



## Original Article

## Comparison of Anxiety, Depression and Lifestyle in Obese and Normal Weight Children

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## ABSTRACT

**Background:** Childhood obesity is a health issue that, in addition to physical complications, can have many psychological consequences such as anxiety and depression. The aim of the present study was to compare anxiety, depression and lifestyle in obese and normal weight children.

**Methods:** We carried out a cross-sectional study in Rasht, North of Iran. The study population included all children studying at primary school in city of Rasht during 2015-2016. Using non-probability multi-stage sampling method, a total of 240 children were selected. Body mass index was used to assess obesity. Revised Children's Manifest Anxiety Scale, Children Depression Inventory, and Lifestyle Assessment Questionnaire were used to measure anxiety, depression, and lifestyle, respectively. Analysis of covariance was used to compare adjusted mean of anxiety, depression, and lifestyle scores between the two groups.

**Results:** The mean age of participants was 11.78 years (standard deviation = 0.7). There was no statistical significant difference between obese and normal weight children in anxiety and depression. The adjusted mean of lifestyle score in obese children (216, 95% confidence interval (CI): 211-221) was significantly lower than that in the normal weight group (224, 95% CI: 219-229). In both groups of obese and normal weight, the mean lifestyle scores in girls (214, 95% CI: 209-219) were significantly lower than boys (226, 95% CI: 221-231).

**Conclusion:** This study found no significant association between obesity with psychological disorders of anxiety and depression. Regarding to the better lifestyle scores of normal weight children compared to that of obese children, prospective studies on school-age children's lifestyle especially in girls is needed.

**Keywords:** Anxiety, Depression, Life Style, Obesity

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## Introduction

Obesity in children is a major health concern that have obvious effects on both psychological and physical health

(1, 2). The prevalence of obesity and overweight has increased in recent decades in both developed and developing countries (3). In North America, about a third of

children are overweight or obese (4, 5). According to a study in Iran, the prevalence of overweight and obesity in Iranian children and adolescents was found to be 9.7% and 11.9%, respectively (6).

An increase in the prevalence of overweight and obesity in adolescents is associated with the development of chronic diseases such as diabetes, cardiovascular diseases, increased blood lipids, and some cancers (7). In addition to its undesirable effects on physical health, obesity in children and adolescents is related to some psychological and social problems such as discrimination, low self-esteem, depression, body dissatisfaction, and social isolation that can have adverse effects on adolescents' psychosocial health (8).

Obesity is not a mental disorder and is not often considered the consequence of abnormal psychological processes, but it can cause anxiety in many affected people. Obesity has been positively correlated with low self-confidence, emotional disorders, anxiety, depression, and social isolation (9).

Depression is a disorder causing loss of interest in life. Sadness, energy loss, distraction, sleep disorder, appetite disturbances, physical pains, headache, and digestive problems are signs and symptoms of depression. The depressed patients have disrupted personal and social performance (10). Depression is associated with obesity in adults and adolescents, and depressed adolescent girls are at higher risk of obesity than boys (11, 12).

Currently, with the transition from traditional to sedentary living, lifestyle-related diseases such as lung cancer, diabetes, high blood pressure, overweight, and obesity are rising in many countries, including Iran. Changing diet habits and activity patterns, limited outdoor activities, and watching TV are among the causes of obesity and overweight in children (9). Lifestyle as the most important factor for regulating behaviours is the set of beliefs, plans, behavioural habits, and methods of explaining social or personal circumstances that determines the type of individual response (13). Studies show that the prevalence and incidence of obesity increases with unhealthy lifestyle, particularly inappropriate diet and inactivity (14).

Studying the psychological and psychiatric disorders of obese people and their causes can provide psychologists with valuable information, so that the effective steps are taken to treat these disorders and control obesity using the results of such studies. On the other hand, nutrition experts can gain a more comprehensive knowledge of psychological and nutritional problems and their socio-cultural causes of obesity based on the findings of these studies. Moreover, nutritionist as the first group of specialists for obesity therapy may refer the patients to a psychologist or psychiatrist as well. Therefore, conducting fundamental research to identify the underlying psychological factors of the occurrence and persistence of obesity help healthcare providers in order to meet the needs of the community, modify the behaviours and provide a context for a healthy lifestyle, especially in children and adolescents, and make significant contributions to prevent the development of obesity and its growing trend in the country, as well as its treatment. Given above, the present study aimed to compare the anxiety, depression and lifestyle in obese and normal weight children.

