

Research Paper:

The Relationship Between Adolescents' Awareness of Non-alcoholic Fatty Liver and Their Health-Promoting Lifestyle



Farahnaz Barmak¹, Marhamat Farahaninia^{1*}, Mehri Bozorgnezhad², Hamid Haghani³

1. Department of Community Health Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences and Health Services, Tehran, Iran.

2. Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran.

3. Department of Biostatistics, School of Public Health, Iran University of Medical Sciences, Tehran, Iran.



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ABSTRACT

Background: Lifestyle modification is recognized as the first step of fatty liver treatment. This study was done to determine the relationship between the awareness of the Non-Alcoholic Fatty Liver Disease (NAFLD) and adolescents' health-promoting lifestyle in senior high school students in the west of Tehran, Iran.

Methods: This descriptive-correlational study was performed on 338 high school students in 2020. The students were recruited by cluster sampling method. The data were collected by demographic information form, awareness of non-alcoholic fatty liver questionnaire, and Health-Promoting Lifestyle Profile II (HPLPII) and were expressed using frequency, mean, standard deviation, and analyzed by inferential statistical tests of ANOVA, Chi-square, independent t-test, and Pearson correlation coefficient using SPSS 20.

Results: The results showed that the highest Mean±SD of health-promoting lifestyle was related to spiritual growth and self-actualization dimension (27.41±5.53) and the lowest Mean±SD was related to the dimension of physical activity (19.71±6.63). There was a significant relationship between awareness of NAFLD and the health responsibility subscale of HPLP (P=0.004). Awareness of NAFLD had a direct relationship with the father's education (P=0.004). The health-promoting lifestyle was positively related to students' grade (P<0.001), birth order (P=0.019), economic status (P<0.001), number of children (P=0.037), and living with parents (P=0.031), and negatively associated with the students' age (P=0.014).

Conclusion: The significant relationship between knowledge about fatty liver and health responsibility indicates the need to increase students' awareness of this disease to improve a health-promoting lifestyle. Therefore, it is suggested that educational interventions be provided at different levels of prevention to empower students.

* Corresponding Author:

Marhamat Farahaninia, MSc.

Address: Department of Community Health Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences and Health Services, Tehran, Iran.

Tel: +98 (21) 43651800

E-mail: farahaninia.m@iums.ac.ir

Highlights

- Chronic diseases that pose a major threat to health, are often the result of poor lifestyle and cost the health care system dearly.
- Although adolescents and their health raise an extensively vital problem, studies on non-alcoholic fatty liver disease in adolescents have received little attention.
- The results of this study showed that the highest mean of health-promoting lifestyle was related to spiritual growth and self-actualization dimension and the lowest mean was related to the dimension of physical activity.
- There was a significant relationship between awareness of non-alcoholic fatty liver and the health responsibility of the students.

Plain Language Summary

Non-alcoholic fatty liver as one of the most prevalent chronic diseases is a silent and benign disease, which is preventable. It has been shown that improper lifestyle is responsible for most of the causes of chronic diseases and mortality. A health-promoting lifestyle is a process an individual pursues consciously to promote his/her health. This study discusses the relationship between awareness of non-alcoholic fatty liver disease and health-promoting lifestyle in secondary high school adolescents in the west of Tehran. The results showed that the spiritual growth and self-actualization dimensions of health-promoting lifestyle had the highest and the physical activity had the lowest score. Furthermore, the results revealed a significant relationship between awareness of the non-alcoholic fatty liver disease and health responsibility.

