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Educational Interventions to Change Obesity Perceptions Among High School Students

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ABSTRACT

Objective: The aim of the study is to assess the changes in high school students' perceptions about the causes and results of obesity, and possible solutions suggested by the students who received a healthy lifestyle education intervention on physical activity and nutrition.

Material and Methods: The study was conducted in an Anatolian High School which is located in the District of Çankaya in Ankara Province. The study sample consisted of 139 volunteer high school students, including 62 males (45.60%) and 77 females (55.40%). The age range of the students was between 14-16, and their mean body mass index (BMI) was 20.6 kg/m^2. These students received this intervention during a period of one month. The Obesity Perception Questionnaire (Cronbach's alpha:0.76) was applied before and after the intervention. The analysis of the research data, descriptive statistics as well as student t-test and one-way variance analysis were carried out by SPSS software program. For all analyses p≤0.05 was adopted as the significance level.

Results: The students' perceptions were seen to improve with regard to the risks of overweight, obesity, and diabetes for health following the intervention (p≤0.05). The responsibility to solve the obesity problem was attributed to the family, food industry and healthcare workers by the students while they realized the importance of taking personal responsibility after the intervention (p≤.05). They also expressed that governments should provide more opportunities for increasing physical activity at schools (p≤.05).

Conclusion: Giving healthy lifestyle trainings on physical activity and nutrition to the young creates differences in perceptions concerning the health risks of obesity and taking personal responsibilities in the fight against it. In this sense, such interventions are of vital importance and necessity in maintaining social health.

Keywords: Obesity, Perception, Health, Education, Physical Activity, Nutrition

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INTRODUCTION

The obesity epidemic is an ever-increasing global health problem. Worldwide, the prevalence of overweight and obesity among children and adolescents aged 5-19 rose dramatically from 4% in 1975 to just over 18%

in 2016. In Turkey, 14.3% of children and adolescents aged 6-18 are overweight and 8.2% are obese (1). The death rates due to lifestyle-related diseases have reached 70-80% in developed countries and 40-50% in developing countries (2). Obesity is closely related to physical activity and nutrition, which are two important elements of healthy lifestyle behaviours. An increase in healthy lifestyle behaviours reduces the incidence of obesity (3). The childhood period is the most suitable period for developing healthy lifestyle behaviours (4) while unhealthy behaviours in high school students are increasing (5). Keating et al. (6) found that 40-50% of university students were not physically active. Therefore, conducting early health screening and creating awareness in the young generation are regarded as measures for protection against diseases (7).

The increase in rates of overweight and obesity concerns healthcare professionals, governments, organisations, and institutions worldwide. They attempt to develop effective strategies against obesity aiming at increasing energy expenditure through physical activity and decreasing unhealthy calorie consumption with balanced diet. Although a number of studies on physical activity and nutrition have been conducted, very few have focused on people's perceptions of obesity. Focusing on individuals' perceptions of obesity might increase success in the fight against it.

People's perception of their body weight is effective in individual behaviours aimed at improving their weight status. For example, when elements of the written and visual media use images of morbidly obese individuals while defining obesity, this causes a shift in perception of the relationship between obesity and health. Once people see a morbidly obese body weight, they perceive this as a danger to health (8-10).

Fleary et al. (11) suggest that people's perceptions regarding body weight, health, and obesity in weight management affect their decisions and actions with regard to weight control. Americans regard obesity as a serious health problem and believe that individuals and families are mainly responsible for solving it, but they believe that governments and non-governmental organisations also have a role to play. However, consumers' preferences restrict that society's health policies, and, moreover, obesity perceptions differ according to environmental and demographic factors. The public are aware of health risks like diabetes that are caused by obesity, while overweight individuals' perceptions of their own weight are inaccurate (12).

Eliminating or minimising the changeable behavioural factors that affect the formation of obesity constitutes an essential part of the struggle. People's healthy lifestyle behaviours are affected by factors such as family, culture, psychology and socio-economic situation. Therefore, the perceptions of individuals regarding obesity will provide valuable information for solving this problem.

For the existence of healthy generations, the determined dietary habits can be arranged for children based on their personal characteristics with nutrition training (13). Individuals' personal preferences, such as eating habits and physical activity, especially during the childhood and adolescence periods, can affect their obesity status and thus their health. Educational activities related to obesity risk factors for children and adolescents have a positive effect on obesity treatment and the fight against obesity (14). Evaluating the perceptions of young people in high school regarding obesity may facilitate their awareness of obesity.