## Methods

### *Study design and participants*

This cross-sectional study was conducted on primary school students (aged 10-13 years) in city of Rasht during 2015-2016 school year. Three schools including one girl's primary school and two boy's primary schools were selected using non-probability quota sampling method after obtaining the necessary permissions from the Education Organization. At each school, the students were selected using convenience sampling method. A written consent was taken from the students' parents for participation in the study.

### *Obesity measurement*

The students' height was measured without shoes and the students' weight was measured with light clothing by standard scales. BMI was calculated as the ratio of body weight in kilogram to the body height in square of meter. Using the definition of the Center for Disease Control, normal weight defined as BMI between 5<sup>th</sup> and 85<sup>th</sup> percentile, and obesity defined as BMI higher than 95<sup>th</sup> percentile of the same age and sex.

### *Questionnaires*

Three questionnaires including revised children's manifest anxiety scale, children's depression inventory, and lifestyle assessment questionnaire were used in this study. All questionnaires were completed in a self-administered way after the researcher explained the items to the students in the classroom.

Revised Children's Manifest Anxiety Scale was provided by Reynolds and Richmond to assess the level and quality of anxiety in children aged 6-19 years (15). This scale has 37 items in three subscales including physiological anxiety, concentration and worry. A high score in physiological anxiety indicates the presence of physical symptoms of anxiety (hand sweating, abdominal pain, and some other symptoms). A high score in concentration indicate that the child internalizes the experienced anxiety, causing weakness and isolation. A high score in worry subscale indicate that the child feels inability to meet the expectations of his (her) loved individuals in his (her) life, and has a major problem in focusing on doing homework. A score was also assigned for honesty in responding (polygraph scale). The levels of anxiety were categorized according to the score obtained, so that the scores between 0 and 9 show low level of anxiety, scores between 9 and 19 indicate moderate level of anxiety, and scores above 19 represent high level of anxiety in children and adolescents. The previous study has reported satisfactory psychometric properties for the Children's Manifest Anxiety Scale. Pela and Reynolds (16) reported suitable reliability in test-retest evaluation (general anxiety score:  $r = 0.98$ ).

Children's depression inventory is a 27-item and self-assessment scale suitable for children and adolescents aged 7-17 years (17). High scores in the test indicate an increase in depression severity. The overall scores of the questionnaire range from 0 to 54. The cut-off point for diagnosis of depression is a score higher than 18. The scores of 0-8 show low level of depression, 9-19 represent depression symptoms with no depression disorder (moderate), and 20 and above indicate severe depression. The reliability coefficient of the questionnaire was 0.81 using test-retest method, and the

reliability coefficient of the questionnaire was 0.88 by Cronbach's alpha method (18).

Lifestyle Assessment Questionnaire (19) consists of 46 items completed by each subject according to his (her) way of living during the last week. The purpose of this questionnaire was to examine lifestyle behaviours as self-reporting in children, including questions related to the level of consumption and type of eaten food, physical activities, sedentary behaviours, duration of watching TV, playing computer games, sleep, and child health. The higher scores indicate better lifestyle. The questions on watching TV in a sample of American children aged 11-15 years had a validity of 0.47 and a reliability of 0.55-0.68 for each subject's lifestyle. Also, the dietary intake in a sample of 11-15 year-old children in more than 40 countries in North America and Europe showed the reliability coefficient of 0.82 by Cronbach's alpha method, that the coefficient was similar to that of the present study's questionnaire.

#### Statistical analysis

The variables were described as mean and standard deviation or frequency and percent. The normality assumption was assessed using Skewness and kurtosis indices. Multivariate analysis of covariance were applied for group comparison. The homogeneity assumptions of variance were assessed using the Leven's test. Data were analysed using SPSS version 23.