1. Introduction

Chronic diseases are the major threats to health and sources of healthcare costs (Riegel et al. 2018). Non-Alcoholic Fatty Liver Disease (NAFLD) is one of the most prevalent chronic diseases in developed and developing countries (Paknahad & Zeraei-Bidgoli 2013; Shen et al. 2014; Zolfaghari et al. 2016); however, it is preventable (Ghevariya et al. 2014). Although the disease is silent and benign, it can lead to more advanced stages, like fibrosis, cirrhosis, liver transplant, and even death (Alavian 2012). The major established risk factors for NAFLD are obesity, insulin resistance, dyslipidemia (Perdomo, Frühbeck & Perdomo 2019; Younossi 2019), an increase in calorie intake/poor diet, and lack of physical activity/exercise (Hallsworth, Avery & Trenell 2016). The prevalence of NAFLD is 8-45% throughout the world (Perdomo, Frühbeck & Perdomo 2019) while being reported at 27% in Asia (Younossi et al. 2016). The incidence of this disease ranges from 2.9 to 7.1% in the general population of Iran (Lankarani et al. 2013), while it has been estimated at 27.88% among Iranian adolescents and children (Salehi Sahlabadi et al. 2018). The disease afflicts 20 out of 100000 individuals per year and the peak of the disease is in the 6th decade of

life and is more common in males (Tsuneto et al. 2010). The economic load linked to the NAFLD epidemic will be increasing since societies are gradually influenced by this global problem of general health (Allen et al. 2018). The economic load impacts of this disease approximate \$103 million in the USA and €35 billion in England, Germany, France, and Italy (Neuschwander-Tetri 2017). There is now no medicine for the treatment of this illness. Lifestyle modifications, such as dietary adjustments and increased physical activity, are the first treatment options (Chalasanani et al. 2018; Vos et al. 2017).

The increasing prevalence of chronic diseases has led countries to pay more attention to related lifestyle behaviors because chronic diseases are the outcome of improper lifestyles (Baum & Fisher 2014). Lifestyle is a unique pattern of characteristics, behaviors, and habits that each person shows. The World Health Organization defines lifestyle as specific and definable patterns of behavior that result from the interaction between personal characteristics, social relationships, environmental conditions, and socioeconomic status (Mohammadbeigi et al. 2016).

Statistics show that 70% of the diseases and 53% of mortality in the world are due to inappropriate lifestyles (Kalroozi et al. 2015). Health-promoting lifestyle as a

process that is consciously performed by a person with the aim of promoting his/her health (Chuang et al. 2016), has a significant impact on reducing health costs, increasing people's life expectancy, and improving their quality of life (Kurnat-Thoma et al. 2017).

Lifestyle changes in the last decade have led to an increase in obesity in society as a whole and adolescents have been no exception (Salehisahlabadi et al. 2018). Studies have shown that adolescents, despite having the highest population incidence, have paid little attention to health care (Mohammadian et al. 2013). Lifestyle modification, with emphasis on proper eating habits and increased physical activity, can lead to weight loss and reduced fatty liver disease (Zou et al. 2018).

Eastern Mediterranean research also indicates the prevalence of non-communicable diseases in adolescents. Therefore, it is necessary for health care providers, education officials, and policymakers in this field to collect accurate information from adolescents about their health-related lifestyles to design and develop health promotion strategies (Molaeifard, Mohamadian, & Haghighi Zadeh 2018).

Understanding adolescent health behaviors, especially their awareness of health-promoting behaviors is important for health-related interventions because their behaviors and decision-making processes are learned and sustained over time (Schnall, Okoniewski & Tiase 2013). Studies on NAFLD in adolescents in South Asia have received little attention (Shaman et al. 2017), and most of the studies are from Western countries (Anderson et al. 2015).

Given the lifestyle changes, the lack of studies on the lifestyle of people with NAFLD, and the declining age of the prevalence of fatty liver, awareness of a health-promoting lifestyle can provide valuable information to improve adolescents' healthy lifestyles and assist in planning appropriate interventions to prevent chronic diseases, especially fatty liver. Therefore, this study was done to determine the relationship between awareness of NAFLD and health-promoting lifestyle among senior high school students of the west of Tehran in 2020.

2. Materials and Methods

It was a descriptive-correlational study. A total of 338 senior high school students of the west of Tehran were recruited by the cluster sampling method. To collect the data, the researchers referred to the General Education Administration of Tehran and received the permit for sampling from west of Tehran (education districts 2, 5 & 6). Then, three public high schools for girls and three public high

schools for boys were selected from each district (for controlling gender differences as confounding factors). In order to collect data, due to COVID-19 and the impossibility of students attending schools, the questionnaires were first linked and this link was approved by the General Directorate of Education and the relevant regions. The researcher referred to the selected schools and after introducing himself and explaining the goals and importance of conducting the research, provided the link of the questionnaires to the school principal or deputy principal. Then, the questionnaires were sent to the students by the school officials through Telegram or WhatsApp groups.