The aim of this study is to evaluate the obesity perceptions of young people attending a high school in which healthy lifestyle education aimed at physical activity and nutrition habits is given, the reasons for obesity, their opinions regarding the findings and their suggestions for solving the problem of obesity as an epidemic disease.

MATERIALS AND METHODS

Research Design

The study was designed as a single-group pretest-posttest comparison. The research was

carried out on a total of 139 ninth-grade high school students aged 14-16, of whom 62 were boys (45.6%) and 77 were girls (55.4%) with a mean Body Mass Index (BMI) of 20.6 kg/m^2(min:15.4; max:30.2) enrolled in a high school located in Ankara. Prior to the healthy lifestyle training related to physical activity and nutrition habits, the participants answered a questionnaire. Following the training, the questionnaire was repeated. The institutional review board of Marmara University approved the study (No: 09.2015.351). Participants gave their informed consent.

Research Questionnaire

The questionnaire used in the study was adapted from a combination of questions selected from the "Obesity in the United States: Public Perceptions" (15) and "Public Perceptions of Obesity in Europe" (16) surveys. The original questionnaires were translated into Turkish by 5 bilingual individuals and then these translations were integrated by 3 persons. Differences in item translations were discussed with native English speakers, and the Turkish was re-expressed. Before the questionnaire was finalised, it was applied to 20 ninth graders and their feedback was considered. To ensure the validity of the language, the questionnaire was applied to 20 senior students from the English Language Department. The linguistic validity of the questionnaire, for which the correlation coefficient between the two applications was found to be positive (0.76), was agreed upon. The final version of the *Survey of Public Perceptions towards Obesity in Turkey* ***(Türkiye'de Obezite'ye Karşı Toplumsal Algı Anketi)*** was created with 34 questions. In this study, only the responses to five questions were analysed.

Training Programme

The students in the research group were subjected to the four-week "***training programme for healthy lifestyle behaviour related to physical activity and nutrition***", ensuring their understanding of the relationship with obesity of physical activity and nutrition habits, increasing their cognitive levels with regard to correct and sufficient nutrition, and encouraging them to engage in regular physical activity.

To ensure the students' understanding of the relationship between physical activity and obesity and health risks, and to increase their cognitive levels on this subject, 10 minutes during a weekly two-hour physical education lesson were set aside by the physical education teacher. Information was given about the results of the physical fitness measurements related to health carried out 3 times a year, and attempts were made to develop their perceptions regarding their own bodies.

The participants were given seminars related to developing their levels of consciousness regarding nutrition for 40 minutes, once a week over the four-week period, by a nutritionist and dietician. The weekly seminars consisted of "General dietary recommendations for a healthy body and mind," "The key to healthy nutrition: a low glycaemic index and healthy carbohydrates", "Choose, prepare and order healthy food" and "The dietary needs and metabolism of adolescents, and the importance of healthy nutrition during the developmental period.", respectively.

Statistical Analyses

Since the results of the Kolmogorov-Smirnov and Shapiro-Wilk tests revealed that all sub-dimension questions showed normal distribution below 0.05, the Kruskal-Wallis H test, which is a non-parametric test, was used. In the analyses of the sub-dimensions of the survey questions, mean square, chi-square, significance level, N and % were evaluated. For paired questions, independent groups t test was used, while for multiple choice questions, interpretation was made on the number of preferences.

RESULTS

The students reported that they regarded their health status as good. Whereas this rate was 39.6% before the training, it rose by 12.7% to 44.60% after the training. 63.80% of the study group defined their own weight as

"normal/ideal". This rate increased by 6.32% to 72.70% following the intervention.

The students stated that for weight management, they considered that a joint effort was necessary, in which both they themselves and all organisations of society were responsible. While the rate for these views was 43.17% prior to the training, it showed an increase of 16.67% to 50.36% following the education.

Prior to the intervention, participants considered that the biggest problem for people in Turkey was "addiction to alcohol and drugs" (mean square = 138.44). Following the intervention, however, their awareness of the fact that overweight and obesity ($p = 0.01 < 0.05$), diabetes ($p = 0.04 < 0.05$) and mental disorders ($p = 0.00 < 0.05$) are serious problems showed a statistically significant increase.

