

## Effect of Peer Education on Physical Activity and Nutrition among Iranian Adolescents

### Abstract

**Introduction:** Due to the high prevalence of sedentary lifestyle and inappropriate nutrition among adolescents, the present study aimed to investigate the effect of peer-based education on physical activity and nutrition among adolescents. **Methods:** In a randomized field trial with control group, a total of 223 students with a mean age of 16.52 (0.9) years participated in the study. Students were randomly selected from four high schools of Tehran's 17<sup>th</sup> district, Iran, using the multistage clustered sampling method. Two females and two males high schools were randomly assigned as an intervention or a control group. After selecting peer educators, they were educated about nutrition and physical activity at two 90-min sessions. Then, peer educators were asked to educate their classmates. Data were collected using demographic, nutrition, and physical activity subscales of Health Promoting Lifestyle Profile-II before and 3 months after the intervention. Data were analyzed using analysis of covariance in SPSS version 24 (IBM Corp., Armonk, New York). **Results:** Peer-based education improved girl's physical activity mean scores ( $16.19 \pm 4.07$ – $19.74 \pm 4.25$ ,  $P > 0.001$ ), but no statistically significant effect on their nutrition. No statistically significant effect was observed after intervention on the nutritional status and physical activity of the male students. **Conclusion:** Peer education seemed to be a good method to improve physical activity among female students, but not their nutrition. In addition, physical activity and nutrition of male students were not improved by the peer education. Therefore, the future research using multidisciplinary approach which targets family involvement, and changes in physical activity and school nutrition policies are needed.

**Keywords:** Adolescents, nutrition, peer education, physical activity

### Introduction

Adolescence is a time of profound changes with sexual, cognitive, and social maturity.<sup>[1]</sup> It can lead to a dramatic and profound evolution in adolescents that underlies the foundation of adulthood and aging.<sup>[2]</sup> Many high-risk behaviors are due to self-centeredness and lack of knowledge about these behaviors' consequences.<sup>[3]</sup> They are grounded in this period and influence the health and well-being of individuals in the future.<sup>[4]</sup> High-risk behaviors can have a deteriorating effect on the overall development and health of adolescents or prevent their success and development in the future.<sup>[5]</sup> Inappropriate diet and inactivity are high-risk behaviors among adolescents, with various prevalence in different countries. In Europe, the prevalence of weight gain and obesity in boys is 19%–49% and in girls is 18%–43%.<sup>[6]</sup> The Tehran Lipid and Glucose Study found that

the prevalence of obesity and overweight in boys aged 10–19 years in 1997 and 2000 were as 6.6% and 12.6%, respectively. In girls, it was 4.1% and 13.3%, respectively. The prevalence of obesity and overweight in boys was 8.8% and 16.5% and 13.5% in girls, respectively. In 2001 and 2004, the prevalence of obesity and overweight among male adolescents was 8.8% and 16.5% and in female adolescents was 5.9% and 13.5%, respectively, indicating the increasing trend of obesity and overweight among adolescents.<sup>[7]</sup> Epidemiological studies indicate the reduction of physical activities among adolescents. Pirasteh *et al.*'s research in Iran showed a significant reduction in physical activity among adolescents, which was more severe in girls than in boys.<sup>[8]</sup> Furthermore, Taymoori and Lubans study in Iran showed that only 36% of adolescent girls performed physical activity.<sup>[9]</sup> In recent years, apart from the reduction of physical activity in children and adolescents in our society, their tastes tended toward foods with inadequate

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nutritional values instead of traditional foods and healthy meals.<sup>[10]</sup>

The best time to correct and change the behavior is childhood and adolescence because a large part of the individual's eating habits is established during this period.<sup>[11]</sup> Furthermore, the habit of physical activity may be transferred from adolescence to adulthood.<sup>[12]</sup> Therefore, it is necessary to familiarize students with the necessary skills and knowledge regarding physical activity and healthy nutrition programs. Nutrition education and a healthy lifestyle for adolescents have differences with those of other age groups because social and cognitive factors such as the tendency of abstract thinking and problem-solving skills, desire to have authority, increased independence from parents, and increased trust in peers as the source of identity, support, and behavioral norms are developed in this period.<sup>[13]</sup> The impact of peers on adolescent health behaviors has been supported by some studies.<sup>[14]</sup>

Given that the high incidence of sedentary lifestyle and inappropriate nutrition among adolescents, health care provides need to know whether peer-based interventions have positive effects on health behaviors among adolescents. The present study aimed to investigate the effectiveness of a peer-based educational program on physical activity and nutrition of adolescents.