The data were collected by three questionnaires. The first part of the questionnaire assessed basic demographic data. The second and third parts included general awareness of NAFLD and Health-Promoting Lifestyle Profile II (HPLP II).

The demographic questionnaire included the variables of educational level, age, gender, parents' employment, parents' education, birth order, economic status, height, weight, Body Mass Index (BMI), disease history, and residence conditions.

The public awareness questionnaire on NAFLD is a 14-item tool with three choices for each item as "correct", "incorrect" and "I do not know". The correct, incorrect, and I do not know answers are given a score of 1, 0, and 0, respectively. The total score ranges from 0 to 14 and the total score for NAFLD is obtained by summing the number of correct answers. The higher the score, the higher awareness of NAFLD (Ghevariya et al. 2014). The validity and reliability of the Persian version of this questionnaire were first determined in this study. Three judges of the faculty members of the School of Nursing and Midwifery of Iran University of Medical Sciences evaluated this questionnaire to provide their views on its qualitative content validity. The questionnaire was revised after receiving their comments. To determine the reliability of this tool, the researchers used the Kuder-Richardson coefficient, which was estimated to be 0.73.

The (HPLP II) has 52 items and six subscales, including spiritual growth (9 items), health responsibility (9 items), physical activity (8 items), nutrition (9 items), interpersonal relations (9 items), and stress management (8 items). The HPLP (II) is scored on a 4-point Likert scale (never = 1, sometimes = 2, often = 3, and most of the time = 4). The score of each subscale is the sum of the scores given to answers. The total score is obtained from the responses to 52 questions. The maximum and

minimum scores of this scale are 208 and 52, respectively. Higher scores represent a better health-promoting lifestyle (Walker, Sechrist & Pender 1987; Pender et al. 2015).

Mohammadi Zeidi, Pakpuor Hajiagha and Mohammadi Zeidi (2012) examined the validity and reliability of the Persian version of and estimated the Cronbach's alpha coefficient of 0.82 for the whole scale and 0.64-0.91 for the subscales. In the current study, Cronbach's alpha coefficient was calculated at 0.82 for the whole scale and 0.68-0.79 for the subscales. Data were described by frequency, mean, standard deviation, maximum, and minimum and were analyzed by the ANOVA, Chi-square, independent t-test, and Pearson correlation coefficient in SPSS 20.

3. Results

The students' age ranged from 15-18 years (16.7 ± 0.96 years) and most of them were males (53.8%). Their average BMI was 23.17 ± 4.54 kg/m². Also, 39.3% of them were studying in grade 12 and 57.4% were the first child.

The economic status of 72.7% of the subjects was at an average level and most of them (80.2%) did not have any underlying diseases. Besides, 66.6% possessed private houses, and they were mostly (92.6%) living with both parents. The educational level of 31.7% of the subjects' fathers and 39.6% of their mothers was a diploma. Furthermore, 43.4% of the fathers were self-employed, and 65.9% of the mothers were housewives. The Mean \pm SD score of the students' awareness was 8.52 ± 3.18 , slightly larger than the median (7) of the instrument (Table 1).

The Mean \pm SD score of health-promoting lifestyle was 140 ± 26.66 , being larger than the median. The students received a maximum mean score in the spiritual growth and self-actualization dimension (68.2) and a minimum mean score in the physical activity dimension of HPLP (II) (48.81) (Table 2). Only the health responsibility dimension of the health-promoting lifestyle was positively correlated with awareness. Put differently, with an increase in awareness, health responsibility ascended, as well (Table 3).

