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Relationship between physical activity level and demographic characteristics, eating habits and sedentary behaviors of Turkish school children aged 11, 13 and 15 years

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Summary

Aim: The aim of this study was to determine the relationships between physical activity level and demographic characteristics, body mass index and some other health behaviors in Turkish adolescents.

Material and Method: The data presented in this study were a part of the Turkish data collected for the cross-sectional and international "Health Behavior in School-aged Children 2005/2006 study" which aimed to evaluate adolescents' health and health behavior around Europe and North America. The data were collected from 3884 students aged 11 and 13 years (1946 males, 1938 females) who attended 180 classes of 82 primary schools in 26 cities and 1668 students aged 15 years (901 male, 767 female) who attended 88 classes of 83 high schools in 26 cities. Statistical analyses were made by using chi-square test, factor analysis and logistic regression analysis.

Results: Twenty percent of the students reported that they were physically active for at least 60 minutes each day over the course of a week. In logistic regression analysis being 11 and 13 years old, being male, spending 4 or more evenings with friends outside the home were found to be associated with being physically active. When the "eating both healthy and unhealthy foods rarely" group was taken as the reference group, the other 3 groups (healthy foods frequently + unhealthy foods rarely; unhealthy foods frequently + healthy foods rarely; eating both healthy and unhealthy foods frequently) were more likely to be physically active than the reference group.

Conclusions: The results of this study are important in terms of showing that physical inactivity is common among Turkish adolescents, especially in females. These results are also important in terms of showing that both eating habits and time spent with friends are related to physical activity of adolescents. Effective health promotion programmes should be especially focused on females and emphasize the importance of adolescents' eating habits. It should also be remembered that peers could play an important role in improving adolescents' physical activity level. (*Turk Arch Ped 2011; 46: 13-20*)

Key words: Adolescent, eating habits, obesity, physical activity, sedentary behavior

Introduction

Adoption of a sedentary life-style by children and adolescents is a global problem. According to 2004 report of the World Health Organization at least 60% of the popula-

tion in the world do not perform moderate-intensity physical activity for 30 minutes daily (1).

Although 2006 report of the "Health Behavior in School-aged Children (HBSC)" survey varies from country to country, it demonstrated that school-aged children liv-

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ing in Europe and North America do not perform sufficient level of physical activity (moderate-heavy) (2). According to the results of this survey, the lowest level of activity was found in 11-year-old children in Switzerland with a rate of 15%, in 13-year-old children in France with a rate of 12% and in 15-year-old children in Israel with a rate of 8% (2).

The relation of sedentary life-style with diabetes, coronary heart disease and early death is well known (3). In addition, it is accepted that physical activity enhances optimal growth and development in terms of adolescents, is important for bone health (4) and develops emotional wellness by decreasing stress and anxiety (5-7).

Therefore, from a public health point of view, it is important to determine the factors related to physical activity levels of adolescents and develop efficient policies and programmes to protect and improve health.

Although children and adolescents are physically more active compared to adults, gradual increase in the incidence of obesity (8) has led to questioning the adequacy of physical activity levels of children and adolescents (9). Therefore, children and adolescents have been recommended to perform moderate-intensive physical activity at least for one hour daily (moderate-heavy) (9). Investigations have consistently shown that physical activity levels of girls are lower compared to boys and physical activity level decreases with age from early adolescence to young adulthood (10-15). The results of investigations examining the relation between socioeconomic level (SEL) and physical activity level are variable (3,10,16,17). Different studies about the relationship between physical activity level and time spent in sedentary behaviors including watching television and using the computer demonstrated different results (11,14,18-20). The relation of inadequate physical activity and obesity has been shown in some studies (12,21-24).

The objective of this study was to determine the relation of physical activity levels of school-age adolescents with demographic factors, body mass indexes and health-related behaviors (time spent outside home, eating habits, sedentary behaviors).

Material and Method

In this study, data of 11, 13 and 15-year-old adolescents attending the 6th, 8th and 10th classes who participated in the Turkish arm of the cross-sectional, descriptive and multi-national survey "Health Behavior in School Aged Children (HBSC)" which aimed to determine the health status and health behaviors of adolescents were evaluated (2).

