NEC
Nursing Evidence and Care
Integrating Science, Education & Caring Practice
INTERNATIONAL JOURNAL

NEC 2025; 1(1): 25 - 35

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Original scientific article

Use of Mobile Health Applications and Health-Promoting Behaviors Among Nursing Students: A Cross-Sectional Study

Healthy lifestyle behaviors of nursing students and use of mobile applications

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Received September 5, 2025; Accepted October 10, 2025

https://doi.org/10.67009/nec.1.1.3

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Keywords: health-promoting behaviors; mobile application; mobile technology; nursing students; smartphone.

Abstract

Background: Encouraging healthy behavior in student's nursing education is imperative because leveraging technology like mobile applications can facilitate behavior change and improve healthy lifestyles. The purpose of this study is to determine the healthy lifestyle behaviors and the use of mobile health applications among nursing students.

Methods: This study used a cross-sectional survey design. The sample consisted of 101 nursing students across the four-year Bachelor of Nursing program in a foundation university in Ankara, Turkey. Data were collected using a "Nursing Student Information Form", and "Health Promoting Lifestyle Profile II (HPLP-II)".

Results: The vast majority did not actively engage in health-risk behaviors. The mean score of the students' HPLP-II scale is 130.69±19.22. Among subscales, the highest score (27.10±4.58) is in interpersonal relations, and the lowest score in physical activity (19.19±5.23). Most nursing students reported owning a smartphone, having constant internet access, using mobile applications. Students, users of mobile health applications showed a significantly higher score on the interpersonal relations subscale score (p=0.04). However, no significant relation was found between nursing students' perception of mobile health applications and the mean HPLP II scale and subscale scores (P>0.05).

Conclusions: The healthy lifestyle behaviors are moderate and the majority of them use mobile health applications in everyday life. The average score of the physical activity is the lowest, suggesting that the students should be motivated to practice physical exercise. Mobile health applications to promote a healthy lifestyle can be included in the nursing curriculum.

INTRODUCTION

Promoting health and maintaining wellness begins with adopting healthy habits. A healthy lifestyle includes basic behaviors, such as a healthy and balanced diet, exercising, adequate rest, avoiding smoking, alcohol, and substance use [1, 2]. Strategies to control chronic medical conditions include targeting unhealthy behaviors, often by means of the use of patient empowerment tools, such as mobile health (mHealth) technology. Mobile health is the use of personal wireless communication devices, including mobile phones and smartphones, smart-watches, wireless sensors worn or carried by an individual, tablet computers, and point-of-care devices, to support continuous health monitoring and feedback [3, 4].

Nurses have an opportunity to empower patients to self-manage their own care by increasing awareness and use of mHealth technologies in preventive care. To do so, nurses should have the skills necessary to empower them in lifestyle management, as well as to understand both the potential and the limitations of mHealth technologies [5]. Therefore, in order for nursing students to be competent nurses in the future, they must first adopt healthy lifestyle behaviors. The personal health practices of nurses can affect the care they give to patients on health-related issues. The use of mobile learning devices is important in terms of using up-to-date and accurate information and supporting evidence-based applications by students in nursing education. Despite the increasing number of studies on health-promoting behaviors of nursing students, studies have not been sufficiently conducted to date to identify the relationship between health perceptions, and health-promoting behaviors among nursing students. Therefore, this study examined the relationship between the use of mobile health applications and health-promoting behaviors in nursing students.

BACKGROUND

All of the behaviors that protect people from getting sick and keep them healthy throughout their lives are called “Healthy Lifestyle Practices” [6, 7]. A healthy lifestyle is the ability to control the behaviors that may affect the health of the individual and to choose the behaviors that are appropriate for their health while organizing their daily activities. Health behavior is expressed as all of the behaviors that the individual believes and applies to stay healthy and to remain free from diseases [2]. Healthy lifestyle behaviors are behaviors that increase the level of well-being of the individual and enable self-realization. It includes balanced and adequate nutrition, stress management, adequate and regular exercise, non-smoking, taking health responsibility, and hygienic measures [1, 2, 8, 9].