There was merely a statistically significant correlation between awareness of NAFLD and the educational

Table 1. Frequency distribution of awareness of non-alcoholic fatty liver among the students

Awareness		No. (%)		
		Yes	No	I Do Not Know
1. In your opinion, which one of the below cases can lead to cirrhosis?	Hepatitis A & B infections	58(17.2)	21(6.2)	259(76.6)
	Fatty liver	149(44.1)	16(4.7)	173(51.2)
	Obesity	279(82.5)	7(2.1)	52(15.4)
2. In your opinion, which one of these conditions can lead to a fatty liver?	Diabetes	116(34.3)	62(18.3)	160(47.3)
	High cholesterol	230(68.0)	17(5.0)	91(26.9)
	Physical inactivity	249(73.7)	11(3.3)	78(23.1)
3. Fatty liver is inherited.		96(28.4)	227(67.2)	15(4.4)
4. Is fatty liver treatable?		237(70.1)	12(3.6)	89(26.3)
5. Fatty liver is preventable.		319(94.4)	7(2.1)	12(3.6)
6. Is fatty liver treatable in the initial stages?		262(77.5)	5(1.5)	71(21.0)
7. How do doctors diagnose a fatty liver?	Liver sonography	157(46.4)	23(6.8)	158(46.7)
	Blood test	222(65.7)	19(5.6)	97(28.7)
	Obesity	106(31.4)	59(17.5)	173(51.2)
8. Do you think the fat in the liver can create a serious health problem?		294(87.0)	5(1.5)	39(11.5)
Total score, mean \pm SD		52.18 \pm 8.3		
Minimum-Maximum		0-14		

Table 2. Mean score of the students' health-promoting lifestyle and its dimensions

Health Promoting Lifestyle & its Dimensions	Minimum	Maximum	Mean±SD	0-100 Basis		
				Minimum	Maximum	Mean±SD
Spiritual growth and self-actualization	9	36	27.41±5.53	0	100	68.2±20.49
Health responsibility	9	36	23.31±6.58	0	100	53.03±24.38
Interpersonal relations	9	36	26.62±5.29	0	100	65.27±19.61
Stress management	8	32	20.04±4.98	0	100	50.2±20.77
Physical activity	8	32	19.71±6.63	0	100	48.81±27.66
Nutrition	9	36	23.99±5.37	0	100	55.53±19.91
Total Health promoting lifestyle	52	208	140.93±26.66	0	100	57.01±17.09

Client- Centered Nursing Care

level of the subjects' fathers ($P=0.004$), such that the pairwise Tukey comparison indicated that the acquired mean score of adolescents whose fathers' educational level was M.A. and above was significantly higher than their counterparts whose fathers' education was diploma ($P=0.002$); however, this difference was not significant at other levels (Table 4).

The health-promoting lifestyle of the students was significantly related to their grades ($P<0.001$), such that the pairwise Tukey comparison revealed that the acquired mean score of grade 12 adolescents was significantly lower than their grade 10 counterparts ($P<0.001$). However, this difference was not significant at other levels. The birth order had also a statistically significant relationship with health-promoting lifestyle ($P=0.019$), such that the average score of students who were the third child in the family was significantly lower than the first children.

Likewise, the mean score of the health-promoting lifestyle of the students living with both parents was significantly higher than those living with one of their parents ($P=0.031$). Finally, age was also significantly correlated with health-promoting lifestyle; i.e., health-promoting lifestyle declined with aging ($P=0.014$) (Table 5).

4. Discussion

This study investigated the relationship between awareness of NAFLD and health-promoting lifestyle among adolescents in senior high schools in the west of Tehran in 2020. The mean awareness of the subjects was higher than the median. Gupta et al. (2019) in their study in India declared that people possess insufficient knowledge and extensively inadequate awareness of this disease (Gupta et al. 2019), the result that is incongruent with the findings of the current study. The reason for this can be

Table 3. Correlation between the students' health-promoting lifestyle and their awareness of the non-alcoholic fatty liver disease

Health-Promoting Lifestyle and its Dimensions	of NAFLD	
	r	P
Spiritual growth and self-actualization	0.06	0.272
Health responsibility	0.156	0.004
Interpersonal relations	0.047	0.387
Stress management	0.006	0.919
Physical activity	0.058	0.287
Nutrition	0.095	0.082
Total health-promoting lifestyle	0.099	0.069

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Table 4. Relationship between the students' characteristics and their awareness of the non-alcoholic fatty liver disease

