

## Original Research Article

# Evaluation of the relationship between adolescents' nutritional habits and school achievements

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## ABSTRACT

**Background:** This research was performed for the purpose of evaluating the relationship between adolescents' nutritional habits and school achievements.

**Methods:** This is a cross-sectional study and it was performed with the participation of adolescents. Research sample was composed of a total of 1,651 students selected via cluster sampling method from six high-schools and their equivalents chosen through simple random sampling in a manner to ensure that each high school type was represented in the sample from 46 high-schools.

**Results:** The mean of students' school achievement scores is  $72.95 \pm 12.28$ . As per analysis of the correlation between means of scores obtained by students from nutrition exercise behavior scale (NEBS) sub-scales and means of students' school achievement scores, it was found that students' school achievement was positively correlated with sub-scales of healthy nutrition-exercise behavior and regularity of meal patterns.

**Conclusions:** It was ascertained that, as scores obtained by students from NEBS increased, students' school achievement scores went up. It is recommended that, through the cooperation to be established between health professionals, school staff and family, adolescents should be enticed to acquire the healthy food selection autonomy and to make it a part of their lifestyles as of early age.

**Keywords:** Adolescent, Nutritional habits, School achievement

## INTRODUCTION

The developmental stage covering 10-19 years of age is adopted as the adolescence period by the World Health Organization.<sup>1</sup> Across the world, there exist 1.2 billion adolescents and approximately 90% of all these adolescents live in low or middle-income countries.<sup>1,2</sup> 16% of Turkey's entire population is composed of adolescents.<sup>3</sup> Adolescence period is a stage in which physical development and up-growth of human beings get accelerated. Acquiring the habit of having sufficient and balanced diet in this period is a matter of particular importance.<sup>4</sup> Healthful nutrition is an integral part of

healthy lifestyle and it is essential to acquire healthful nutritional habits.<sup>5</sup> Nutritional behaviors which are physiological in the childhood period by nature are transformed in adolescence period into behaviors which are learned and consciously controlled.<sup>6</sup> Unhealthy nutritional habits of adolescence period are primarily characterized by factors such as having meals irregularly especially missing the breakfast, having snacks in-between meals, eating out, consuming fast-food, having saccharine and carbonated food.<sup>7-9</sup> Therefore, acquiring a healthy nutritional habit is of importance to the avoidance of problems (obesity, anemia, cardiovascular diseases, development of insulin resistance, fall in school

achievement, delay in development and growth) which are likely to come to the forefront. Nutrition directly affects the brain development, and this effect plays a crucial role in the determination of school achievement.<sup>10,11</sup> It is argued that factors such as the consumption of fast-food, insufficient nutrition intake especially the iron deficiency, having highly fatty and starchy foods and overconsumption of sweets are associated with low levels of school achievement.<sup>11,12</sup>

Particularly the breakfast has a considerable effect on cognitive functions and learning. In the study performed by Kim et al it was ascertained that factors such as healthy nutrition, physical activity and high education level of parents were positively associated with high levels of school achievement.<sup>11</sup> In the study conducted by Correa-Burrows et al it was found that healthy nutrition was positively correlated with success in mathematics and language.<sup>12</sup>

That adolescents acquire right and healthy nutritional habits and have sufficient and balanced diets is a quite crucial step towards the establishment of foundations of a healthful society. An increase in adolescents' unhealthy nutritional behaviors and the corresponding prevalence of obesity is observed all over the world. As a consequence of unhealthy nourishment, the probability of having various diseases goes up while the school achievement goes down.<sup>4,10</sup> This research was carried out for the purpose of evaluating the relationship between adolescents' nutritional habits and school achievements.

## METHODS

This is a cross-sectional study, and it was performed with the participation of adolescents enrolled at the 9<sup>th</sup>-11<sup>th</sup> grades of high schools located in provincial center of Malatya, Turkey. There exist 46 high-schools and their equivalents at the province center where the research was carried out.

### *Sample technique*

Study sample was composed of a total of 4,018 students selected via cluster sampling method from six high-schools and their equivalents chosen through simple random sampling in a manner to ensure that each high school type was represented in the sample from 46 high-schools and their equivalents affiliated with Provincial Directorate of the Ministry of National Education of Turkey in Malatya. As the 12<sup>th</sup> grade students were on leave for the purpose of getting prepared for the university matriculation exam when the research was performed, the 12<sup>th</sup> grade students were not included in the research.