## Methods

### Design and participants

This was a field trial with a control group. Participants were adolescent girls and boys aged 15–18 years, who were studying in secondary schools in the 17<sup>th</sup> district of Tehran city. Exclusion criteria were having a physical problem limiting physical activity, known psychological illness, history of taking medications associated with current physical and mental problems, and unwilling to take part in the study.

There were 12 females and 10 males high schools in Tehran's 17<sup>th</sup> district. Sampling was carried out using the two-stage randomized clustered sampling method. In the first stage, a list of all public high schools in the 17<sup>th</sup> district of Tehran city was obtained. Each school was considered as the first-level cluster. Four high schools (two females and two males) were then randomly selected. In the next step, from each high school, three classrooms (one classroom from each grade) were selected randomly as the second cluster. All students of selected classrooms were invited to participate in this study.

### Randomization

Simple randomization was performed for the first cluster using research randomizer online program (<https://www.randomizer.org>). This means that school-level randomization was carried out due to probable exposure of different classrooms at the school. This clustered

randomization was used to minimize the risk of information leakage among participants. One female and male high school was randomly selected as the intervention, and the other ones were assigned to control groups.

### Sample size estimation

According to the previous study,<sup>[15]</sup> taking into account an effect size of 0.5,  $\alpha = 0.05$  and 90% study power, the sample size was estimated to be 86 people in the intervention and control groups each. Considering the probability of sample attrition by 10%, the final sample size was estimated to be 95 people in each group.

### Intervention

From each selected class, three students were selected as peer educators. Selection of peers was based on the students' interests and the suggestion of teachers regarding the relationship of selected students with their friends, their ability to manage and lead the classroom, and ability to transfer educational concepts to students. The peers were educated on the importance of physical activity, proper nutrition for adolescents, appropriate physical activity patterns, and a balanced nutrition tailored to the needs of adolescents, as well as important skills to provide education to their classmates during two 90-min sessions. The time of education to their counterparts was determined according to their class conditions (leisure or exercise time). Peer educators were asked to divide educational contents among themselves and explain each part to their friends. Teaching to counterparts in the classroom was held in two 90-min sessions. The researcher asked the peers to inform him if they were not able to answer the questions of their friends.

### Instruments

#### *Demographic information sheet*

It was designed by the researcher based on available resources and the study aims. This form included questions about age, gender, education level, education and occupation of parents, and access to information sources such as the Internet and telegrams and family economic status.

#### *Health-Promoting Lifestyle Profile-II Questionnaire*

It was developed by Walker *et al.* in 1987<sup>[16]</sup> and consisted of 52 questions in six domains of nutrition, physical activity, health responsibility, stress management, interpersonal support, spiritual, and self-development. It uses a four-level Likert response, including never (Score 1), sometimes (Score 2), often (Score 3), and always (Score 4). Validity of this tool was confirmed using the content validity method, and its reliability was confirmed using calculation of the Cronbach's alpha coefficient.<sup>[16]</sup> In 2011, Mohammad Zeidi *et al.* assessed its reliability in Iran using the calculation of the Cronbach's alpha coefficient within a 2-week interval. The Farsi version of the health-promoting lifestyle profile showed an acceptable and reliable validity

and Cronbach's alpha coefficients varied from 0.79 to 0.91.<sup>[17]</sup> To calculate the score for each dimension, the score of each question was related to that dimension was added together. Given the purpose of this study, two dimensions of nutrition and physical activity of the questionnaire were selected and used for gathering data.

### Procedures

The present study was approved by the Research Council of the Social Medicine Community and Ethics Committee of Tehran University of Medical Sciences, Iran (decree code: TUMS.MEDICINE.REC.1396.4311). After obtaining approval, coordination with schools, peers, and participants was selected. The participants were informed of the research objectives, privacy, and confidentiality of data, freedom to participate in the study. Next, they signed the informed consent form. The questionnaires were completed before the intervention and 3 months after the intervention. In the control group, 3 months after the first visit, the questionnaires were completed. Figure 1 shows the flowchart of the research process.

