. While numerous studies have explored the connection between depression and obesity, it remains unclear whether depression causes obesity or vice versa²⁰. However, evidence suggests that obesity is a comorbidity of depression, with a higher prevalence of depression observed in overweight individuals²¹.

Although the relationship among obesity/overweight, self-esteem, and depression was examined in previous research, little is known about the relationship among these variables in Moroccan adolescents. We believe that this study will be the first to highlight the potential relationship among a sample of Moroccan adolescents.

Our aim was to identify factors related to low domain-specific self-esteem and depression in children with overweight/obesity.

SUBJECTS AND METHODS

Study setting and participants

We aim through this study, to describe prevalence and the associated factors to self-esteem in 410 middle school students of 16 public middle students of Casablanca, Morocco's largest city. Thus, Students have been invited to take part over a period running from April to May 2022 after obtaining informed consent from a parent or guardian.

Sampling

This was a descriptive and analytical cross-sectional study. The list of public-sector middle schools in the city of Casablanca was provided by the Casablanca-Settat Regional Academy for Education and Training. Sampling was carried in collaboration with the Direction Regional of the High Commission for Planning. In the first stage, 16 middle schools were selected at random, each representing one of Casablanca's 16 districts. The entire city of Casablanca was thus represented. Then, one class per school being drawn at random, including only the 1st and 2nd years.

Ethical considerations

The authorization of the Casablanca-Settat Regional Education and Training Academy, and the agreement of the Ethics Committee of the Faculty of Medicine and Pharmacy in Casablanca were obtained. All those involved in the study were fully informed of the objectives and conduct of the survey. Informed consent was obtained from each parent before their child was included in the study. Participants' anonymity was respected. The results obtained were used exclusively for scientific purposes.

Data collection and measuring instruments

The data was collected by a team of trained dietician-nutritionists, PhD students and psychology students. A pre-tested and validated questionnaire was used. Socio-demographic data including age, gender, school level, eating habits, life style, and anthropometrics parameters were recorded, as well as data on self-esteem based on the Rosenberg scale, and depression with the beck inventory. Anthropometrics measurements, weight (kg) and height (cm), were taken according to the standard norms of the World Health Organization (WHO).

Body mass index

The body mass index (BMI) was calculated and expressed in kg/m² using WHO AnthroPlus software, based on the weight, height, sex, date of birth, and survey date of each of the participants²².

Rosenberg scale²³

The Rosenberg Self-Esteem Scale (RSES) is composed of a total of 10 items and has an estimated duration of 3 minutes. This test can be administered both individually and in groups and, in principle, there are no restrictions on the presentation format.

All items of the scale have the same 4-point Likert-type response format, according to the values: absolutely disagree, disagree, agree and strongly agree. Depending on the original studies, we can obtain a total score, as well as a score for each of the two dimensions composing it. For the total score, we would add the scores assigned to the items composing the scale. We utilized the Arabic version of the scale adapted from Ziadi and al.²³ in this study. The adaptation was conducted following the methodology outlined by Supple *et al.* (2012)²⁴.

Beck Depression Inventory²³

It is an assessment instrument that provides a quantitative the intensity of depressive symptoms. Although the original inventory consisted of a total of 21 items, the adapted scale is reduced to 19 items, with an estimated duration of 5-10 minutes. It can be applied individually or collectively, with pencil and paper or orally. The adaptation of the scale in Arabic was based on the grouping model proposed by Ghareeb (2000)²⁵.

Based on the original studies, we can obtain a total score, as well as a score for each of the two dimensions (Cognitive-affective, Somatic). The score would indicate the severity of the depression, indicative of symptoms such as sadness, crying, loss of pleasure, feelings of failure and guilt, suicidal thoughts or desires, pessimism, etc.

Statistical analysis

Statistical analyses were conducted using Jamovi software. Regarding the descriptive analysis, we calculated position and dispersion parameters, which are presented in a table. For analytical statistics, we used a bivariate approach by calculating Pearson correlation coefficient (r), Student's t-test, and ANOVA. The goal of these statistical analyses was to identify correlations and statistical differences between BMI categories and the sociodemographic and psychological variables

under study. The significance level was set at 5%.