### *Sample size*

The minimum size for the research sample was designated as 1,651 participants in the context of the analysis performed via G-power 3.1.9.2 software ( $\alpha=0.05$ , 1-

$\beta=0.80$ ). As the data collection tool, a survey form prepared by researchers and NEBS were utilized.

### *Study inclusion criteria*

The study included patients between 14 and 18 years, being native speaker students of Turkish, and having no communication problem.

### *Survey form*

It contains a total of 10 questions, eight of which address participants' socio-demographic characteristics and 2 of which are intended for evaluating participants' school achievements.

Data on students' academic achievements were generated on the basis of the weighted mean of grades on student's report cards and adolescent's self-perception.

### *Nutrition exercise behavior scale (NEBS)*

The validation and reliability of the scale intended for enabling health professionals to take initiatives and to provide adolescents with guidance on the basis of evaluations to be made on nutrition and exercise behaviors of adolescents were tested by Yurt in 2008, and it was demonstrated that the scale could be employed by health professionals interested in analyzing adolescents' nutrition and exercise behaviors.<sup>13</sup>

### *Calculation of scale scores*

NEBS is a 5-point Likert type scale composed of 45 items and four sub-scales (psychological eating behavior, healthy nutrition-exercise behavior, unhealthy nutrition-exercise behavior and regularity of meal patterns). It is evaluated on the basis of lower and upper limits of scores obtained from its sub-scales. The sub-scale of psychological eating behavior is comprised of 11 items. Its scores range between 11-55 points. High scores indicate the existence of psychological eating behaviors. The sub-scale of healthy nutrition-exercise behavior includes 14 items. Its scores range between 14-70 points. High scores signify the existence of healthy nutrition and exercise behaviors. The sub-scale of unhealthy nutrition-exercise behavior contains 14 items. Its scores range between 14-70 points. High scores suggest the existence of unhealthy nutrition and exercise behaviors.

The sub-scale of regularity of meal patterns is composed of 6 items. Its scores range between 6-30 points. High scores imply the regularity of meal patterns whereas low scores point to irregular meal patterns. Cronbach's Alfa coefficient for the scale was ascertained as 0.85 whereas it was found to be 0.86 for this research.<sup>13</sup>

Research data were collected in 20 minutes on average through the application of survey form and NEBS with face-to-face interview technique by the research team

during guidance hours upon receiving the necessary permit from guidance teacher.

### **Ethical aspect of the research**

Permit for the research was received from ethics committee of Malatya Province and the Provincial Directorate of the Ministry of National Education of Turkey in Malatya. Moreover, permit was obtained from principals of high schools where the research would be undertaken. The principle of 'respect for autonomy' was assured by providing participants with information on research objective and plan and as to where findings to be obtained along with the research would be used, the 'privacy and protection of privacy' principle was satisfied by ensuring participants that the confidentiality of data to be collected would be respected, and the satisfaction of 'respect for human dignity' and 'volunteerism' principle was guaranteed by including in the research only those interested in participating in it on a voluntary basis.

### **Evaluation of data**

Data obtained in the context of the research were evaluated through computer. Frequencies, percentages and means were utilized in the analysis of data. After Kolmogorov-Smirnov test, independent samples t-test and analysis of variance (ANOVA) were used when the dependent variable was normally distributed, and Kruskal-Wallis test was used when the dependent variable was not normally distributed, and also correlation analysis was employed. For all data to be statistically analyzed, the significance level was set at 5% ( $p < 0.05$ ).

### **Limitations**

The limitation of the research pertains to that findings obtained as a consequence of the research were based on students' own statements. Results obtained along with this research can be generalized only to the population of this research.

## **RESULTS**

The comparison of descriptive characteristics of students participating in the research and means of students' nutrition and exercise scores was displayed in Table 1. Upon the review of Table 1, it was discerned that there was a statistically significant relationship between the sub-scale of psychological eating behavior and education level of students' parents ( $p < 0.05$ ), on the other hand, there was no statistically significant relationship between the sub-scale of psychological eating behavior and students' age, gender, family income level, grade year, family structure and mode of transportation to the school ( $p < 0.05$ ).