Personal Characteristics		Frequency	Awareness, Mean±SD	Test Result	Test Type
Gender	Female	156	8.83±3.12	t=1.626 df=336 P=0.105	Independent t-test
	Male	182	8.26±3.22		
Grade	10	120	8.41±3.52	F=0.349 P=0.705	ANOVA
	11	85	8.77±2.91		
	12	133	8.47±3.05		
Father's educational level	Below diploma	34	8.23±2.9	F=4.58 P=0.004	ANOVA
	Diploma	106	7.7±3.36		
	B.A.	105	8.77±2.98		
	M.A. & above	89	9.31±3.12		
Mother's educational level	Below diploma	30	80.3±2.61	F=0.419 P=0.74	ANOVA
	Diploma	133	8.52±3.35		
	B.A.	124	8.72±3.11		
	M.A. & above	49	8.41±3.31		
Father's employment	Self-employed	144	8.25±3.11	F=0.967 P=0.381	ANOVA
	Employee	139	8.71±3.22		
	Retired	46	8.82±3.13		
Mother's employment	Housewife	222	80.52±3.17	F=0.304 P=0.822	ANOVA
	Self-employed	24	8.79±3.64		
	Employee	79	8.39±3.16		
	Retired	12	9.25±2.8		
Birth order	First	194	8.44±3.22	F=0.325 P=0.723	ANOVA
	Second	110	8.72±3.05		
	Third and above	34	8.35±3.44		
Economic status	Weak	14	8.42±4.81	F=1.037 P=0.356	ANOVA
	Average	246	8.37±3.16		
	Good	78	8.97±2.88		
No. of children	1	141	8.38±3.34	F=0.6232 P=0.532	ANOVA
	2	141	8.75±2.97		
	≥3	56	8.32±3.33		
Underlying disease	No	271	8.41±3.15	t= 1.351 df=336 P=0.178	Independent t-test
	Yes	67	9.0±3.3		
Residence conditions	Rental	106	8.19±3.43	F= 1.153 P=0.317	ANOVA
	Private	223	8.72±3.05		
	Government-leased	6	7.83±2.04		
Who are you living with?	Both parents	312	8.49±3.19	t= 0.588 df=335 P=0.557	Independent t-test
	One parent	25	8.88±3.16		
	Age		r=0.03; P=0.585		Pearson correlation coefficient
	BMI		r=0.094; P=0.084		Pearson correlation coefficient

Table 5. Relationship between the students' characteristics and their health-promoting lifestyle

Personal Characteristics		Frequency	HPL, Mean±SD	Test Result	Test Type
Gender	Female	156	140.87±26.58	t=0.039 df=336 P=0.969	Independent t-test
	Male	182	140.98±26.8		
Grade	10	120	147.7±26.97	F=8.174 P<0.001	ANOVA
	11	85	141.54±26.9		
	12	133	134.43±24.78		
Father's educational level	Below diploma	34	139.58±26.73	F=0.517 P=0.671	ANOVA
	Diploma	106	139.21±25.4		
	B.A.	105	143.58±28.2		
	M.A. & above	89	141.37±28.2		
Mother's educational level	Below diploma	30	138.87±25.41	F=0.269 P=0.848	ANOVA
	Diploma	133	142.27±28.87		
	B.A.	124	140.97±23.92		
	M.A. & above	49	138.83±28.51		
Father's employment	Self-employed	144	144.4±26.83	F=1.282 P=0.279	ANOVA
	Employee	139	140.12±26.56		
	Retired	46	138.62±22.64		
Mother's employment	Housewife	222	141.6±26.87	F=0.471 P=0.703	ANOVA
	Self-employed	24	134.8±23.8		
	Employee	79	141.6±26.87		
	Retired	12	140.74±24.82		
Birth order	First	194	143.14±27.39	F=4.008 P=0.019	ANOVA
	Second	110	140.65±24.6		
	Third and above	34	129.24±26.54		
Economic status	Weak	14	121.91±31.05	F=8.519 P<0.001	ANOVA
	Average	246	139.14±24.74		
	Good	78	149.5±29.0		
No. of children	1	141	144.31±24.5	F=3.322 P=0.037	ANOVA
	2	141	140.46±26.78		
	≥3	56	133.59±30.29		
Underlying disease	Not have	271	142.14±26.41	t=1.686 df=336 P=0.093	Independent t-test
	Have	67	136.02±27.33		
Residence conditions	Rental	106	137.35±28.17	F=2.205 P=0.112	ANOVA
	Private	223	142.64±25.58		
	Government-leased	6	7.83±2.4		
Who are you living with?	Both parents	312	141.79±26.82	t=2.163 df=335 P=0.031	Independent t-test
	One parent	25	129.85±22.83		
	Age		r=0.134; P=0.014		Pearson correlation coefficient
	BMI		r=0.015; P=0.786		Pearson correlation coefficient