Sampling plan

Determination of the number of students

2004 data of Turkish Republic Ministry of National Education were used for sampling. To achieve an adequate number in the age group of interest the system was framed by increasing the number of students in that class

according to the probability of that age group to be actually present in that class (6th class 73%; 8th class 70%; 10th class 43%). Sample number was determined considering the fact that the question with the highest number of options in the questionnaire had 11 options, 95% confidence level, 80% power, 0.01 error and the number of stratum.

There were four stratum for the 6th and 8th classes (private/public/rural/urban) and three stratum for the 10th class (private high school, general high school, profession high school). The specified sample number was distributed to these stratum separately for each class.

Sampling unit was classroom. For the 6th and 8th classes, the number of students per classroom was 37 in public schools (25 in rural region, 46 in urban region) and 13 in private schools. For 10th class, the number of students per classroom was 46 in public high schools, 27 in profession high schools and 9 in private high schools.

Distribution of classrooms was as follows: For the 6th class; five classrooms in private schools, 90 classrooms in public schools (38 classrooms in rural regions, 52 classrooms in urban regions). For the 8th class; four classrooms in private schools and 82 classrooms in public schools (34 classrooms in rural regions and 48 classrooms in urban regions). For the 10th class; 8 classrooms in private schools, 87 classrooms in public schools (45 in general high schools, 42 in profession high schools).

It was aimed to reach a total of 9388 students. 3407 of the students included in the sample were in the 6th class (the number of 11-year-old students aimed to be reached was 2487) (public school =3342- rural: 950, urban=2392; private school=65). 3110 students were in the 8th class (the number of 13-year-old students aimed to be reached was 2177) (public school=3058- rural: 850, urban=2208-; private school=52). 2871 students were in the 10th class (the number of 15-year-old students aimed to be reached was 1579) (private high school=72, public high school=1665, profession high school=1134). The effect size was found to be 1.44 for the sample number determined by this number obtained with adjustments including stratum, classroom and rounding.

It was thought that 11, 13 and 15-year-old adolescents obtained from this sample would represent the 11, 13 and 15-year-old school-age group in Turkey.

Province selection criteria

There are 81 government regions named "province" in Turkey. Selection of sample province was based on 12 regions NUTS-1 "The Nomenclature of Territorial Units for Statistics (NUTS)" level (25). Except for Istanbul and West Anatholia regions (Ankara was included), at least two cities from each region were included in the sample. Provinces demonstrating heterogeneous demographic properties in their region were included in the sample without drawing of lots.

Application

Preparation of the questionnaire

Translation of the original questionnaire from English to Turkish and afterwards back to English was performed by four different persons. The compatibility of back-translations with the original questionnaire was evaluated by the HBSC international coordinator and some words were corrected according to his/her recommendations.

The pilot study was performed in the 6th classes (two classes, 63 students) of an elementary school and in the 10th class of a high school (one class, 43 students) in the province of Istanbul. Some statements were corrected according to the problems which emerged during the application of the questionnaire and the results obtained in two different group studies performed subsequently.

Structure of the questionnaire

HBSC survey consists of obligatory questions and optional questions the use of which is left to each country participating (2). International survey includes obligatory or optional questions which are collected under titles of social inequality, positive health, body perception and weight management behaviors, accidents and injuries, aggression and violence, eating habits, peer culture, family culture, school environment, physical activity, leisure time activity, substance abuse (smoking, alcohol and narcotic substances) and sexual health and which have been generated or adopted by focus groups present in the international survey team. Since obligatory questions about substance abuse and sexual health were not confirmed by the Ministry of Education, these questions were not included in the questionnaire used by the Turkish team prepared for 11, 13 and 15-year-old age groups (students in 6th, 8th and 9th or 10th class). In the questionnaire prepared for 11 and 13-year-old age groups (students in 6th and 8th class), the above mentioned questions were excluded and only the other obligatory questions were used. In the questionnaire prepared for the students in the 10th class (15-year-old group), optional questions related to positive health, family culture, peer culture and school environment were included. A total of 42 question titles were included in the questionnaire prepared for the 6th and 8th classes and a total of 62 question titles were included in the questionnaire prepared for the 10th class.