33.09% of participants stated that the most serious health problem caused by obesity was "heart diseases". There was no change in the rate of this view after the training ($p = 0.58 > 0.05$).

In reply to the question asking them whether or not it was possible for people to remain healthy despite being overweight, there was a 17.54% increase in students' answering "no" to this question following the intervention ($p = 0.80 > 0.05$). Similarly, 117 (84.17%) of the students who took part in the study stated that it was not possible for people to remain healthy despite being obese, and they retained these views after the training ($p = 0.43 > 0.05$).

66.20% of the students stated that "access to places like shops and corner shops without a car" was very easy, while they also reported that they had no difficulties regarding "access to greengrocers selling fresh fruit and vegetables or similar small places and supermarkets."

The great majority of the participants believed that obesity shortened people's lifespan by 5-10 years. The fact that 8.63% fewer of them gave the answer "I don't know" to this question following the training shows that their awareness of the fact that obesity can shorten people's lifespan had increased.

25.18% of the students stated that they applied the "regular exercise" option for weight control, while after the intervention, this value rose by 14.29% and remained in first place with 28.78%.

With regard to the most suitable treatment method for obesity, while the best mean was seen to belong to the "medicine" dimension (mean square = 138.73) before the training, first place switched to the "diet" dimension after the training (mean square = 130.94), although it can be said that statistically, a significant difference was not found ($p > 0.05$ in all sub-dimensions). While 43.20% of participants chose the "operation" option in first place for treatment of morbid obesity before the training, following the training a statistically significant difference occurred with a 32.50% increase in the "exercise" option ($p = 0.02 < 0.05$).

In terms of obese people's alienation from society due to their weight, 36.69% of participants stated their views as "a lot", whereas this fell to 29.59% after the training, while the number of people saying "a little" rose by 46.81% from 33.81% to 49.64%, an increase which was not found to be statistically significant.

Examining the participants' views regarding the reasons for the rise in obesity in Turkey, prior to the intervention, the "access to fast food is easy and cheap" dimension was chosen by the great majority (103 people, or 74.10%), whereas following the intervention, the same choice remained in first place with a statistical increase (110 people, or 79.10%). However, for the "a great deal of unhealthy food, drinks and snacks is sold in schools" (before training: 57 people, or 41%; after training: 75 people, or 54%; percentage increase: 31.58%) and "there are not enough safe activity areas in order to be physically active" (before training: 79 people, or 56.80%; after training: 96 people, or 69.10%; percentage increase: 21.52%) dimensions, the education provided was effective enough to generate a statistically significant increase ($p = 0.03 < 0.05$) (Table 1).

Table 1. Views of participants regarding reasons for increase in obesity in Turkey, differences prior to and following intervention

Variable	Test Type	*A Major Reason*		*A Minor Reason*		*Not a Reason*		*No Opinion*		Mean Square	Chi-Square	Asymp. Sig.
		N	%	N	%	N	%	N	%			
People spend too much time in front of computers, video games and television	Before	97	69.80	32	23.00	9	6.50	1	0.70	141.63	0.31	0.58
	After	100	71.90	34	24.50	4	2.90	1	0.70	137.37		
	Measurement Difference	3.09%	6.25%			-55.56%		0.00%		-3.0%		
Access to fast food is easy and cheap	**Before**	**103**	**74.10**	31	22.30	5	3.60			143.24	1.11	0.29
	After	***110***	***79.10***	27	19.40	1	0.70	1	0.70	135.76		
	Measurement Difference	6.80%	-12.90%			-80.00%				-5.2%		
People do not want to make changes to their lifestyle	Before	63	45.30	49	35.30	26	18.70	1	0.70	133.45	1.82	0.18
	After	49	35.30	64	46.00	18	12.90	8	5.80	145.55		
	Measurement Difference	-22.22%	30.61%			-30.77%		700.00%		9.1%		
People do not know how to control their weight	Before	78	56.10	48	34.50	7	5.00	6	4.30	144.65	1.51	0.22
	After	86	61.90	47	33.80	3	2.20	3	2.20	134.35		
	Measurement Difference	10.26%	-2.08%			-57.14%		-50.00%		-7.1%		
A lot of advertisements are made related to unhealthy food, drinks and snacks	Before	56	40.30	54	38.80	28	20.10	1	0.70	142.55	0.47	0.49
	After	57	41.00	62	44.60	19	13.70	1	0.70	136.45		
	Measurement Difference	1.79%	14.81%			-32.14%		0.00%		-4.3%		
A great deal of unhealthy food, drinks and snacks is sold in schools	**Before**	**57**	**41.00**	55	39.60	21	15.10	6	4.30	148.96	4.55	**0.03**
	After	**75**	**54.00**	4	31.70	17	12.20	3	2.20	*130.04*		