Today, the use of mobile health apps (mHealth apps) on smartphones or tablets for health or medical purposes is increasing rapidly. With the increasing use of mobile technologies in the health sector, individuals can use mobile applications to improve their lifestyle and lead healthy life [2, 6]. Mobile health applications offer opportunities for individuals to follow their health, to access their health information whenever and wherever they want, and other individuals become their followers. Self-monitoring of health-related behaviors and receipt of feedback on these behaviors via mHealth technologies can also support personalized care [1, 10]. Besides, mobile healthcare applications enable individuals to communicate with healthcare professionals and healthcare institutions. Similarly, health institutions can follow up with their patients through mobile health applications [1, 11]. Smart applications used with mobile health tools can help in achieving nutritional goals (counting calories, logging food, losing weight, etc.), increasing physical activity, in changing lifestyle, stop smoking, and managing chronic diseases [4, 6]. Systematic review revealed that mHealth practices have been used more in recent years to adjust nutritional goals (calorie counting, keeping a food diary, etc.), physical activity, and change in lifestyle [3]. In another systematic review, examining the difficulties and problems of using mHealth technologies in developing countries indicated that

most mHealth applications are used for smoking cessation, weight loss, and management of chronic diseases [11]. In addition, it has been reported that mHealth applications are not difficult to use and have a positive effect on medication adherence [12].

Nowadays, the young generation is very tech-friendly. The ownership of smartphones is 77% in the United States, but it is found almost everywhere among young adults (18 to 20 years old) with 92% ownership [13]. According to the 2020 mobile phone usage report in our country, 98% of adults in Turkey with 82.4 million population use mobile phones [14]. Modern smartphones have powerful computing and communication capabilities with high-resolution color displays, and phones can store any type of data, including multimedia. In addition to smartphones, there are highly portable wearable devices, such as smartwatches [3]. This technology allows the development of mHealth apps that maximize the use of traditional behavioral modification theories to stimulate, inspire, manage time and provide accurate current information [15, 16].

Nurses are the largest group of healthcare professionals, responsible for promoting and maintaining the health of individuals in the community. One of their main tasks is to provide health education to patients, which helps them live a healthier life. Therefore, for nursing students to become competent nurses in the future, they must first adopt healthy lifestyle behaviors by themselves. Today's nursing students will become future healthcare providers and act as health supporters. However, there are still some concerns about to what extent nurses are ready for their roles in health promotion while also promoting their self-care [17, 18]. The personal health practices of nurses can affect their effectiveness and shape the care interventions they give to patients on health-related issues [9, 19]. It is imperative to encourage healthy behavior in the initial stages of nursing since most of the previously acquired lifestyle habits are difficult to change. For this reason, determining the healthy lifestyle behaviors of nursing students will enable the assessment of the current situation and define the needs in this field. Mobile health applications are widely used in the health sector for many purposes, such as improving health, preventing, treating diseases, and managing chronic diseases. However, studies on the use of mobile health applications of health professionals, especially nurses, are scarce [20, 21]. Chiauzzi et. al [4] reported that nurses did not conduct research on mobile health practice. Choi and Kang [18] reported that nursing students had a high desire to use applications that includes health-improving behaviors on their smartphones.

Leveraging technology like mobile applications can facilitate behavior change and improve healthy lifestyles in nursing students. Therefore, the purpose of our study is to determine the healthy lifestyle behaviors and the use of mobile health applications of nursing students. In this study, we sought to answer the following questions:

1) What is the status of using mobile health applications and health-promoting behaviors among nursing students?

2) Are there any differences between the mean Health-Promoting Lifestyle Profile-II scale and subscale scores according to socio-demographic features and the use of mHealth applications?

METHODS

Design and Participants

This study used a cross-sectional survey design. In this research there were altogether 101 nursing students of a foundation university enrolled in second, third, and the fourth study year. Sample selection was not made in the study, because all students who agreed to participate in the study were included in the study. The study reached 65% of the sample.

Data Collection Tools

Data were collected using the "Nursing Student Information Form" and the "Health-Promoting Lifestyle Profile II Scale".