Besides, it was discerned that there was a statistically significant relationship between the sub-scale of healthy nutrition-exercise behavior and students' gender and family structure ( $p < 0.05$ ), however, there was no

statistically significant relationship between the sub-scale of healthy nutrition-exercise behavior and students' other descriptive characteristics ( $p < 0.05$ ). Furthermore, it was found that there was a statistically significant relationship between the sub-scale of unhealthy nutrition-exercise behavior and students' gender, education level of their parents and family income level ( $p < 0.05$ ), nevertheless, there was no statistically significant relationship between the sub-scale of unhealthy nutrition-exercise behavior and students' other descriptive characteristics ( $p < 0.05$ ). Moreover, it was observed that there was a statistically significant relationship between the sub-scale of regularity of meal patterns and students' age, gender, grade year, family structure and family income level ( $p < 0.05$ ) whereas there was no statistically significant relationship between the sub-scale of regularity of meal patterns and students' other descriptive characteristics ( $p < 0.05$ ). Additionally, of students participating in the research, 40.6% reported that they were aged 15 years and below, 53.5% stated that they were females and 43.6% noted that they were the 9<sup>th</sup> grade students. It was found that 86.4% were members of nuclear family, 54.8% had mothers who were elementary school graduates, 30.5% had fathers holding university degrees, 63.1% were from middle income families and 48.3% took shuttle service to commute between school and home (Table 1).

The comparison of descriptive characteristics of students participating in the research and means of students' school achievement scores was shown in Table 2. Upon the examination of Table 2, it was discerned that there was a statistically significant relationship between students' school achievement scores and students' age, gender, grade year, family structure, mode of transportation to the school and education level of their parents ( $p < 0.05$ ), on the other hand, there was no statistically significant relationship between students' school achievement scores and students' family income levels ( $p > 0.05$ ). Moreover, it was ascertained that students who were aged 17 years and above, females, enrolled at the 11<sup>th</sup> grade, members of nuclear family, had parents holding university degrees, had high levels of family income and took shuttle service to commute between school and home had higher means of academic achievement scores.

The mean of scores for students' school achievement is  $72.95 \pm 12.28$  (min. 32, max. 100). It was found that students' school achievement scores went up as scores obtained by them from NEBS increased. As per analysis of the correlation between means of scores obtained by students from NEBS sub-scales and means of students' school achievement scores, it was discerned that students' school achievement was positively correlated with sub-scales of healthy nutrition-exercise behavior and regularity of meal patterns ( $r = 0.057$ ,  $p < 0.05$ ;  $r = 0.139$ ,  $p < 0.05$ ) whilst there was no statistically significant relationship between students' school achievements and their psychological eating behaviors and unhealthy nutrition-exercise behaviors ( $r = 0.027$ ,  $p > 0.05$ ;  $r = -0.045$ ,  $p < 0.05$ ) (Table 3).

**Table 1: Comparison of descriptive characteristics of students participating in the research and means of students' nutrition and exercise scores.**