### Statistical analysis

Data were analyzed using descriptive (mean and standard deviation, number, and percentage) and inferential statistics (Chi-square test, Fisher's exact test, *t*-test, ANOVA, and analysis of covariance [ANCOVA]). The normal distribution of data was checked using the Kolmogorov-Smirnov test. Parametric tests were used to compare the groups. ANCOVA tests were used to assess the effectiveness of the intervention. Assumptions for running ANCOVA model were checked. Assumptions included independence of the groups, homogeneity of the variances in the groups (based on the Levene's test), the normal distribution of the dependent variable (scores of the nutritional status and physical activity), the continuity of

the covariate (scores of the baseline nutrition and physical activity), and a linear relationship between the dependent variable and the covariate (with a correlation coefficient above 0.5). The significance level was considered to be  $\leq 0.05$ .

### Results

In this study, 223 students with a mean age and standard deviation of  $16.5 \pm 0.9$  years participated. Of them, 98 (43.9%) students were assigned in the intervention group and 125 (56.1%) students in the control group. Regarding gender distribution, 82 (36.8%) of them were male and the rest were female. The 10<sup>th</sup>-grade students had the highest frequency of 48.9%. Regarding the economic status, the majority of them (80.3%) reported an average household's economic status. In terms of access to social media and the Internet, majority of the students (50.7%) had access to both. Regarding parental characteristics, the mean and standard deviation of parental age for their fathers was  $46.13 \pm 5.11$  years and for their mothers was  $40.96 \pm 4.81$ . The parents (36.8% of fathers and 43.9% of mothers) had diploma. Comparison of the demographic characteristics of the participants in the groups showed that both groups had no statistically significant differences in terms of all variables except maternal education. Table 1 shows the demographic characteristics of the participants in general and in groups.

### The nutritional status and physical activity

The nutritional statuses and physical activity of the girls in both groups were not significantly different before the intervention. The covariance test with the control of pretest effect showed that the intervention significantly improved the physical activity status in the adolescent girls. However, girls' nutritional status was not improved. The nutritional status and physical activity of boys in both groups were not significantly different before the intervention. The covariance analysis showed that the intervention had no effect on the nutritional status and physical activity of adolescent boys, and there were no significant differences in nutritional score and physical activity in the adolescent boys [Table 2].

### Discussion

Physical activity is associated with the physical and psychological well-being of young adolescents.<sup>[18]</sup> The pattern of physical activity that is sustained in adolescence continues during adulthood.<sup>[19]</sup> However, various reports indicate a lack of physical activity among adolescents.<sup>[20]</sup> Decrease of physical activity is associated with an increase in noncommunicable diseases such as cardiovascular diseases, diabetes, hypertension, besides reduced health, and life expectancy.<sup>[21]</sup>

Considering the importance of physical activity during adolescence, various interventions have been designed

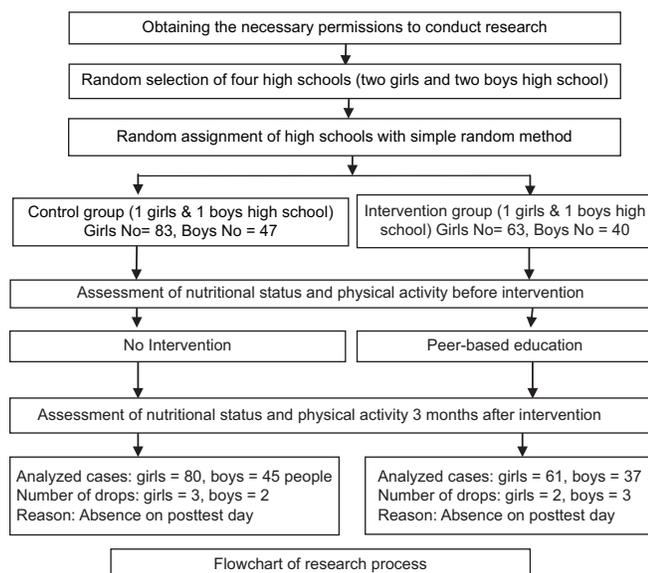


Figure 1: Flowchart of the research process

to improve the status of physical activity in adolescents. In the present study, a peer-based method was used for this purpose. The results of this study showed that the physical activity status of girls in the intervention group significantly improved, which was statistically significant