The Nursing Student Information Form was created by the researchers based on a literature review. It consists of items on age, gender, marital status, as well as on obtaining information about health habits, use of mobile health applications and perception on benefits.

The Health-Promoting Lifestyle Profile Scale was developed in 1987 by Walker, Sechrist, and Pender [22], and then revised in 1995 as "Health Promoting Lifestyle Profile II" (HPLP-II) [23]. The scale measures the behaviors of individuals that improve their well-being associated with a healthy lifestyle. The HPLP-II is a 52-item scale consisting of six subscales, which are health responsibility, physical activity, nutrition, spiritual growth, stress management, and interpersonal relations. It is a 4-point Likert type scale that has "never", "sometimes", "often", and "regularly" options, the lowest and the highest scores of the scale are 52 and 208 respectively. It is considered that students' healthy lifestyle behaviors increase with the increasing total score. The Turkish reliability and validity study of the scale was conducted by Bahar et al. [7]. They reported Chronbach Alpha coefficient of the scale as 0.92. The reliability coefficient was 0.77 for the subscale health responsibility, 0.79 for physical activity, 0.68 for nutrition, 0.79 for spiritual growth, 0.80 for interpersonal relationships and 0.64 for stress management.

In this study, the Cronbach's α coefficient of the scale was 0.92 and for the subscales Cronbach's α coefficient was obtained as health responsibility 0.85, physical activity 0.80 nutrition 0.73, spiritual growth 0.84, interpersonal relationships 0.72, and stress management 0.85.

Ethical considerations

Prior to participation in the study, all students gave their formal consent. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of a foundation university in Ankara (2020-604.01.01/12526).

Statistical Analysis

Data were analyzed using IBM SPSS statistics software, Version 17. Percentages, means and standard deviations were used for the analysis. Tests of a normal distribution, parametric tests, and correlation analyses were performed. In the analysis, independent sample t-test and ANOVA were used. A p-value of <0.05 was considered statistically significant with a 95% confidence interval.

RESULTS

The demographic characteristics of the nursing students are presented in Table 1. The mean age of the nursing students was 20.96 ±1.56 years (min:18 - max:25); 87.1% were female; 26.7% were first year, 20.8% second year, 28.7% third year, and 23.8% fourth year students; 92.1% had nuclear family structure; 63.4% had income equal to expenses and 74.3% of them perceived their socioeconomic level at a medium level; 59.4% graduated from public high school; 71.3% lived with their families during their study (Table 1).

Table 1. Characteristics of Nursing Students (N = 101)

Characteristics	Number	Percent (%)
Gender		
Female	88	87.1
Male	13	12.9
School year/Class		
First year	27	26.7
Second year	21	20.8
Third year	29	28.7
Fourth year	24	23.8
Family structure		
Nuclear family	93	92.1
Extended family	8	7.9
Income status		
Less than income	11	10.9
Income equal to expenses	64	63.4
More than expenses	26	25.7
Location of longest residence		
Village	3	3.0
District	21	20.8
Province	76	75.2
Abroad	1	1.0
Graduated high school		
Public	60	59.4
Private	41	40.6
Place of living during university education		
Family	72	71.3
Alone	2	2.0
Private dorm	11	10.9
Government dorm	11	10.9
At home with friends	5	5.0

Health-related characteristics of the nursing students involved in the study are shown in Table 2. According to the calculated body mass index of nursing students, it was determined that 69.3% were of normal weight, 14.9% were underweight and 3.0% were obese. In the study, 48.5% of nursing students had a moderate sleep pattern; 25.7% had slept 7-8 hours per day; 29.7% were smoked and 26.7% consumed alcohol. The daily sleep time of students averages 8.05 ± 1.43 (min; 4 max: 12), and 61.4% of nursing students stated that their self-rated general health status was good. Only 10.9% had an existing disease (hyperthyroidism, hypothyroidism, insulin resistance, etc.) and 11.9% were using regular medicines, 47.5% exercised regularly, 54.5% had hobbies (reading books, listening to music, painting, etc.) (Table 2).