Features		Psychological eating	Healthy eating	Unhealthy eating	Regular meals
		X±SD	X±SD	X±SD	X±SD
<b>Age (in years)</b>					
15 and under	670 (40.6)	29.47±9.50	45.90±9.27	38.52±8.73	22.25±5.01
16 old	593 (35.9)	29.89±9.24	45.06±10.01	38.92±8.90	21.89±5.40
17 and over	388 (23.5)	30.37±8.88	44.54±9.40	39.38±8.53	21.12±5.15
Test and significance		F: 1.186, p: 0.306	F: 2.719, p: 0.066	F: 1.223, p: 0.295	F: 5.849, p: 0.003
<b>Gender</b>					
Girl	883 (53.5)	29.66±9.72	44.03±9.72	37.88±8.48	21.16±5.30
Male	768 (46.5)	30.03±8.72	46.72±9.22	40.00±8.91	22.66±4.97
Test and significance		t: -0.805, p: 0.421	t: -5.742, p: 0.000	t: -4.935, p: 0.000	t: -5.879, p: 0.000
<b>Class</b>					
9th grade	720 (43.6)	29.56±9.29	45.83±9.68	38.77±8.79	22.31±5.02
10th grade	588 (35.6)	29.65±9.45	45.04±9.56	38.73±8.98	21.71±5.38
11th grade	343 (20.8)	30.73±8.85	44.54±9.37	39.29±8.24	21.14±5.18
Test and significance		F: 2.055, p: 0.128	F: 2.386 p: 0.092	F: 0.520 p: 0.595	F: 6.298, p: 0.002
<b>Family structure</b>					
Nuclear family	1426 (86.4)	29.89±9.31	45.28±9.51	38.91±8.75	21.98±5.17
Extended family	195 (11.8)	29.18±8.95	45.92±9.30	38.58±8.57	21.65±4.94
Fragmented family	30 (1.8)	31.20±9.29	41.26±13.31	38.63±9.82	17.50±6.25
Test and significance		F: 2.055, p: 0.432	F: 3.082, p: 0.046	F: 0.128, p: 0.880	F: 11.191, p: 0.000
<b>Mother education (n: 1639)</b>					
Illiterate	117 (7.1)	27.85±9.33	45.06±9.65	36.76±9.24	21.91±4.81
Primary education	904 (54.8)	29.15±8.98	44.87±9.89	38.60±8.50	21.82±5.20
High school	353 (21.4)	30.83±9.49	46.36±9.05	39.66±9.19	21.97±5.23
University	265 (16.1)	31.78±9.41	45.18±9.12	39.67±8.53	21.87±5.33
Test and significance		F: 8.805, p: 0.000	F: 2.060, p: 0.104	F: 4.284, p: 0.005	F: 0.079, p: 0.971
<b>Father education (n: 1614)</b>					
Illiterate	20 (1.2)	28.05±9.17	42.90±9.86	33.20±6.97	22.80±3.59
Primary education	664 (40.2)	28.77±8.83	45.01±9.68	38.21±8.69	21.79±5.10
High school	426 (25.8)	29.76±9.29	45.21±9.71	39.23±8.69	21.48±5.24
University	504 (30.5)	31.44±9.67	45.78±9.25	39.63±8.83	22.31±5.28
Test and significance		KW: 26.63, p: 0.001	KW: 3.78, p: 0.286	KW: 16.52, p: 0.001	KW: 7.55, p: 0.056
<b>Family income</b>					
Good	582 (35.3)	30.47±9.86	45.97±9.60	39.89±9.06	21.80±5.58
Middle	1042(63.1)	29.50±8.91	44.95±9.58	38.37±8.54	21.97±4.94
Bad	27 (1.6)	29.03±9.07	43.33±8.57	36.03±7.44	18.70±5.77
Test and significance		KW: 4.208, p: 0.122	KW: 5.795, p: 0.055	KW: 14.574, p: 0.001	KW: 8.746, p: 0.013
<b>How to go to school</b>					
On foot	456 (27.6)	29.26±8.80	45.14±9.40	38.45±8.76	21.58±5.09
Bicycling	23 (1.4)	32.00±8.62	49.26±10.18	40.08±7.59	21.17±6.45
With school bus	798 (48.3)	30.25±9.63	45.51±9.42	38.89±8.74	21.94±5.29
By bus	325 (19.7)	29.24±8.84	44.88±10.07	39.05±8.52	22.09±4.99
With car	49 (3.0)	31.28±10.17	43.59±10.06	40.48±10.53	21.83±5.55

Continued.

Features	Psychological eating	Healthy eating	Unhealthy eating	Regular meals
	X±SD	X±SD	X±SD	X±SD
Test and significance	KW: 6.395, p: 0.171	KW: 6.904, p: 0.141	KW: 3.688, p: 0.450	KW: 2.442, p: 0.655

F: ANOVA, KW: Kruskal Wallis test, t: t test in independent groups

**Table 2: Comparison of descriptive characteristics of students participating in the research and means of students' school achievement scores.**