				4									
	Measurement Difference	**31.58 %**	-20.00%			-19.05%		-50.00%		-12.7%			
Healthy food is very expensive	Before	41	29.50	38	27.30	55	39.60	5	3.60	139.79	0.00	0.95
	After	38	27.30	47	33.80	45	32.40	9	6.50	139.21		
	Measurement Difference	-7.32%	23.68%			-18.18%		80.00%		-0.4%		
People do not know enough about the contents of the food they eat	Before	85	61.20	36	25.90	15	10.80	3	2.20	139.42	0.00	0.98
	After	83	59.70	43	30.90	8	5.80	5	3.60	139.58		
	Measurement Difference	-2.35%	19.44%			-46.67%		66.67%		0.1%		
There are not enough safe activity areas in order to be physically active	**Before**	**79**	**56.80**	39	28.10	16	11.50	5	3.60	148.33	4.56	**0.03**
	After	**96**	**69.10**	29	20.90	12	8.60	2	1.40	130.67		
	Measurement Difference	**21.52 %**	-25.64%			-25.00%		-60.00%		-11.9%		

** indicates significant difference within or between groups (p ≤ 0.05).*

Table 2. Differences prior to and following intervention in answers given to the question "In your opinion, which of the following poses a greater threat to your health?"

Variable	Test Type	Obesity		Smoking		Mean Square	t	Asymp. Sig.
		N	%	N	%			
In your opinion, which of the following poses a greater threat to your health?	**Before**	59	42.50	**80**	**57.60**	1.57	1.20	0.11
	After	***71***	***51.10***	68	48.90	1.50		
	Measurement Difference	20.34%		-15.00%		-4.46%		

** indicates significant difference within or between groups (p ≤ 0.05).*

Please add Tables 1 and 2 here.

With regard to the question of whether obesity or smoking is a greater risk to health, prior to the training, participants leaned towards "smoking" (80 people, or 57.60%), whereas after the training, more of them chose the "obesity" option (71 people, or 51.10%). It was found that the participants' views regarding the question of whether obesity or smoking is a greater risk to health did not show significant differences between pre-intervention and post-intervention ($p = 0.11 > 0.05$). The results of the descriptive statistics reveal that the pre-intervention mean of 1.57 and the post-intervention mean of 1.50 are not high enough to create a significant difference between each other.

Table 3. Differences prior to and following intervention in answers given to the question "Which of the following statements about obesity do you agree with?"

Dimensions	*Measurement Type*	*N*	*%*	*Measurement Difference*
Obesity is a psychological disorder	*Before*	*48*	*19,8*	*-10.42%*
	After	*43*	*17,3*	
Obesity is a genetic disorder	*Before*	*13*	*5,4*	*15.38%*
	After	*15*	*6*	
Obesity is an illness	*Before*	*64*	*26,4*	***14.06%***
	After	*73*	*29,3*	
Obesity is the result of an unhealthy lifestyle	*Before*	***116***	***47,9***	***0.86%***
	After	***117***	***47***	
None	*Before*	*1*	*0,4*	*0.00%*
	After	*1*	*0,4*	
I do not know	*Before*	-	-	-
	After	-	-	

Descriptive statistic with multiple response option.

Since multiple answers were given, N is greater than sample volume.

** indicates significant difference within or between groups ($p \leq 0.05$).*

The highest mean belonged to the "obesity is the result of an unhealthy lifestyle" dimension, chosen 116 times (47.90%) before the training, and that in the evaluation following the training, the same sub-dimension was selected 117 times (47%), which was the most preferred dimension. The greatest increase (14.06%) in the measurements taken prior to and following the intervention belongs to the "obesity is an illness" dimension.