Determination of schools and data collection phase

Classrooms were randomly distributed to schools using school lists of provinces included in the survey obtained from the Ministry of Education. For each school, a spare school was specified at the baseline.

For each elementary school two classrooms from the 6th and 8th classes were randomly specified. For schools

with less than 20 students per classroom, a second classroom was included in the sample to generate class equivalence. In high schools, a single classroom was selected for each school.

School directors of the schools included in the survey were called and informed about the survey. Data collection was performed in May 2006. Questionnaires were sent to the schools via PTT (Post, Telegraph and Telephone). In addition to questionnaires, the approval letter obtained from the Ministry of Education for the survey, a letter written to school directors explaining the scope of the survey and points which should be cared for during application, a form including necessary information related to classes included in the survey (number of students in the class, number of students participating the application etc.), a standard instruction prepared for class teachers or guidance counselors who will perform the application and contact information were sent to the schools. Questionnaires were not returned from 17 of the schools. Two schools stated that they did not receive the questionnaires. Application was not performed in three schools. It was thought that problems related to PTT was the reason for the other 12 questionnaires not to return.

Number of students reached

A total of 8675 students were reached (rate of reaching 92%). Among these students, 2329 were excluded because they were outside the 11, 13 and 15-year-old age group at the time of data collection, 87 were excluded because they did not state their date of birth and 8 were excluded because they were disabled.

The number of students who were absent from school on the day the questionnaire was applied was 656 and the number of students who did refuse to participate the survey was 43. 2072 of the students who were reached (rate of reaching relative to the aim was 83%) were 11 years old, 1812 students were 13 years old (rate of reaching relative to the aim was 83%) and 1668 students were 15 years old (rate of reaching relative to the aim was 105%). Consequently, data analyses of this study were performed in 3884 students (1946 male, 1938 female) aged 11 and 13 years old in 180 classrooms in 82 elementary schools and in 1668 students (901 male, 767 female) aged 15 years old in 88 classrooms in 83 high schools in a total of 26 provinces.

Data analyses

Physical activity level which is a dependent variable was measured to assess "moderate-heavy" physical activity. Individuals who performed physical activity for at least 60 minutes each day of the week were accepted to be the ones performing adequate physical activity (moderate-heavy).

Independent variables

From the birth dates of the students ages were calculated and these ages were classified in three categories. Allocation regions were divided into two groups according to the location of schools in rural or urban areas.

Frequency of having breakfast was evaluated separately for the weekdays and for the weekend. In the analysis of data, the frequency of having breakfast only on the weekdays was examined in two groups as "students having breakfast every day" and "others".

Factor analysis of answers to four questions related to the frequency of consumption of vegetables, fruit, sugar/chocolate and sweet and carbonated beverages divided students into two groups as "healthy food consumers" and "unhealthy food consumers". Therefore, factor scores were taken as criteria to generate nutrition groups. Students whose factor scores were in the highest 25% of the healthy food consumer group were considered as "frequently consuming healthy food" and students whose factor scores were in the highest 25% of the unhealthy food consumer group were considered as "frequently consuming unhealthy food". In this way, both groups were divided into two groups at first. Afterwards students were divided into four groups evaluating their place in the two food consumption frequency group.

1. Group: frequently consuming healthy food+rarely consuming unhealthy food.

2. Group: frequently consuming unhealthy food+ rarely consuming healthy food.

3. Group: frequently consuming both groups of food.

4. Group: rarely consuming both groups of food.

Dieting frequency was measured with one question and analyses were done by classifying students in two groups as answering this question "yes" and "others".