Features	N (%)	School success [mean (SD)]	Test and significance
<b>Age (in years)</b>			
15 and under	670 (40.6)	73.12±11.29	F: 4.303 p: 0.014
16 old	593 (35.9)	71.92±12.80	
17 and over	388 (23.5)	74.24±12.96	
<b>Gender</b>			
Girl	883 (53.5)	73.90±11.99	t: 3.385 p: 0.001
Male	768 (46.5)	71.86±12.51	
<b>Class</b>			
9th grade	720 (43.6)	72.46±11.64	F: 39.095 p: 0.000
10th grade	588 (35.6)	70.71±13.14	
11th grade	343 (20.8)	77.82±10.64	
<b>Family structure</b>			
Nuclear family	1426 (86.4)	73.36±12.09	F: 5.965 p: 0.003
Extended family	195 (11.8)	70.31±12.44	
Fragmented family	30 (1.8)	70.45±17.30	
<b>Mother education (n:1639)</b>			
Illiterate	117 (7.1)	69.66±12.28	F: 32.336 p: 0.000
Primary education	904 (54.8)	71.48±12.00	
High school	353 (21.4)	72.77±12.97	
University	265 (16.1)	79.27±9.90	
<b>Father education (n:1614)</b>			
Illiterate	20 (1.2)	73.70±14.15	KW: 116.418 p: 0.001
Primary education	664 (40.2)	70.53±11.87	
High school	426 (25.8)	71.13±12.53	
University	504 (30.5)	77.62±11.12	
<b>Family income</b>			
Good	582 (35.3)	73.56±12.15	KW: 13.832 p: 0.243
Middle	1042 (63.1)	72.66±12.29	
Bad	27 (1.6)	70.98±14.40	
<b>How to go to school</b>			
On foot	456 (27.6)	68.41±13.60	KW: 131.863 p: 0.001
Bicycling	23 (1.4)	72.69±12.29	
With school bus	798 (48.3)	76.58±10.18	
By bus	325 (19.7)	70.65±12.03	
With car	49 (3.0)	71.46±14.40	

**Table 3: The comparison of students' nutrition-exercise behaviors and school achievements (n=1651).**

NEBS					
School success	Psychological eating	Healthy eating	Unhealthy eating	Regular meals	Total
r:	0.027	0.057	-0.045	0.139	0.570
p:	0.273	0.021	0.066	0.001	0.470

## DISCUSSION

Students' academic achievement is a matter of particular importance to both students and their parents in Turkey as academic achievement is directly related to entrance to the university and future employment opportunities. In this part of the study, findings which were obtained through the current research performed for identifying nutrition-exercise behaviors and school achievements of adolescents living in eastern Turkey were discussed with respect to the relevant literature.

In the current research, it was found that there was a statistically significant relationship between students' ages and grade years and the mean of scores obtained from NEBS sub-scale of regularity of meal patterns. It was discerned that students at a relatively young age had more regular meal patterns. In contrast to the current research, it was indicated in the study by Akan that there was no statistically significant relationship between the age and regularity of meal patterns of students.<sup>14</sup> In the study by Kalay and Türkmen, it was demonstrated that there was a statistically significant relationship between the age of students and their psychological eating behaviors and unhealthy nutrition-exercise behaviors.<sup>15</sup> Kalay and Türkmen argued that, as secondary school students grew older, their healthy nutrition-exercise behaviors were negatively affected, and Demirezen and Coşansu suggested that, together with the age, adolescents' nutritional risk levels went up.<sup>16</sup> Aksoydan and Çakır stated that, as students' grade year went up, students' frequency of having food at school cafeteria fell down and their consumption of fast-food increased.<sup>17</sup> In a similar vein to the current research, it was ascertained in studies in the literature that students at a relatively young age had more regular meal patterns. It is thought that this situation arises from the fact that families continue to check the regularity of meal patterns of students who are at relatively young age, however, as students grow older, they develop habits of eating with friends, consuming fast-food and missing meals.

In the current research, it was discerned that there was a statistically significant difference between the gender of students and means of their scores from NEBS sub-scales of healthy nutrition-exercise behavior, unhealthy nutrition-exercise behavior and regularity of meal patterns. Moreover, it was ascertained that male students were more healthful and had more regular meal patterns than female students. In a similar vein to the current research, there exist studies in the literature alleging that males had healthier diets than females.<sup>15,16</sup> On the other hand, in contrast to the current research, there are studies in the literature asserting that females had healthier diets.<sup>14,18</sup>

In the current research, it was demonstrated that there was a statistically significant difference between the family structure of students and means of their scores from NEBS sub-scales of healthy nutrition-exercise behavior and regularity of meal patterns. It was found that students from

broken families had less healthy diets and less regular meal patterns. In the study by Akan, it was exhibited that there was no statistically significant difference between students' family structures and means of their scores from NEBS sub-scales of healthy nutrition-exercise behavior, unhealthy nutrition-exercise behavior and regularity of meal patterns, however, in a similar vein to the current research, students from broken families obtained low scores from all NEBS sub-scales.<sup>14</sup>