Regarding the extent to which groups should be responsible for solving the obesity problem in Turkey, the best mean was in the "parents or other family members" dimension before the training (mean square = 125.55), whereas it switched to the "personal" dimension following the training (mean square = 139.40).

Statistically significant differences were found in the "parents or other family members" ($p = 0.00 < 0.05$), "doctors or other health professionals" ($p = 0.05 \leq 0.05$) and "food industry" ($p = 0.05 \leq 0.05$) sub-dimensions, while no statistically significant differences were formed in the other sub-dimensions ($p > 0.05$ for all parameters).

Results showed that prior to the training, the best mean was in the "people should be given guidance in choosing healthy food and exercise" dimension (mean square = 133.00), whereas after the training, it was in the "more opportunities should be provided for physical activity in school" dimension (mean square = 131.59).

Table 4. Differences prior to and following intervention in participants' views regarding to what extent each of the following groups should be responsible for solving the obesity problem in Turkey

	Measurement	*No.*	*Mean*	*Chi-*	*Asymp.*
Personal	*Before*	*139*	*139,6*	*0*	*0,97*
	After	*139*	*139,4*		
Parents or other family members	*Before*	*139*	*126,55*	*9,21*	*0*
	After	*139*	*152,45*		
Doctors or other health professionals	*Before*	*139*	*130,49*	*4,01*	*0,05*
	After	*139*	*148,51*		
The food industry	*Before*	*139*	*130,53*	*3,74*	*0,05*
	After	*139*	*148,47*		
Schools	*Before*	*139*	*133,41*	*1,72*	*0,19*
	After	*139*	*145,59*		
Health insurance companies	*Before*	*139*	*132,42*	*2,28*	*0,13*
	After	*139*	*146,58*		
Government policies	*Before*	*139*	*136,19*	*0,5*	*0,48*
	After	*139*	*142,81*		
Local authorities such as governor's offices or municipalities	*Before*	*139*	*134,94*	*0,94*	*0,33*
	After	*139*	*144,06*		
Employers	*Before*	*139*	*133,1*	*1,85*	*0,17*
	After	*139*	*145,9*		

** indicates significant difference within or between groups (p ≤ 0.05).*

Table 5. Some measures that can be implemented by governments in the fight against obesity are given below. Differences prior to and following intervention in participants' views regarding each measure

	Measure-	**No.**	**Mean**	**Chi-**	**Asymp.**
More opportunities should be provided for physical activity in school	Before	139	147,41	4,74	0,03
	After	139	131,59		
People should be given guidance in choosing healthy food and exercise	Before	139	133	2,73	0,1
	After	139	146		
Organic food shops, bicycle lanes and other alternatives related to health should be created	Before	139	145,55	2,92	0,09
	After	139	133,45		
The food industry should be encouraged to produce healthy food	Before	139	140,17	0,03	0,87
	After	139	138,83		
Restaurants should be required to indicate calorie contents on their food menus	Before	139	141,72	0,25	0,62
	After	139	137,28		
Unhealthy food advertisements for children should be banned	Before	139	134,9	0,98	0,32
	After	139	144,1		
Sales of unhealthy food and drink should be subjected to extra taxes	Before	139	135,96	0,56	0,27
	After	139	143,04		
The amount and variety of unhealthy food and drink that people can buy should be restricted	Before	139	137,05	0,45	0,6
	After	139	141,95		

** indicates significant difference within or between groups (p ≤ 0.05).*

There was a statistically significant difference in the "more opportunities should be provided for physical activity in school" sub-dimension (p = 0.03 < 0.05), while no statistically significant differences were formed in the other sub-dimensions (p> 0.05 for all parameters).