Body mass indexes (BMI) were calculated by asking the students their body weights and heights. Obese, overweight, normal and underweight groups were generated using international cut-off values of BMI for age and gender (26). Since no difference was found in physical activity level of the students in the normal and underweight groups, analyses were done by combining these two groups. Sedentary activities of students were evaluated by measuring time for watching TV and time for leisure-time computer use with separate questions for weekdays and weekend. For TV watching and computer use weighted mean values were calculated covering weekdays and weekend together. For both behaviors separately, students with mean values in the highest 25% were considered as individuals watching TV for a long period and using computer for a long period.

The time spent by students outside home with friends in the evenings was measured with one question. Students who spent time outside home with friends in the evenings at least four days a week were considered as individuals frequently spending time with friends.

The economic status of students was evaluated with Family Affluence Scale (FAS). Family Affluence Scale was calculated separately for each student according to answers given to questions related to the number of cars of the family, the students' having a separate room at home, the frequency of going on vacation of the family in the last 12 months and the number of computers at home. A serial measurement scale was developed for analyses. According to this scale, FAS 1 (score : 0-3) indicated low affluence level; FAS 2 (score: 4-5) indicated moderate affluence level and FAS 3 (score 6-7) indicated high affluence level.

Chi-square test was used for single variant analyses. For multivariate analyses, logistic regression analysis by "enter" method was performed to determine factors affecting physical activity level independently. Since it was predicted that each variable could affect physical activity level by itself, all variables were included in logistic sample without considering the significance level found in paired comparisons.

SPSS 11.5 package program was used for statistical analyses. In all comparisons, a p value <0.05 was considered to be statistically significant.

Results

5254 students answered the question related to physical activity. 47.9% of these students were (n=2515) female and 52.1% were (n=2739) male. 37.3% of the survey group were 11 years old, 32.6% were 13 years old and 30.1% were 15 years old. 80.1% of the adolescents were living in an urban area (n=4207) and 19.9% (n=1047) were living in a rural area (Table 1).

20% of the students (n=1055) reported that they performed a certain physical activity at least for one hour daily.

The relations between physical activity and socio-demographic variables are shown in Table 2. Boys were physically more active than girls (p<0.0001). Physical activity levels of adolescents decreased as the age got

Table 1. Socio-demographic properties of the study group

		n	%
Gender	Female	2515	%47.9
	Male	2739	%52.1
Age	11 years old	1962	%37.3
	13 years old	1711	%32.6
	15 years old	1581	%30.1
Residential area	Urban area	4207	%80.1
	Rural area	1047	%19.9
FAS*	Low	3511	%69.2
	Moderate	1282	%25.3
	High	278	%5.5

*FAS: Family Affluence Scale

older ($p < 0.0001$). No significant relationship was found between physical activity level and richness of equipment and residential area.

The relation between health behaviors and physical activity is shown in Table 3. According to the results of chi-square test, being physically active was found to be significantly related to having breakfast every day on weekdays ($p < 0.001$). Physical activity level of the students varied according to the pattern of food consumption

($p < 0.0001$). It was found that physically active adolescents spent more time outside home with their friends, watched TV for a longer period and used computer more for playing games ($p < 0.0001$ and $p = 0.001$, respectively). Dieting behaviors of the students and BMI's were not significantly related to physical activity levels.

The results of multivariate analysis (logistic regression) are shown in Table 4. In the logistic regression analysis, a significant relation was found between male gender, being 11 and 13 years of age compared to being 15 years of age and spending time outside home. When eating behaviors were examined with reference to individuals consuming both healthy and unhealthy food with a low rate, it was found that physical activity level of students who consumed healthy food rarely and unhealthy food frequently was 1.6 fold higher than the reference group; physical activity level of students who consumed healthy food frequently and unhealthy food rarely was 1.65 fold higher than the reference group and physical activity level of students who consumed both types of food frequently was 1.97 fold higher than the reference group. According to the results of single variant analysis, physically active students spent significantly more time watching TV and played games in the computer for significantly longer period, but multivariate analysis did not show the same significance.