In the current research, it was indicated that there was a statistically significant difference between the education level of students' parents and means of their scores from NEBS sub-scales of psychological eating behavior and unhealthy nutrition-exercise behavior. It was observed that, as the education level of students' parents went up, students' scores from NEBS sub-scales of psychological eating behavior and unhealthy nutrition-exercise behavior increased. In the study by Akan, it was argued that there was a statistically significant difference between the education level of students' mothers and means of students' scores from NEBS sub-scales of unhealthy nutrition-exercise behavior and regularity of meal patterns, besides, there was a statistically significant difference between the education level of students' fathers and means of students' scores from NEBS sub-scale of regularity of meal patterns. Martins et al suggested that obesity was more common among students whose parents had high education levels.<sup>14,19</sup>

In the study by Akman et al it was reported that the increase in the education level of adolescents' mothers affected adolescents' nutritional habits, in this respect, it negatively influenced fruit consumption of adolescents whereas it had the impact of reducing tea consumption by adolescents.<sup>10</sup> In case-control studies by Uskun et al it was indicated that there was no statistically significant relationship between the education level of students' mothers and obesity while, in studies by Daştan et al the education level of students' mothers was negatively associated with obesity.<sup>20,21</sup> It is believed that divergences in results of studies are likely to arise from socio-cultural and regional differences of societal groups on which these studies were performed.

In the current research, it was found that there was a statistically significant difference between the income level of students' families and means of their scores from NEBS sub-scales of unhealthy nutrition-exercise behavior and regularity of meal patterns. It was ascertained that students from low-income families had less healthful nourishment and less regular meal patterns (Table 1).

In the study by Kalay and Türkmen, it was demonstrated that there was a statistically significant relationship between the income level of students' families and their healthy nutrition-exercise behavior and unhealthy nutrition-exercise behavior, and students from families with low income levels had less healthy and less regular meal patterns.<sup>15</sup>

In the current research, it was found that there was a statistically significant relationship between the age and grade year of students and their school achievements. In this regard, it was observed that those aged 17 years and above and those enrolled at the 11<sup>th</sup> grade had higher levels of academic achievement. In a similar vein to the current research, in the study performed by Kim et al on 359,264 students, it was suggested that there was a statistically significant relationship between the age of students and their school performance.<sup>11</sup> It is considered that the increase in academic performance along with the age can be associated with the fact that, in order to enter universities, students are supposed to participate in a national matriculation exam in the last year of high school in the education system of Turkey.

In the current research, it was ascertained that there was a statistically significant relationship between the gender of students and their school achievements. In this context, it was discerned that female adolescents had higher levels of academic achievement. In a similar vein to the current research, in the study carried out by Arora in India, it was argued that there was a statistically significant relationship between the gender and academic achievement, and female students were more successful.<sup>22</sup> In the study performed by Kang and Park on Korean adolescents, it was indicated that females had higher school achievement scores than males.<sup>23</sup> Unlike the current research, in the study conducted by Burrows et al in Chile, it was exhibited that there was no statistically significant relationship between gender and success in language course whereas there was a statistically significant relationship between gender and success in math course, besides, male students were more successful than females in both courses.<sup>24</sup> In the study carried out by Kim et al it was asserted that there was a statistically significant relationship between the gender and school performance, and male students were more successful than female students.<sup>11</sup> In the study performed by Çınar and Temelli on university students, it was alleged that there was no statistically significant relationship between the gender of students and their academic achievements.<sup>25</sup>

In the current research, it was found that there was a statistically significant relationship between the family structure of students and their school achievements. In this sense, it was identified that students from nuclear families had higher levels of academic achievement.