RESULTS

Sociodemographic and anthropometric characteristics of the sample

The socio-demographic characteristics of our study population indicate that there was a slightly higher number of female participants (51.2%) compared to male participants (48.8%), resulting in a sex ratio of 0.95. When it comes to age distribution, a significant majority (55.1%) fell between the ages of 13 and under 15 years, followed by those under 13 years (35.1%), and those 15 years and older (9.8%). In terms of school level, 233 participants (56.8%) were in their first year of secondary school, while 177 (43.2%) were in their second year. Analysis of anthropometric characteristics revealed that the average body mass index (BMI) was 19.26 kg/m². **Table 1**

Table 1. Sociodemographic and anthropometric characteristics of the sample (n= 410)

Variables	Frequency	Percentage (%)
Gender		
Girls	210	51,2
Boys	200	48,8
Age		
<13 years	144	35,1
[13-15 years[226	55,1
15 years &+	40	9,8
School level		
1st year	233	56,8
2 nd year	177	43,2
Averages ± Sdandard deviations		
Weight (Kg)	48,77 ±10,96	
Height (cm)	158,73 ± 8,25	
BMI (Kg/m²)	19,26 ± 3,63	

Note. BMI : Body mass index

Participants' scores on the Rosenberg self-esteem scale.

In this study, we observed that the participants had an average total score of 32.4 on the Rosenberg scale. The average score for positive factors was 23.6, while the average score for negative factors as 8.75. **Table 2**

Table 2. Average self-esteem score according to the Rosenberg scale (n= 410)

	Averages ± Standard déviations
Rosenberg Total Score	32.4±4.37
Rosenberg Positive Factors Score	23.6±3.03
Rosenberg Negative Factors Score	8.75±2.59

Profile of participants' self-esteem based on the Rosenberg scale

Regarding the self-esteem profile of our population, the study revealed a diverse distribution of self-esteem levels among participants. It highlighted a significant prevalence of participants with low to very low self-esteem, with 6.3% of participants having very low self-esteem. This suggests a significant level of psychological vulnerability. Additionally, a quarter of participants (25.6%) displayed low self-esteem, indicating a notable prevalence of self-esteem-related issues. The confidence intervals emphasized the variability of these levels and underscored the stability and reliability of these estimates. **Table 3**

Table 3. Profile of self-esteem according to the Rosenberg scale (n= 410)

Self-Esteem Profile	Frequency (%)	95% Confidence Intervals
Very low self-esteem	26 (6.3)	[4.4% ; 9.1%]
Low self-esteem	105 (25.6)	[21.6% ; 30.1%]
Medium self-esteem	105 (25.6)	[21.6% ; 30.1%]
High self-esteem	159 (38.8)	[34.2% ; 43.6%]

Self-esteem scores based on gender, age, level of education, eating habits, and lifestyle.

According to the bivariate analysis using Student's t-test, the study on self-esteem revealed a significant difference in scores between the two sexes, with a p-value of 0.001. In our population, girls had a lower self-esteem score of 31.7 compared to boys who scored 33.1. In terms of age and grade scores, the results showed homogeneity with no statistically significant differentiation. However, the lowest score observed 31.6 was among adolescents over 15 years of age. Eating habits emerged as a significant factor. Participants who always ate meals with their family showed higher

self-esteem at 32.7, compared to those who sometimes ate with their family (31.2) and those who never did (31.1); The p-value was 0.015. On the other hand, there was no significant difference either in the results for eating at the table or for eating in front of TV. Regular engagement in sports outside of school activities was associated with higher self-esteem at 32.8, compared to those who did not participate in such activities (31.9), with a p-value of 0.05.

Lastly, in terms of exposure to screens for entertainment activities, such as video games, having less than 2 hours of exposure per day was associated with higher self-esteem at 33.1, compared to prolonged exposure of more than 2 hours a day (31.9). The difference was statistically significant with a p-value of 0.014. **Table 4**

Table 4. Self-esteem scores according to gender, age, level of education, eating habits and lifestyle for all participants (n= 410)

Variables	Averages ± Standard déviations (SD)	Test de Student/ANOVA	P-value	
Gender				
Girls (n= 210)	31.7 ± 4.71	3.87	0.001***	
Boys (n= 200)	33.1 ± 3.87			
Age				
<13 years (n= 144)	32.4 ± 4.29	0.83	0.43	
[13-15 years[(n= 226)	32.5 ± 4.39			
15 ans &+ (n= 40)	31.6 ± 4.52			
School level				
1st year (n= 233)	32.5 ± 4.29	0.52	0.60	
2 nd year (n= 177)	32.3 ± 4.49			
Eating habits				
Family meals	Always	32.7 ± 3.99	4,24	0.015**
	Sometimes	31.2 ± 5.61		
	Never	31.1 ± 5.00		
Meals at the table	Always	32.5 ± 4.28	1.32	0.102
	Sometimes	30.4 ± 5.55		
	Never	31.0 ± 6.04		
Eating in front of the TV	Always	32.6 ± 4.16	1,69	0.187
	Sometimes	31.9 ± 4.56		
	Never	32.8 ± 4.28		