Table 2. Health Related Characteristics of Nursing Students (N = 101)

Health-Related Characteristics	Number	Percent (%)
Body Mass Index		
Underweight (<18.5)	15	14.9
Normal weight (18.5-24.9)	70	69.3
Overweight (25-29.9)	13	12.9
Obesity Class 1 (30-44.9)	3	3.0
Sleep patterns		
Good	25	24.8
Moderate	49	48.5
Poor	27	26.7
Smoking status		
Yes	30	29.7
No	71	70.3
Alcohol-use		
Yes	27	26.7
No	74	73.3
Self-rated general health status		
Good	62	61.4
Moderate	36	35.6
Poor	3	3.0
Chronic disease condition		
Yes	11	10.9
No	90	89.1
Regular medication use		
Yes	12	11.9
No	89	88.1
Regular physical activity		
Yes	48	47.5
No	53	52.5
Have a hobby		
Yes	55	54.5
No	46	45.5

Mobile nursing practices of nursing students are not included in the table, but almost all of the nursing students had constant internet access on their smartphones. In the study, 72% of students stated that they use mobile health applications. Nursing students stated that they frequently use e-Pulse (22.7%), physical exercise such as fitness or yoga (17.1%), Hospital Appointment System (17.1%), ovulation calendar (14.1%), calorie counter (11.4%) via mobile health applications. In the study, 86,1% of nursing students found mobile applications useful. They found it useful because they said "Individual follow-up of his/her health improves a person's knowledge and skills about health" with the highest rate of 68.2%; those who did not find it useful said "If smart health applications are not used regularly by the users, it may not be possible to achieve the targeted health results" with the highest rate of 57.9%.

It has been determined that the mean score of the nursing students' HPLP-II scale is 137.53 ± 22.96. The highest scores were obtained from interpersonal relations (27.10±4.58) and the lowest scores were obtained from the physical activity subscale (19.19±5.23) (Table 3).

Table 3. The mean HPLP-II and subscale scores (N = 101)

HPLP-II Subscales	Mean±SD	Range (min-max)	Range of possible scores (min-max)
Total HPLP-II score	137.53 ± 22.96	80-202	52-208
Spiritual Growth	26.71±4.87	13-35	9-36
Health Responsibility	23.66±4.80	11-36	9-36
Physical Activity	19.19±5.23	8-32	8-32
Nutrition	20.98±4.38	12-36	9-36
Interpersonal Relationships	27.10±4.58	13-35	9-36
Stress Management	20.46±4.48	8-30	8-32

Table 4 shows comparison of the HPLP-II subscale mean scores according to the socio-demographic characteristics. There was no significant relationship between socio-demographic characteristics and total score of HPLP-II scale (*P*>0.05). The mean total score of the HPLP-II scale and the health responsibility, physical activity, nutrition, and stress management subscale scores were lower in the first-year students. There was a significant relationship between nutrition and gender (*P*=0.05), class and health responsibility (*P*=0.05), spiritual growth and income status (*P*=0.03). The interpersonal relations score was also significantly related to the class (*P*=0.05). Fourth-year students have the highest mean interpersonal relations scores (28.79±3.32) and the first-year students are the lowest (25.33±5.17). Stress management scale score averages of students with high-income status were found to be significantly higher (*P*=0.05). Although it is not mentioned in the table, no significant relationship has been detected in other socio-demographic characteristics (Table 4).

Table 4. Comparison of the HPLP-II and subscale scores according to socio-demographic characteristics (N = 101)