#### Results

Of the 240 participants in this study, 50% were female. Half of participants (60 subjects) in each gender were obese and the other half were normal weight children. The mean age of the participants was 11.78 (SD = 0.7) with a minimum of 11 and a maximum of 13 years old. There was no significant difference in age of the two groups (P-value = 0.85).

Descriptive statistics of the study variables are presented in table 1. The mean of total anxiety score as 42 indicates the high level of anxiety in both obese and normal weight children. The mean depression score of 12 shows the presence of depression signs and symptoms without disorder in children.

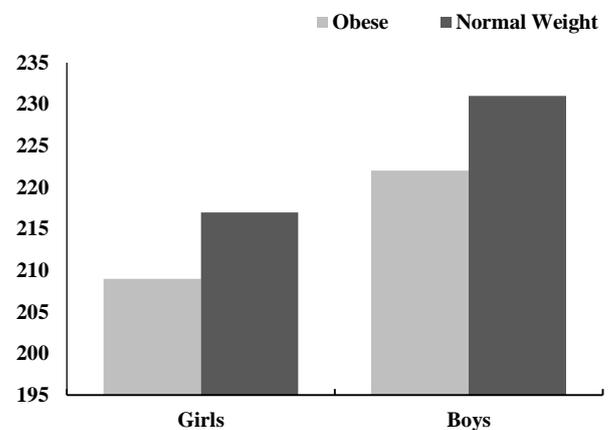
Table 2 shows the adjusted mean with 95% confidence interval for anxiety, depression, and lifestyle between the two groups. The mean of all scores are adjusted for age and gender. No significant difference was found between the two groups of normal weight and obese children in total anxiety, physiological anxiety, extreme sensitivity, worry, and depression. However, the mean adjusted lifestyle score in children with normal weight was significantly higher than that in obese children (P-value = 0.02).

Figure 1 shows the mean lifestyle score between normal weight and obese group according to gender. In both groups, the adjusted mean score of girls' lifestyle (214, 95% CI: 209-219) was significantly lower than that of boys' lifestyle (226, 95% CI: 221-231) (P-value = 0.001).

**Table 1.** Descriptive Statistics of the Study Variables

Variable	Mean	Standard deviation
Total Anxiety	42.1	4.3
Physiological Anxiety	13.1	2.3
Extreme Sensitivity	13.6	2.7
Worry	8.9	1.8
Depression	12.6	7.1
Lifestyle	220	28.6

There was no significant interaction between gender and the study group. Also, no significant difference was found between the two genders in anxiety and depression indices.



**Figure 1.** Lifestyle Score in Obese and Normal Weight Children According to Sex of the Participants

#### Discussion

The aim of this study was to compare anxiety, depression and lifestyle in obese and normal weight children. The results showed that no significant difference was found between two groups of obese and normal weight children in anxiety and depression level, but these two groups showed a significant difference in lifestyle score. This result is consistent with Hashemipour et al that showed no relationship between anxiety score with overweight and obesity in 12 to 18 years old students in Isfahan (20).

**Table 2.** Comparison of adjusted scores of anxiety, depression, and lifestyle scores in the two study groups using multivariate analysis of covariance

Variable	Normal Weight	Obese	F Statistic	P-value
	Mean (95% CI)	Mean (95% CI)		
Anxiety	41.9(41.2-42.7)	42.3(41.5-43.1)	0.33	0.56
Physiological Anxiety	13.1(12.7-13.5)	13.07(12.6-13.5)	0.025	0.875
Extreme Sensitivity	13.4(12.9-13.9)	13.8(13.3-14.3)	1.06	0.304
Worry	8.9(8.6-9.2)	8.9(8.5-9.2)	0.04	0.846
Depression	12.3(11.1-13.6)	12.9(11.5-14.1)	0.305	0.852
Lifestyle	224(219-229)	216(211-221)	5.515	0.02

Abbreviation: CI, confidence interval

Some studies in the United States have also shown no difference between the level of anxiety and self-confidence in obese and other students (21, 22). Titchener and Wong in their study on women showed that BMI had no significant relationship with the generalized social anxiety, but BMI had a significant positive relationship with appearance-based social anxiety (23).