in the ANCOVA. However, the intervention did not have a significant effect on the physical activity of the boys. A recent systematic review on the effectiveness of various interventions in the field of physical activity among adolescents showed that interventions with the participation of the school, family, or community were more successful.<sup>[22]</sup> Investigation of the effect of different interventions on physical activity among adolescents showed that these interventions had an effect size of 14% in the intervention group compared to the control group.<sup>[23,24]</sup> Similarly, the results of meta-analysis by Pearson *et al.* and Owen *et al.* showed that the effect size is more observed in interventions on female adolescents.<sup>[23,24]</sup>

Nutrition is one of the important components of individuals' health, which in addition to providing energy; it must meet the needs for growth and development in different life stages.<sup>[25]</sup> Childhood and adolescence are important times for the formation and stabilization of people's eating habits and play a determining role in the risk of developing metabolic diseases.<sup>[26]</sup> Nutrition of most children and adolescents increases the risk of metabolic diseases, overweight and obesity, and other nutrition-related diseases.<sup>[27]</sup> Nutrition education is one of the main steps for improving the nutritional status of adolescents.<sup>[28]</sup> The results of the present study showed that the educational intervention did not have a significant effect on the nutritional status of participants. While there was an increase in scores of female participants in both intervention and control groups, the ANCOVA showed that the peer-based intervention did not improve the students' nutritional status. Peer-based interventions have particular complexities in terms of selection of peers, level of interest and participation of peers in learning, curriculum transfer, and influence on others.<sup>[29]</sup> In the study by Oakley and Nickols-Richardson, no difference was found between the training time by peers and adults and the education content.<sup>[30]</sup> However, peer educators did not emphasize on the use of fruits and vegetables as adult educators. Furthermore, their skills for directing their group toward the main goal

**Table 1: Participant's characteristics based on study groups**

Qualitative variables	Intervention, n (%)	Control, n (%)	P
Gender			
Girl	61 (62.2)	80 (64)	0.90*
Boy	37 (37.8)	45 (36)	
Students' educational grade			
10 <sup>th</sup>	49 (50)	60 (48)	0.96**
11 <sup>th</sup>	34 (34.7)	45 (36)	
12 <sup>th</sup>	15 (15.3)	20 (16)	
Father's education			
Illiterate	3 (3.1)	1 (0.8)	0.11 <sup>#</sup>
Under diploma	56 (57.2)	58 (46.4)	
Diploma	29 (29.6)	53 (42.4)	
Academic	10 (10.2)	13 (10.4)	
Mother's education			
Illiterate	9 (9.3)	1 (0.8)	0.02 <sup>#</sup>
Under diploma	49 (50.5)	48 (38.7)	
Diploma	32 (33)	66 (53.2)	
Academic	7 (7.2)	9 (7.3)	
Family economic status			
Poor	4 (4.1)	14 (6.4)	0.26 <sup>#</sup>
Moderate	76 (77.6)	103 (82.4)	
Good	18 (18.4)	8 (11.2)	
Access to internet and social media			
Yes	94 (95.9)	122 (97.6)	0.48 <sup>#</sup>
No	4 (4.1)	3 (2.4)	
Adolescents' age, mean±SD	16.51±0.9	16.54±0.9	0.83*
Fathers' age, mean±SD	46.67±5.99	45.70±4.33	0.17*
Mothers' age, mean±SD	41.22±5.18	40.76±4.52	0.48*

\*Independent t-test, \*\*Chi-square test, <sup>#</sup>Fisher's exact test. SD: Standard deviation

**Table 2: Results of the analysis of covariance to investigate the effect of intervention on nutritional status and physical activity of boys and girls by controlling the effect of pretest**