Socio-demographic characteristics	HPLP-II x̄±SD	Health Responsibility x̄±SD	Physical Activity x̄±SD	Nutrition x̄±SD	Spiritual Growth x̄±SD	Interpersonal Relations x̄±SD	Stress Management x̄±SD
Gender							
Female	137.40±21.14	23.11±4.58	18.93±4.71	20.65±3.90	26.72±4.60	27.39±4.50	20.57±4.31
Male	138.38±33.94	22.76±6.30	21.00±7.90	23.15±6.60	26.61±6.46	25.15±4.75	19.69±5.69
P value*	0.88	0.81	0.18	0.05	0.95	0.13	0.50
Class							
First	129.51±23.91	21.22±5.06	17.25±4.54	20.25±4.38	26.40±5.11	25.33±5.17	19.03±5.26
Second	142.57±25.93	24.52±4.78	20.95±5.88	20.90±4.64	27.09±5.54	27.52±5.51	21.57±4.52
Third	136.48±20.87	22.75±4.17	19.37±5.28	20.55±4.59	26.34±4.45	27.06±3.69	20.37±4.25
Fourth	143.41±19.84	24.25±4.78	19.62±4.90	22.37±3.80	27.16±4.69	28.79±3.32	21.20±3.52
P value**	0.11	0.05	0.09	0.33	0.89	0.05	0.98
Income status							
< income	122.90±16.64	20.45±4.52	16.45±3.04	18.81±3.37	24.09±3.88	24.81±5.47	18.27±4.10
Income equal to expenses	136.76±21.62	23.12±4.65	18.85±4.85	20.90±3.84	26.48±4.69	27.15±4.64	20.23±4.33
> expenses	145.61±25.61	24.03±5.06	21.19±6.22	22.07±5.63	28.38±5.23	27.96±3.81	21.96±4.68
P value**	0.19	0.10	0.02	0.11	0.03	0.16	0.05

Note: *Independent sample t-test; **One-way ANOVA test

There is a significant relationship between sleep patterns and total score of the HPLP-II scale (*P*=0.002) and subscale scores except for interpersonal relations (*P*=0.18). There is a significant relationship between students' smoking status and stress management scores (*P*=0.03). The stress management subscale mean score (21.08±4.52) of non-smoker students was higher than of smokers (19.00±4.12). Nutritional (*P*=0.07) and spiritual growth (*P*=0.006) subscale mean scores of nursing students who did not use alcohol were found to be higher than the mean scores of students using alcohol which were found as statistically significant. The average HPLP-II score (*P*=0.001), health responsibility (*P*=0.007), physical activity (*P*=0.001), and stress management (*P*=0.01) scores of the students doing physical activity were significantly higher. The average HPLP-II total score, physical activity and spiritual growth scores of nursing students engaged in hobby were significantly higher (Table 5).

The relationship between the HPLP-II subscale scores and the use of mobile health applications is shown in Table 6. In our study, no significant relationship was found between continuous internet use and HPLP-II scale and subscale scores. The nutrition mean score (21.50±4.16) of the students using the mobile health application was higher than the nutri-

Table 5. Comparison of the HPLP-II scale and subscale scores according to health-related characteristics (N = 101)

Health Related Characteristics	N	HPLP-II x̄±SD	Health Responsibility x̄±SD	Physical Activity x̄±SD	Nutrition x̄±SD	Spiritual Growth x̄±SD	Interpersonal Relations x̄±SD	Stress Management x̄±SD
Sleep patterns								
Poor	25	132.68±22.46	23.16±4.74	18.28±4.80	19.52±4.37	25.76±4.89	27.00±4.54	18.96±4.46
Moderate	49	133.15±20.37	21.92±4.33	18.35±4.82	20.78±3.92	25.82±4.27	26.47±4.35	19.80±4.06
Good	27	[a] 151.32±23.73	[a] 25.32±5.14	[a] 21.84±5.72	[a] 22.84±4.79	[a] 29.48±5.12	28.52±4.92	[a] 23.32±4.22
P value*		0.002	0.01	0.01	0.02	0.004	0.18	0.001
Smoking status								
Yes	30	134.83±20.80	22.96±3.82	19.83±5.05	21.66±3.31	25.50±4.94	25.86±4.44	19.00±4.12
No	71	138.67±23.85	23.11±5.18	18.92±5.31	20.69±4.75	27.22±4.78	27.83±4.56	21.08±4.52
P value**		0.42	0.89	0.43	0.30	0.10	0.07	0.03
Alcohol use								
Yes	27	131.62±19.21	22.07±3.62	19.37±4.67	19.70±3.20	24.51±5.01	26.59±4.65	19.37±3.71
No	74	139.68±23.90	23.43±5.14	19.13±5.45	21.44±4.67	27.51±4.59	27.29±4.56	20.86±4.70
P value**		0.11	0.21	0.84	0.07	0.006	0.49	0.14
Physical activity								
Yes	12	145.62±22.37	24.41±4.24	22.37±4.54	21.77±4.58	27.58±5.28	27.81±4.65	21.61±4.34
No	89	130.20±21.12	21.84±4.99	16.32±4.03	20.26±4.10	25.92±4.37	26.47±4.46	19.37±4.37
P value		0.001	0.007	0.001	0.08	0.08	0.14	0.01
Have a hobby								
Yes	55	141.89±22.20	23.81±4.60	20.49±4.89	21.56±4.47	27.63±4.75	27.16±4.32	21.21±4.30
No	46	132.32±22.99	22.17±4.93	17.65±5.25	20.28±4.21	25.60±4.83	27.04±4.91	19.56±4.58
P value**		0.03	0.08	0.006	0.14	0.03	0.89	0.06