Table 2. The relationship of socio-demographic properties of the students with physical activity levels

		Physically active		Not physically active		p
		n	%	n	%	
Gender	Female	433	17.2	2082	82.8	0.000
	Male	622	22.7	2117	77.3	
Age	11 years old	498	25.4	1464	74.6	0.000
	13 years old	335	19.6	1376	80.4	
	15 years old	222	14	1359	86	
	Urban	859	20.4	3348	79.6	
Residential area	Rural	196	18.7	851	81.3	0.22
	Low	706	20.1	2805	79.9	0.277
FAS*	Moderate	250	19.5	1032	80.5	
	High	66	23.7	212	76.3	

*FAS: Family Affluence Scale

Table 3. Relation between health behaviors of the students and physical activity level

		Physically active		Not physically active		p
		n	%	n	%	
Having breakfast	1-5 days	360	17.8	1664	82.2	0.001
	Every day	664	21.6	2406	78.4	
Dieting	Yes	60	24.7	183	75.3	0.065
	No	992	19.8	4007	80.2	
Nutrition groups	HF*rarely + UF**rarely	480	16.4	2447	83.6	0.000
	HF rarely + UF frequently	209	23.8	668	76.2	
	HF frequently + UF rarely	219	25.6	636	74.4	
	HF frequently+ UF frequently	115	28.4	290	71.6	
Body Mass Index	Obese+Overweight	98	20.9	370	79.1	0.668
	Normal +Underweight	806	20.1	3204	79.9	
Time spent with friends	0-3 evenings	852	19.2	3588	80.8	0.000
	> 4 evenings	174	26.5	482	73.5	
Watching TV	> 5.57 hours	338	22.9	1138	77.1	0.002
	< 5.57 hours	668	19	2852	81	
Playing games on the computer	> 3.71 hours	318	23.8	1020	76.2	0.001
	< 3.71 hours	686	18.9	2947	81.1	

HF: Healthy food

UF: Unhealthy food

Discussion

The results of our study show that physical activity level of a high proportion of adolescents in Turkey is not as high as recommended. In HBSC 2006 survey, among 41 countries, Turkey was in the 20th order in terms of physical activity level in the 11-year-old age group, in the 18th order in the 13-year-old age group and in the 23rd order in the 15-year-old age group (2). These results are important, because it is known that physical activity has positive effects on general health. In addition, physical activity can be considered to be one of the areas of priority in studies supporting adolescent health, since it is thought that physical activity level during childhood and adolescence may be a determinant of physical activity level during adulthood.

The results of this survey showed that physical activity level of male adolescents was 1.41 fold higher compared to female adolescents. This result was similar to the results of the surveys performed in other countries previously (10-13,15). The reason for this difference between genders may be the fact that physically active male adolescents are socio-culturally more acceptable compared to physically active female adolescents. Studies have shown that parents support female adolescents with a lower rate in terms of participating in sportive activities (27). In addition, male adolescents may have easier access to game areas and sports areas. There are studies suggesting that physical activity level is also related to biologic maturation and thus physical activity level of female adolescents decrease before male adolescents, but the difference disappears later (28). We think that quantitative and qualitative studies investigating the reasons for the difference between genders are needed to increase the effectiveness of health improvement programmes. In our study, physical activity level was found to decrease as the age got older which was similar to the lit-

erature (10,12,13,15,29). Factors including differentiation of areas of interest of adolescents, difficulties of older adolescents to find facilities where they can perform sportive activities and increase in time spent for academic life may play a role in this decrease. However, it is rather important that bone density reaches best values during adolescence and thus physical activity levels are maintained without decreasing especially in terms of female adolescents (4). Therefore, we think that priority should be given to older adolescents in health improvement programmes and studies should be planned to determine the reasons for the decrease in physical activity level with advanced age.

In our study, adolescents consuming both healthy and unhealthy food frequently were found to be the adolescents with the highest physical activity level. Adolescents who consumed healthy food frequently and unhealthy food rarely were in the second order in terms of physical activity level. These results suggested that physically active adolescents should be investigated in terms of eating habits. A portion of physically active adolescents may be consuming high energy food before or after physical activity. In addition, they may be taking care about consuming fruit and vegetables. Thus, the fact that the adolescent group who consumed healthy food frequently and unhealthy food rarely were physically more active compared to the other groups confirmed our view that physically active adolescents might be taking care about consuming fruit and vegetables. It has been shown in the literature that there is a relation between healthy eating and being physically active (15).