DISCUSSION

The frequency and prevalence of overweight and obesity are increasing globally. It is very important for the information, perceptions, motivation and perceived needs of the target group for the aim of encouraging and

developing health to be known. The main finding of our study was that awareness of the risk of overweight, obesity ($p = 0.01 < 0.05$) and diabetes ($p = 0.04 < 0.05$) to health increased following the intervention. While young people regarded the reasons for the increase in obesity as being due to easy and cheap access to fast food before the intervention, after the intervention they linked it with excessive sales of unhealthy food, drink and snacks and with the insufficient number of safe activity areas to be physically active ($p = 0.03 < 0.05$). While the responsibility for solving the obesity problem was considered to be with families, the food industry and health professionals before the intervention, following the intervention responsibility tended more towards the personal ($p \leq 0.05$). It was stated that governments should provide more opportunities for physical activity in schools ($p = 0.03 < 0.05$)

The findings of one of the most comprehensive obesity perception studies in Europe revealed that public awareness levels related to the negative effects of obesity were low. Although obesity is known to be an ever-increasing problem in Europe, the general public are to a large extent still unaware of its importance or of the fact that many of them are already at risk. In the study, almost three-quarters of obese people identified themselves as "overweight", while one-third of overweight people declared that they considered their weight to be within "normal" limits. Obesity was identified by people but there was no awareness of the disease caused (17). Many Europeans seemed to underestimate the need for switching to an active lifestyle. When considered from a health viewpoint, most of the participants were unaware that obesity could cause heart disease, diabetes and high blood pressure (16).

Tompson et al. (12) conducted telephone interviews with 1011 adults aged 18 and over and found that American people mostly regarded individuals (88%) and families (87%) as having responsibility for solving the problem of obesity. Other organisations and institutions that Americans believe are responsible for solving the obesity problem are listed as health service providers (57%), the food industry (53%) and schools (50%). In this study, the participants considered parents or other family members, doctors or other health professionals, and the food industry to have the greatest responsibility for solving the obesity problem. This finding is aligned with the findings of Tompson et al. (12). The high school students' perception that the greatest responsibility for solving the obesity problem lay with parents or other family members before the intervention changed towards a perception that the responsibility was down to the individual after the intervention (Table 4).

The rise of obesity in Americans was largely influenced by individuals' self-control (12) such as spending too much time in front of the TV or computers (82%) (females 89%, males 76%), people's unwillingness to change (64%) and people's ignorance of how to control their weight (52%). Easy access to fast food (75%) and advertisements for unhealthy food, aperitifs and drinks (females 57%, males 46%) make Americans believe that obesity control is out of their hands. Considering the pre-test views for the rise of obesity in Turkey, the "easy and cheap access to fast food" dimension was chosen by most of the participants (103 persons, or 74.10%), but the same choice increased statistically to stay in first place after the training (110 persons, or 79.10%). However, it was seen that for the dimensions, "a great deal of unhealthy food, drinks and snacks is sold in schools" (before training: 57 people, or 41%; after training: 75 people, or 54%; percentage increase: 31.58%) and "there are not enough safe activity areas in order to be physically active" (before training: 79 people, or 56.80%; after training: 96 people, or 69.10%; percentage increase: 21.52%), the training was effective enough to generate a statistically significant increase ($p = 0.05$), (Table. 1).

No studies on the obesity perceptions of high school students in Turkey have been encountered. Sozen et al. (18) examined the obesity awareness of 800 college students (428 females, age: 21.54 ±2.25 years, BMI: 21.60

±3.19 kg/ m^2; 372 males, age: 21.15 ±2.08 years, BMI: 23.82 ±2.84 kg/ m^2) (18). The levels of obesity awareness were higher among females compared to males, in education faculty students, physiotherapy and rehabilitation students, and students in the recreation department of the sports science faculty in comparison with students in the sociology department, and students in the third and fourth years compared to those in other years ($p<0.05$). Kahraman et al. (19) found that the effect of television programmes on developing health attitudes and beliefs towards obesity among 365 excessively overweight and obese individuals who applied to health organisations was weak. It can be concluded that determining the factors perceived as threats, barriers and benefits would be beneficial for creating more realistic policies for the fight against obesity. Moreover, it was considered that making broadcasts containing advertisements for products or services could have an effect on the weak impact of television programmes about obesity.