Variables		Averages ± Standard déviations (SD)	Test de Student/ ANOVA	P-value
Lifestyle				
Practicing sport outside school activities	Yes	32.8 ± 4.42	3.64	0,05*
	No	31.9 ± 4.27		
Exposure to screens for entertainment activities	No exposure	31.9 ± 3.71	4.39	0.014**
	<2h / day	33.1 ± 4.01		
	>2h / day	31.9 ± 4.73		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Self-esteem scores categorized by BMI levels

When comparing the various BMI categories, there was no statistically significant difference in terms of self-esteem between underweight, normal, overweight, and obese participants. However, it is worth noting that the self-esteem score for individuals in the obese category was comparatively lower than those in the other categories. **Table 5**

Table 5. Self-esteem score according to BMI categories

BMI Categories	Averages ± Standard déviations	Test de Student/ ANOVA	P-value
Underweight	31.8 ± 4.26	1,46	0,23
Normal weight	32.6 ± 4.32		
Overweight	32.2 ± 4.50		
Obesity	30.8 ± 4.67		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Self-esteem scores based on BMI categories, categorized by gender, age, educational level, eating habits, and lifestyle.

The evaluation of self-esteem scores, categorized by Body Mass Index (BMI) and separated by gender, showed a notable discrepancy in the “obesity” category. It was found that girls had a significantly lower score (27.89) compared to boys (32.50), with a p-value that was statistically significant (p -value=0.014). However, in the “overweight” category, although girls had a lower mean self-esteem score (31.38) compared to

boys (33.25), the difference did not reach statistical significance.

Examination of self-esteem scores based on Body Mass Index (BMI) categories and age groups revealed significant variations in self-esteem scores. Participants below the age of 13 had a significantly higher average self-esteem score in the obesity category (32.23) compared to those between the ages of 13 and 15 (30.09) and those aged 15 and above. The p-value of 0.046 indicated a significant difference. Although participants below 13 had slightly lower scores (31.16) compared to those between 13 and 15 (33.28) and those aged 15 and above (30.25) in the overweight category, these differences were not statistically significant. Furthermore, there were no statistically significant differences in mean self-esteem scores between age groups in the normal-build and underweight categories.

The study found significant variations in self-esteem scores when stratified by Body Mass Index (BMI) categories and differentiated by grade level. Specifically, there was a significant difference in the obesity category between grade levels. Participants in the second grade had a significantly lower self-esteem score (26.20) compared to those in the first grade (32.00), with a p-value of 0.010. However, there was no statistically significant difference in self-esteem scores between grades in the overweight, normal, and underweight categories.

With regards to self-esteem scores based on Body Mass Index (BMI) categories and eating habits, specifically related to eating meals with family, there were no significant variations across any BMI category. While participants who always had meals with their family had slightly higher self-esteem scores (31.63) compared to those who sometimes (29.60) or never did, this difference was not statistically significant. Similarly, there were no statistically significant differences observed between modalities in other BMI categories.

There were also no significant variations in self-esteem scores based on BMI category, and whether or not sports were practiced outside of school activities. The same lack of variation was found for exposure to screens for entertainment. **Table 6**

Table 6. Self-esteem scores for BMI categories according to sex, age, level of education, eating habits and lifestyle (n= 410).