In the current research, it was found that there was a statistically significant relationship between the education level of students' parents and their school achievements. In this conjunction, it was observed that students whose parents held university degrees had higher levels of academic achievement. Under the meta-analysis conducted by Sarier to examine factors influencing academic achievements of students in Turkey, 62 studies were analyzed. In this framework, it was discerned that the effect of familial factors (socio-economic level, education level of parents and so on.) on students' academic

achievements was low.<sup>26</sup> In a study conducted in Germany, it was demonstrated that there was a statistically significant relationship between education levels of adolescents' mothers and adolescents' academic achievements whilst education levels of their fathers had no association with their academic achievements.<sup>27</sup> In a similar vein to the current research, it was indicated in other studies in the literature that there was a statistically significant relationship between education levels of parents and students' academic achievements.<sup>10</sup>

In the current research, it was indicated that there was a statistically significant relationship between students' modes of transportation to school and their school achievements. It was found that students commuting between school and home by means of shuttle service had higher levels of school achievement. It is thought that this situation emanates from that commuting between school and home by means of shuttle service enables students to arrive at school more safely and comfortably and motivates them to be more successful at school (Table 2).

In the current research, it was discerned that there was a statistically significant positive relationship between means of scores obtained by adolescents from NEBS subscales of healthy nutrition-exercise behavior and regularity of meal patterns and means of their school achievement scores. It was ascertained that, as means of adolescents' scores of healthy nutrition-exercise behavior and regularity of meal patterns went up, their school achievements were enhanced. In a similar vein to the current research, it was found in studies in literature that healthy nutrition and diet quality had statistically significant positive association with academic achievement.<sup>28-31</sup> It was observed that, as diet quality (consumption of diverse nutrition groups, fruit, vegetable and so on) was enhanced, academic achievement was also promoted.<sup>32-36</sup>

In the study conducted by Overby and Hoigaard in Norway, it was demonstrated that students having breakfast for five week days on a regular basis had low levels of behavioral disorders and were well-adapted to their studies.<sup>33</sup>

In the experimental study carried out by Defeyter and Russo in the UK, the relationship between having healthy breakfast and adolescents' cognitive performance and cognitive load was analyzed. It was exhibited that adolescents in the experimental group who had healthy breakfast had enhanced cognitive performance in terms of cognitive load, memory, attention and executive functions.<sup>37</sup> In the study carried out by Stea and Torstveit, it was indicated that the success rate of adolescents having their meals on a regular basis, consuming healthy food (fruit, vegetable and so on) and doing physical exercises went up whereas the success rate of adolescents consuming unhealthy foods and beverages and smoking went down.<sup>36</sup> In the study performed by Valladares et al on university students in Chile, it was stated that there was a

statistically significant positive relationship between students' eating behaviors and their academic performances.<sup>38</sup> In the study carried out by Faught et al in Canada, it was asserted that the increase in consumption of vegetables, pulses and fruits by those in early adolescence period (adolescents aged 11-15 years) and having more regular and healthy nutritional habits were positively associated with higher academic achievements.<sup>39</sup>

In the study conducted by Kang and Park on Korean adolescents, it was argued that adolescents who missed breakfast and were overweight had unsatisfactory academic achievements.<sup>23</sup> In the study performed by Sinurat et al on students aged 12-15 years in Indonesia, it was alleged that there was a statistically significant relationship between having healthy diet and normal body weight by students and total values of their report cards and their academic achievements in math (Table 3).<sup>40</sup>

These results in the literature complement findings of the current research. Nevertheless, it is necessary to take into consideration the fact that these studies were performed on different age groups and that scales which were utilized for the assessment of students' academic achievements and nutritional status were not identical.

## CONCLUSION

In the current research, it was found that there was a statistically significant relationship between students' socio-demographic characteristics (age, gender, grade year, and education level of parents and income level of family) and NEBS sub-scales. It was ascertained that there was a statistically significant positive relationship between means of students' scores from NEBS sub-scales of healthy nutrition-exercise behavior and regularity of meal patterns and means of their school achievement scores, and, as means of scores obtained by students from NEBS increased, students' school achievement scores went up.

## Recommendations

It should be assured that, through the cooperation to be established between health professionals, teachers, and school administration and family, adolescents would be enticed to acquire the healthy food selection autonomy and to make it a part of their lifestyles as of early age.

In order to induce adolescents to adopt healthy life behaviors (sufficient and balanced nourishment and physical activity), the awareness of adolescents should be raised via educational programs to be offered through social media and mass communication media.

Nurses should be acquainted with adolescents' health risks and their impacts, and, also by taking into account adolescents' socio-demographic characteristics affecting their nutrition-exercise behaviors, nurses should provide adolescents and their families with consultancy services.

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