There are a number of research studies conducted worldwide on defining the relationship between data related to obesity and body mass index in children. People who are better informed about overweight and obesity display a more positive attitude (20). In order to increase the awareness of obesity, a number of school-based programmes successfully integrate nutrition and physical activity (21-24). These programmes have been successful in increasing knowledge of children and young people about nutrition and/or physical activity and fitness. They have succeeded in developing positive behaviours related to obesity. An eight-hour education programme named "What's Food Got to Do with It?" integrated into health education lessons of 783 middle school students with high BMI levels, decreased the BMI levels after a year. In particular, regarding correct attitudes towards nutrition, development increased from 32% to 49%. Students' purchases of fruit rose from 2.82 to 3.25 portions per day, while their vegetable purchases increased from 1.11 to 2.03 portions per day. In the *Eat Well and Keep Moving* project, participants succeeded in watching television for shorter periods following the training, although an increase in their levels of doing strong physical activity could not be achieved (24). The *Choice, Control, and Change (C3)* project caused an increase in middle school students' consumption of fruit from 1.60 times to 1.85 times per day, and of vegetables from 1.05 times to 1.20 times per day. Students' purchases of fizzy drinks decreased by 23%, while their frequency of visiting fast food restaurants decreased by 14%. The educational intervention developed the children's self-efficacy with regard to general nutrition, water consumption, walking and use of stairs (22). Another intervention programme named *Minimal Intervention* also succeeded in increasing nutrition knowledge as participants displayed behaviour changes related to eating less fried food and fewer desserts, examining food labels and limiting the amount of time spent watching television (21).

In another study, participants stated that they were aware that the problem of overweight was constantly becoming more widespread and also that there were consequences of obesity, in the psycho-social sense to begin with and in the physical health sense in the long run (25). The youths revealed that major obstacles to maintaining a healthy weight were very easy access to fatty and highly sugared foods and limited opportunities to take part in physical activities at home, at school and in social environments. The strategies for solving obesity that government and state policies, advertising and media, schools and homes needed to address, as stated by the Australian youths, show parallelism with the findings of the current study (25).

O'Dea (26) found that young people drew attention to the major benefits of a healthy diet as being feeling good physically and mentally and producing energy, and to the barriers as being the ease of access to unhealthy food, the tastiness of the food and the role of the social environment. They listed the benefits of physical activity as socialisation, improvement of psychological state, physical well-being and

better performance in sport. As barriers, they reported the scarcity of indoor activities, lack of energy and motivation, insufficient time and social factors. To overcome these obstacles, they indicated that there was a need for support from parents and school staff, better planning, time management, self-motivation and education, renewal of the physical environment and variation of physical activities.

Guerra et al. (27), examined 38 articles to assess the effect of school-based physical activity and nutrition educational interventions in children and adolescents. They found that school-based physical activity and nutrition educational interventions did not result in a statistically significant reduction in the young people's body mass indices.

Herscovici (28) argued that multi-component programmes in contrast to single-component programmes increased the levels of good-quality nutrition, physical activity, and contributed to the prevention of childhood obesity.

Social and cultural differences also affect energy intake and expenditure. Kucuk Yetgin et al. (29) compared physical activity and nutrition habits of American and Turkish primary school children aged 9-11. The American children reported that their activities and diets were affected by lack of time and friends (48.2%; 41.8%) and their families' bad diets (27.3%), while the Turkish children stated that these were affected by lack of play areas and sports facilities (55.5%; 41.8%), and lack of (45.5%) and expensiveness (37.3%) of healthy food. Children in both countries did not like the taste of healthy food (USA: 52.7%; Turkey: 49.1%).

Kucuk Yetgin (30), also compared the physical activity and nutrition behaviours of 1086 primary school children aged 9-10 living in large (Istanbul) and small (Burdur) cities in Turkey. Students from both cities indicated that sports areas were unsafe (B: 58.6%; I: 48.4%) and insufficient in number (B: 45.1%; I: 41.8%), children did not have time to play sports (B: 42.5%; I: 40.5%), there were few healthy food items in shops (B: 44.9%; I: 40.3%), and healthy food was expensive (B: 44.9%; I: 40.3%) and tasteless (B: 40.5%; I: 41.3%). The results showed that Turkish children and young people shared similar ideas related to physical activity and nutrition. These studies have value in terms of providing ideas about how each section of society in Turkey perceives the reasons for obesity. Studies have indicated that there is a need for education and regulations related to physical activity and nutrition. These findings are important for creating the content of future attitudes to be developed in the fight against obesity.

CONCLUSION

The education given to high school students in our study aimed at changing to a healthy lifestyle related to physical activity and nutrition enabled a change in perceptions regarding their understanding of the health risks caused by obesity and their personal responsibilities regarding obesity. Educational interventions of this type are necessary and important for promoting social health.

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