Outcome	Group	Mean±SD		F statistics	P		
		Before intervention	After intervention				
Girls							
Nutritional status	Intervention	23.05±3.05	24.61±3.61	1.666	0.09		
	Control	22.37±4.18	23.34±3.93				
Physical activity	Intervention	16.19±4.07	19.74±4.25			28.875	<0.001
	Control	17.20±4.88	17.77±4.30				
Boys							
Nutritional status	Intervention	24.15±3.86	23.66±3.76	0.41	0.73		
	Control	22.93±4.41	22.88±3.88				
Physical activity	Intervention	20.20±5.22	20.73±4.04	1.249	0.27		
	Control	20.18±5.80	19.48±5.02				

SD: Standard deviation

was less than adult educators.<sup>[30]</sup> The results of the study by Ladapo *et al.* on the effectiveness of a nutrition and exercise education program at the school showed that the various components of this program together led to an effective training program.<sup>[31]</sup> In their study, the change of nutritional environment of the school, use of the media, the use of healthy school supplies, and the training of peers together make the intervention as comprehensiveness and effectiveness program.<sup>[31]</sup> The systematic review by Micha *et al.* emphasized that nutritional policies in the school environment could improve the nutritional behavior of adolescents.<sup>[32]</sup> Therefore, nutrition education cannot be very effective without considering the involvement of family, school nutrition policies, and social and economic conditions.

Regarding the importance of peer education, adolescence is the time in which the individual identity and the teenage relationship are established with friends, family, and society.<sup>[33]</sup> Adolescents are less receptive to their parents' communication and are more affected by counterparts and the media.<sup>[34]</sup> Adolescents affect their health behaviors and selections.<sup>[35]</sup> Therefore, peer-based education is an educational strategy in which peers provide education, share information, values, beliefs, and behaviors related to health in the community.<sup>[36]</sup> A recent systematic review showed the effectiveness of peer-based educational strategies in various interventions such as cigarette smoking, alcohol, and high-risk behaviors in adolescents.<sup>[37]</sup> However, there are inconsistent results regarding the effectiveness of peer-based interventions in adolescents. A systematic review study by Mellanby *et al.* showed that of 13 studies on adolescent health, peer education versus adult education, 7 studies supported more effectiveness of peer-based interventions, 1 study showed more effectiveness of adult education in boys, and 4 studies showed lack of effectiveness of these interventions.<sup>[29]</sup> Therefore, the results of the present study in terms of the effectiveness of intervention in girls and lack of effectiveness in boys are in line with those of previous studies. The impact of peers on transition from childhood to adolescence in girls plays an important role in improving their physical activity.<sup>[38]</sup> Sebire *et al.* reported the effectiveness of peer-based interventions in promoting physical activity in girls.<sup>[39]</sup> Interpersonal differences between girls and boys on receiving impacts from their counterparts can explain differences in the effect of education on girls and boys. Field *et al.* in a prospective longitudinal study on the impact of counterparts, parents, media on weight-related concerns, and attempts to have a weight loss nutrition showed that girls paid more attention to their weight than boys. They tried to achieve the ideal weight, but the influence of parents on adolescent decisions was greater than that of peers.<sup>[40]</sup>

Despite the importance of peers in adolescent health decisions, the role of family remains important. However, many choices for adolescents in relation to physical

activity such as the use of sports clubs, access to suitable sports facilities and physical activity, and the selection of a balanced nutrition are impossible without family support. Adolescent is still dependent on the family economically, socially, and culturally; and despite the influence of the peer group, the family role remains high.

### Limitations

The main limitation of this study is the subjective assessment of nutritional status and physical activity. Assessing objective outcomes for such study can provide better insight about the effectiveness of such interventions. The other limitation was short follow-up time in the present study: only one follow-up after 3 months was scheduled and the long-term effect of intervention was not assessed.

### Conclusion

The results of this study showed that peer-based education in the adolescent girls' group improved physical activity, but not their nutrition. For adolescent boys, peer education did not have a significant effect on nutritional status and physical activity. Nutrition and physical activity are not solely influenced by individual factors, and the success of education might depend on having a comprehensive program that involves family and school partnerships and the community to facilitate changes in adolescents' behaviors. Therefore, it is recommended that future researches investigate effectiveness approaches that involve parents, changes in schools, and nutritional and physical activity policies besides peer education program.

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### Conflicts of interest

There are no conflicts of interest.

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