the impact of public media, especially television. Public media play a role in raising public awareness (Awad & Al-Nafisi 2014). In their study, the subjects were general public with different levels of education, but in the present study, the subjects were adolescents with the widespread use of mass media and the Internet.

The results of the present study revealed that the mean score of health-promoting lifestyle was higher than the median. Among the scale dimensions, spiritual growth and self-actualization had the highest mean score, while the lowest mean score belonged to the physical activity dimension; after spiritual growth and self-actualization, interpersonal relations, nutrition, health responsibility, stress management, and physical activity were in the subsequent ranks.

Numerous studies have shown that their subjects in different groups enjoyed an acceptable and average status in terms of health-promoting lifestyle (Farahaninia et al. 2019); the results are congruent with the findings of the current study. However, the mean scores of the health-promoting lifestyle in other studies were below the median (Motaghi, Afsar & Tavakoli 2015; Saadati & Ghoreishi 2016; Siboni, Khatooni & Atashi 2018).

The adolescents acquired the highest mean score in the spiritual growth and self-actualization dimension of health-promoting lifestyle. In the studies by Mohammad Alizadeh et al. (2013) among male adolescents, Kamali et al. (2016) among healthcare providers, and Rezaei et al. (2018) among students, the highest score belonged to the spiritual growth and self-actualization dimension, which is in line with the findings of the present study. However, in a study by Saadati et al. (2019), the nutrition dimension received the highest score. In the studies by Wei et al. (2012) and Danaei, Benam and Momeni (2018), the highest score belonged to the dimension of interpersonal relations. In the study by Molaeifard, Mohamadian and Haghghi Zadeh (2018) among high school students, the health responsibility dimension received the highest score.

The subjects of the current study acquired the lowest score in the physical activity dimension. This result is in line with the findings of some other studies (Ay et al. 2012; Balali Meybodi, Hasani & Mehdinejad 2017). However, in some other studies, the lowest score was related to the health responsibility dimension (Mohammad Alizadeh et al. 2013; Raiyat et al. 2012; Wei et al. 2012), the result that was incongruent with the findings of the current study.

The low score on physical activity is probably due to the fact that teens spend most of their time on hobbies, such as using cell phones, tablets, computers, and playing computer games; therefore, they spend less time on exercise and physical activity, and ultimately, their health. (Tavafian & Aghamolaei 2013).

There was a significant and positive relationship between awareness of NAFLD and the health responsibility subscale of health-promoting lifestyle, so that an increase in awareness, enhances responsibility, as well. In their study, Molaeifard, Mohamadian and Haghghi Zadeh (2018) stated that the constructs of the Information, Motivation, and Behavioral (IMB) skills model, directly and indirectly, affect the health-promoting lifestyle of students. Ammouri et al. (2018) showed that there was a positive relationship between awareness of risk factors of coronary artery disease and health-promoting behaviors. Saadati et al. (2019) also showed that health responsibility was the most effective factor in predicting the self-care behaviors of patients with heart failure.

The present study results showed that awareness of NAFLD was significantly related just to the educational level of the adolescents' fathers so that the awareness of adolescents whose fathers' educational level was M.A. and above was higher than the adolescents whose fathers had a diploma. Salehi and Farrokhanian (2020) reported that there was a significant relationship between the students' mean scores of behavior, skills, and awareness and their parents' educational level and the highest mean score belonged to those whose parents' educational level was M.A. and Ph.D. and the lowest mean score was assigned to the students whose parents were illiterate or had a primary school degree. However, Mehdi Karami et al. (2019) revealed that the educational level of the high school students' fathers did not significantly affect the students' awareness, knowledge, attitude, and behavior regarding natural resources.