Whitaker and colleagues have shown that transient obesity in adolescents is not associated with anxiety disorders, but persistent overweight and obesity are related to an increase in anxiety levels (24). Amirkhizi et al. (25) in a study found that obesity can increase the risk of eating disorder and anxiety by up to 25%, and is considered a risk factor for major depression and anxiety disorders. Therefore, it can be concluded that although no significant relationship was observed between child anxiety and obesity status in the present study, these children may be exposed to anxiety disorders in the future. Papageorgiou et al. (26) in their study on morbidly obese patients undergoing surgical treatment, observed an unusual cases of psychological disorder, including depression and anxiety disorders. In current study the association between obesity and anxiety disorders might be attenuated, because there was no severe or morbid obesity according to BMI. Also, different types of anxiety disorders are another factor that result in heterogeneity between the studies. Some differences are found between the various types of anxiety disorders in terms of their relationship with obesity (27, 28). Childhood obesity can cause disorders such as anxiety in the future. Since psychological disorders such as anxiety develop gradually, the causal relationship between anxiety and obesity may not be easily recognized. Prospective studies with appropriate design are required to prove this statement (29).

The results showed that there was no significant difference between obese and normal weight children in the depression level. This finding is consistent with previous reports (30-33). Askari et al. showed no significant difference in the rate of depression in obese and normal weight subjects, and it was found that gender and age cannot have a significant effect (30). Wardle and Cooke (2005) concluded that although the level of body dissatisfaction is higher among overweight and obese compared to normal weight children and adolescents, major depression and low self-esteem are rarely observed among them that is consistent with the results of the present study (34). The finding of current study is in contrast with John and colleagues who found significant relationship between depression and severe obesity (35).

Obesity is not supposed to have a simple relationship with depression (36). Previous studies showed that various factors such as severity of depression, gender, socioeconomic status, interaction between genetic and environmental factors, childhood experiences, physical activity, eating, and stress may influence on the relationship between obesity and depression (37, 38).

Anderson et al. reviewed the relationship between obesity and depression from childhood to adolescence, and showed that depression in overweight people was higher than that in the control group (39), while some studies reported no relationship (31), and some have reported a reverse relationship between obesity and depression (40). Therefore, various factors may predispose individuals to depression's

symptoms. For instance, overweight or obesity may lead to depression in certain conditions, and sometimes depression itself results in overweight and obesity (41).

The results showed a significant difference between normal weight and obese children in lifestyle. This finding is consistent with the previous results (42-48). Studies show that sedentary lifestyle is a major contributor to obesity. A systematic review including 20 studies by Must and Tybor (2005) seeking to determine the relationship between obesity and physical activity level, showed a reverse relationship between body weight and physical activity, and direct relationship between sedentary lifestyle and obesity or overweight (49).

A study conducted by Reeves et al. (2008), showed that an increase in sedentary-based behaviours is most likely to maintain or worsening obesity, unless food intake reduced remarkably (46). The current study found girls' lifestyle in both obese and normal weight group to be significantly healthier than that in boys' groups. This finding is consistent with the study by Ishii et al., suggesting that boys do more physical activity as a protective factor than girls (50). This result can be due to the restrictions in exercise activities in girls relative to boys in the present conditions of our society. Another study revealed differences between men and women in the various factors of lifestyle behaviours, suggesting that differences in lifestyle behaviours lead to different status and prevalence of obesity and overweight in the two genders (51). It has been shown that boys received more encouraging factors to adopt healthy lifestyle behaviours such as exercise and mobility than girls (52). The presence of electronic devices as part of a sedentary and modern lifestyle was positively correlated with BMI in boys and girls (53).

This study suffered from some limitations. We could not measure important confounding variables such as socioeconomic status. Also a non-probability sampling was taken that can induce selection bias and diminish the generalizability of the results.

### Conclusion

The results of this study showed that normal weight children had a significantly better lifestyle than obese children. Lifestyle score of girls in both obese and normal weight group was significantly lower than that of boys, suggesting that more attention is required on girls' lifestyle promotion programs.

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### Ethical consideration

This study has been approved by scientific research committee of Psychology department at Guilan University.

### Conflicts of interests

Authors declared no conflict of interest.

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