Variables	Obesity		Overweight		Normal weight		Underweight					
	Averages ±SD	P	Averages ±SD	P	Averages ±SD	P	Averages ±SD	P				
Gender												
Girls	27,89±5,689	0.014*	31,38±5,069	0.097	32,10±4,535	0.022*	30,75±4,159	0.282				
Boys	32,50±3,077		33,25±3,339		33,24±3,991		32,43±4,296					
Age												
<13 years	32,23±2,920	0.046*	31,16 ±4,140	0.155	32,89 ±4,488	0.595	30,90±3,725	0.729				
[13-15 years[30,09±5,412		33,28 ±4,431		32,62±4,291		32,22±4,493					
15 ans &+	21,00		30,25 ±6,238		31,97 ±3,952		32,20±5,020					
School level												
1st year	32,00±3,934	0.010**	31,54±3,941	0.169	32,94±4,335	0.194	31,06±4,569	0.267				
2nd year	26,20±4,868		33,24 ±5,272		32,29±4,286		32,73±3,807					
Eating habits												
Family meals	Always	31,63± 3,961	0.103	32,60 ±3,797	0.096	32,85± 4,036	0.252	32,46± 4,052	0.125			
	Sometimes	29,60± 5,983								30,00± 6,831	31,93± 5,426	28,67± 4,367
	Never	22,00								----	31,53 ±4,673	34,00
Meals at the table	Always	30,84 ±4,670	X	32,52± 3,961	0.022*	32,74± 4,280	0.327	31,82 ±4,261	X			
	Sometimes	----								27,25± 8,539	31,29 ±4,428	----
	Never	----								----	31,00± 6,042	----
Eating in front of the TV	Always	29,83± 5,154	0.824	32,82± 3,812	0.124	32,75 ±4,224	0.210	32,50 ±3,423	0.118			
	Sometimes	30,88± 4,734								30,96± 5,139	32,10± 4,506	32,88± 3,775
	Never	31,36 ±4,739								33,85 ±3,211	33,12± 4,157	29,33± 5,099
Life Style												
Practicing sport outside school activities	Yes	30,65± 5,267	0.770	33,10± 4,206	0.088	32,99 ±4,370	0.117	32,00 ±4,163	0.816			
	No	31,25± 3,327								31,07 ±4,657	32,20 ±4,227	31,65± 4,471
Exposure to screens for entertainment activities	No	33,00	0.061	29,60 ±5,030	0.342	32,15± 3,565	0.14	32,33± 4,041	0.942			
	<2h/day	32,92± 2,575								31,96 ±4,759	33,53± 3,900	32,00 ±4,315
	>2h/day	28,58 ±5,501								32,76 ±4,172	32,01 ±4,729	31,56± 4,501

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Self-esteem and depression according to BMI categories

The present study examined the relationship between self-esteem and the depression in their two dimensions, cognitive-affective and somatic, in young obese or overweight adolescents. A significant association was

found between the Cognitive-Affective Depression Score and the Global Self-Esteem Score in both obese and overweight participants. This was a negative correlation, when levels of global self-esteem are high; levels of cognitive-affective depression are low. However, no association was found between the level

of somatic depression and self-esteem in either group. The cognitive-affective aspects of depression appear to play a crucial role in determining self-esteem. Table 7

Table 7. Self-esteem and depression correlated by BMI category

BMI Categories	Depression	Self Esteem Score	
		Pearson's r	P-value
Obesity	Cognitive-Affective Depression Score	-0,697	<0,001***
	Somatic Depression Score	-0,125	0,551
Overweight	Cognitive-Affective Depression Score	-0,414	0,001**
	Somatic Depression Score	-0,156	0,242

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

DISCUSSION

To our knowledge, this work reports the first study of its kind conducted in Morocco to identify factors related to low domain-specific self-esteem and depression in adolescent with overweight/obesity. Adolescence is a critical period that requires a focus on promoting both physical and mental health to mitigate the long-term risks of obesity and mental illness. As children reach adolescence, research has shown a significant link between high body mass index and mental health problems. Obesity in early life is associated with later emotional symptoms, such as anxiety and depression, whereas emotional symptoms in early life are associated with later obesity²⁶.

Obesity during adolescence can harm self-esteem²⁷. A relationship is also established by Alvani.S²⁸. A recent study demonstrated that being overweight or obese from 6 to 11 years of age is associated with lower self-esteem at age of 11²⁹. This finding is consistent with our study, which showed that self-esteem scores decreased with age in obese participants. This may be because children may experience reduced social self-esteem as they experience changes in social acceptance and peer relationships during the transition from primary to secondary school³⁰. Other studies have also reported that self-esteem was highest in the normal weight group and lowest in the obese category³¹. In a study conducted by Anitha and William, self-esteem and BMI were examined in 60 Indian preteens. The results revealed a significant negative correlation between BMI and self-esteem, suggesting that as adolescents' BMI increased, self-esteem decreased³².

It was interesting to note that age, gender, and level of education were significantly associated with obesity, while eating habits were associated with overweight in this study. A study conducted by Bhadouria and Bhadoria revealed the same result, that self-esteem was lower among adolescent girls classified as obese or overweight when compared to girls with a normal weight³³. In a recent study conducted by Sophie Byth³⁴, it was found that individuals with higher self-esteem generally tend to engage in more physical activity. And they are confident enough to meet the challenges of learning assessment, and the challenges³⁵.