We found that the health-promoting lifestyle was significantly associated with the adolescents' grades so that the acquired mean score of adolescents in grade 12 was significantly lower than their counterparts in grade 10. Balali Meybodi et al. (2017) showed that the mean score of the health-promoting lifestyle of the students had a significant relationship with different educational levels. Nutritional behaviors, physical activity, interpersonal relationships, and spiritual growth of the students in the first grade were significantly higher than those in other grades. Mohammad Alizadeh et al. (2013) also introduced educational grade as an effective factor in the health-promoting lifestyle of male high school students.

In contrast to our results, [Chang \(2011\)](#) in his study on Taiwanese adolescents stated that an increase in the educational level enhanced the probability of the subjects' health-promoting behaviors. By examining the predictors of health-promoting behaviors among Mexican students, [Ulla Dies and Perez-Fortis \(2010\)](#) explained that the mean score of health-promoting lifestyle enhanced when the educational level heightened.

Lack of time and lack of opportunities in upper-grade students can be one of the effective factors in inactivity because students in higher grades have to be prepared for university; thus, they focus on studying and pay less attention to health-promoting behaviors ([Balali Meybodi, Hasani & Mehdinejad 2017](#)).

Our results showed that the students' health-promoting lifestyle was also related to the number of children, birth order, economic status, and living with parents. No study was found regarding the relationship between health-promoting lifestyle and number of children and birth order.

The mean score of health-promoting lifestyle in adolescents living with their parents was significantly higher than that of those living just with their father or mother. [Tol et al. \(2018\)](#) showed that living with the family and having a good economic status are positively related to a health-promoting lifestyle. With increasing income, health-promoting behaviors also increase. Other studies have also found a positive relationship between health-promoting lifestyle and economic status ([Wei et al. 2012](#); [Siboni, Khatooni, & Atashi 2018](#)). [Yarian and Ameri \(2019\)](#) confirmed that people who have high social and economic status have a healthier life, smoke less, have a better diet and more physical activity, and take more care of their physical and mental health. They are doing health tests and have strong social relationships.

Our results showed that there was also a statistically negative and significant relationship between age and health-promoting lifestyle. In their study, [Torabi et al. \(2016\)](#) investigated the effective factors in adolescents' adoption of health-promoting behaviors using the Theory of Planned Behavior (TPB). They argued that the quality of students' lifestyles declined as they became older. [Molaeifard, Mohamadian and Haghghi Zadeh \(2018\)](#) also reported a significant reverse relationship between age and responsibility; i.e., younger individuals were more responsible for their health. [Mohammad Alizadeh et al. \(2013\)](#) and [Rezaei et al. \(2018\)](#) disclosed a significant relationship between age and health-promoting lifestyle.

5. Conclusion

The NAFLD has been recently become a social health problem and has attracted specific attention. The significant relationship between awareness of NAFLD and health responsibility reveals the importance of improving health-promoting lifestyles; therefore, it is suggested that planners, health service providers, nurses, and social media take a step towards providing educational interventions at different levels of prevention to empower adolescents to become responsible for their health and adopt a healthy lifestyle and with emphasis on controlling weight and increasing physical activity, be able to prevent chronic diseases, especially NAFLD.

Ethical Considerations

Compliance with ethical guidelines

The Ethics Committee of Iran University of Medical Sciences approved the study (Code: IR.IUMS.REC.1399.750). Due to the limitations caused by COVID-19, the researchers asked the school authorities to take the consent of the students and their parents and assure them about the confidentiality of the information.

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Authors' contributions

Conceptualization: Farahnaz Barmak, Marhamat Farahaninia; Methodology: Farahnaz Barmak Marhamat Farahaninia and Hamid Haghani; Investigation: Farahnaz Barmak; Writing an original draft, writing, review, and editing: Farahnaz Barmak, Marhamat Farahaninia, Mehri Bozorgnejad; Supervision: Marhamat Farahaninia.

Conflict of interest

The authors declared no conflict of interest.

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