In the single variant analyses of our study, having breakfast every day during weekdays was significantly related to being physically active, but no such relation was found in multivariate analysis. While adolescents having breakfast regularly were shown have adequate level of physical activity in some of the studies performed previously (30), the same finding was not confirmed in other studies (31,32). In a study, no relation was found between having breakfast and physical activity level in the morning hours or other times during the day in male subjects, but breakfast was found to be related to physical activity level during morning hours in female subjects (33).

It was interesting that no relation was found between BMI and physical activity levels both in paired comparisons and in logistic regression analysis. In literature, there are studies with similar results (14,15,34) and other studies showing that BMI is related to physical activity level, in contrary (21,22,35-37).

In our study, spending time with friends outside home was found to be related to physical activity level. Although the quality of time spent with friends was not examined, this finding may be accepted to be a determinant of physical activity level of friends considering that adolescents frequently perform physical activities with their friends.

Table 4. Results of multivariate analysis (logistic regression)

	β	P	Exp (β)	Confidence interval (%95)	
				Lower limit	Üst sınır
Male gender	0.344	0.000	1.41	1.19	1.671
Being 11 years old	0.899	0.000	2.458	1.993	3.031
Being 13 years old	0.506	0.000	1.659	1.328	2.073
Spending more time with friends	0.404	0.000	1.498	1.2	1.869
HF rarely + UF frequently	0.475	0.000	1.607	1.295	1.996
HF frequently + UF rarely	0.501	0.000	1.651	1.333	2.046
HF frequently + UF frequently	0.681	0.000	1.976	1.503	2.597

HF: Healthy food

UF: Unhealthy food

In our study, socioeconomic level (SEL) assessed by richness of equipment was not found to be related to physical activity level. The results of studies investigating the relation between physical activity and SEL are variable. Some studies have shown that adolescents with a low socioeconomic level have inadequate levels of physical activity (10,13,16,17,27,38). Some other studies have found no relation between socioeconomic level and physical activity level (39). Socioeconomic level may be evaluated with the level of education of the parents or profession of the parents as well as with richness of equipment. Some SEL criteria may be related to physical activity level and some others may not be related to physical activity level. In addition, some accept that adolescence is a period during which individuals are equalized in terms of SEL more or less (2). Some studies have shown that the physical activity level of the parents and siblings is a better determinant of the physical activity level of adolescents compared to SEL (15, 39). Since other SEL criteria and the physical activity level of the parents and siblings were not investigated in our study, no conclusion was drawn. We think that the relation between socioeconomic level and physical activity level should be examined in detail.

Watching TV and using the computer may disrupt energy balance by superseding physical activity (40). In some studies, a relation was found between watching TV and using the computer and physical activity level of adolescents (18,20). In our study, such a relation was found in single variant analysis, but not in multivariate analysis. Similar results were obtained previously in a few other studies (11,14,19). Since there are other sedentary behaviors in addition to watching TV and using the computer, these behaviors may not be found to be related to physical activity level.

Limitations

One of the limitations of our study was that physical activity levels of students were measured based on their own reports. Therefore, it may not reflect the actual frequency.

There are also studies showing that physical activity level shows seasonal variability (41). In a study performed in children attending the elementary school in Cyprus, it was found that children living in rural areas were more active in summer months and children living in urban areas were more active in winter months (41). Since our study was performed in May, it may be predicted that seasonal effect would be minimal.

Conclusion

The results of this study are important in terms of showing that physical activity levels of adolescents living in our country are inadequate and eating habits of adolescents and time spent with friends are related to physical

activity level. Efficient health protection and improvement programmes should specifically focus on girls and older adolescents and eating habits of adolescents should be emphasized. It should be kept in mind that peers can play a significant role in increasing physical activity level of adolescents.

Conflict of interest:None declared.

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