However, contrary to our initial assumptions, our sample revealed that those who participated in out-of-school sports activities actually performed slightly lower in the obesity category than those who did not participate.

In the Moroccan study conducted by El Kabbaoui, it was determined that involvement in sports activities outside of school showed no statistically significant association with overweight and obesity³⁶. In another school-based adolescents study, Lopez-Gonzalez reported no substantial link between obesity and screen time³⁷. Some potential factors that may contribute to this difference include exposure, athletic attire, and the influence of other people's appearance. Additionally, reduced physical activity leads to higher BMI in adolescents. Teens who spend more than 2 hours looking at screens are more likely to be obese, and there are only a few factors that cause obesity in teens. Studies also show that greater screen use is associated with higher rates of obesity in adolescents³⁸. In our study, we found that having less than 2 hours of screen exposure per day was associated with higher self-esteem compared to those who had more than 2 hours of exposure. This may be explained by the fact that spending more than 2 hours engaging with screens can lead to increased consumption of food without paying attention to feelings of hunger or fullness. It can also result in a lack of physical activity, leading to a more sedentary lifestyle. This can then have an impact on weight, body image, self-esteem, and even potentially lead to discrimination. On the other hand, individuals who spend less time with screens may be able to maintain a healthier lifestyle, which in turn can positively impact their self-esteem and mental health. In conclusion, these factors collectively contribute to the relationship between screen exposure, obesity, and mental health in young individuals³⁹.

Hence, the influence of dietary patterns on the onset of obesity, especially concerning the absence of family meals, remains incompletely comprehended. However, it is likely that all of these factors play an important role⁴⁰. In the end, age, gender, socioeconomic status, demographic and environmental factors, and physical activity level are all factors that are associated with both dietary patterns and the risk of overweight and/or obesity in children and adolescents.

A meta-analysis published by Quek *et al.*⁴¹ suggested that non-western obese children and adolescents are at a significantly higher likelihood of experiencing depression and severe depressive symptoms. Additionally, another meta-analysis conducted by Sutaria *et al.*⁴² found no association between overweight and depression in children. According to a recent study, depression was more prevalent in the obese adolescents compared to the normal individuals, and the difference in this regard was considered significant⁴³. The current research also shows a strong association between depression (both affective and cognitive scores) and self-esteem in obese individuals. In the overweight group, high self-esteem scores were associated with low cognitive and affective depression scores. These results are consistent with previous studies on this issue¹⁰.

Low self-esteem is a major contributing factor to obesity, as evidenced by the results of several studies showing a strong correlation between low self-esteem and various negative outcomes. These outcomes include behavioral problems, negative or depressed mood, and other emotional problems³⁴.

CONCLUSION

The ongoing pandemic of obesity, specifically childhood obesity, has emerged as a substantial challenge for epidemiologists, program managers, and policy makers worldwide. Overweight and obesity are serious problems among adolescents with underlying interaction of many factors related to life style, with an impact on mental health. The two variables of low self-

esteem and depression in obese/overweight individuals must be further considered as any negligence causes a negative impact on their lives, annihilating their motivation to start something or finish what they have already started. Furthermore, obese children are more likely to perceive themselves as less competent in areas such as sports, physical appearance, and social interactions with peers. Given these findings, it is crucial to develop interventions that specifically target early adolescents who are overweight or obese, with the goal of strengthening and enhancing their self-esteem. Parents should also play an active role in encouraging and participating in dietary improvements and increased physical activity, as these factors contribute to improved self-esteem during early adolescence. It is essential to raise awareness among parents and teachers about the issue of obesity and its consequences, and to work on reducing the stigma associated with it.

Acknowledgements

We would like to thank the Casablanca-Settat Regional Academy for Education and Training and the Casablanca-Settat Regional Direction of the High Commission for Planning for supporting this research. We would also like to thank all the secondary schools involved, the students taking part in the study and their parents for their cooperation with data collection.

Source of Fund: No

Conflicts of Interest: No

ETHICAL CLEARANCE

We have respected ethical committee approval

AUTHORS'S CONTRIBUTION

Data gathering and idea owner of this study:

Fatima FATHI

Study design: Fatima FATHI

Data gathering Approval of final draft: Fatima FATHI, Hafsa CHOUJAA, Zakaria ABIDLI, Zineb SERHIER, Mohamed AGOUB, Rachid SAILE

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