Note: *One-way ANOVA test; **Independent sample t-test

Table 6. Comparison of the HPLP-II scale and subscale scores according to the use of Mobile Health applications (N = 101)

mHealth applications	N	HPLP-II x̄±SD	Health Responsibility x̄±SD	Physical Activity x̄±SD	Nutrition x̄±SD	Spiritual Growth x̄±SD	Interpersonal Relations x̄±SD	Stress Management x̄±SD
Have constant internet access								
Yes	97	138.02±22.68	23.13±4.78	19.26±5.28	20.94±4.33	26.83±4.83	27.23±4.49	20.59±4.47
No	4	125.75±30.28	21.50±5.91	17.50±3.69	21.75±6.13	23.75±5.56	24.00±6.37	17.25±4.11
P value*		0.29	0.50	0.51	0.72	0.21	0.16	0.14
Use of mobile health applications								
Yes	78	139.80±21.22	23.50±4.33	19.71±5.16	21.50±4.16	26.85±4.80	27.61±3.90	20.61±4.15
No	23	129.82±27.12	21.60±6.03	17.43±5.19	19.21±4.74	26.21±5.17	25.39±6.16	19.95±5.55
P value*		0.06	0.09	0.06	0.02	0.58	0.04	0.53
Perception of mobile applications								
Useful	87	138.52±21.38	23.40±4.40	19.36±5.02	20.86±4.10	26.74±4.79	27.44±4.29	20.70±4.13
Not useful	14	131.35±31.34	21.00±6.62	18.14±6.47	21.71±5.97	26.50±5.54	25.00±5.83	19.00±6.26
P value*		0.28	0.08	0.41	0.50	0.86	0.06	0.19

Note: *Independent sample t-test

tion mean score (19.21 ± 4.74) of the students who did not use the mobile health applications (*P*=0.02). In addition, the mean scores of interpersonal relations subscale of the students who use mobile health applications was significantly higher than of non-users (*P*=0.04).

DISCUSSION

The benefit of the use of mobile applications is high due to advantages, such as user-friendliness, convenience, and effectiveness. Several studies have stated that individuals are capable of making good healthier eating and exercise decisions with the help of mobile health applications [24, 25]. Nurses may be having an opportunity to empower patients to manage their care in a proactive way by increasing awareness and usability of mobile health technology in preventive care. However, if nurses acquire healthy behaviors during their education, they would be able to advise their patients on healthy behavior while working as a nurse. Today, almost all university students have a smartphone [26]. For this reason, students can easily integrate their healthy lifestyle behaviors into their daily lives using technology. However, there are very few studies in the literature regarding the use of nursing students' mobile health applications and healthy lifestyle behaviors [16, 18]. In their study with 450 nursing students, Choi and Kang [18] stated that nursing students are willing to download the applications for health-promoting behaviors to their smartphones. In this study, almost all of the nursing students stated that they think that mobile health applications are beneficial in developing healthy lifestyle behaviors.

It is expected that nursing students who are trained to meet the health care needs of the society should have high healthy lifestyle behaviors [27]. Positive health behaviors are associated with higher HPLP-II scores; the highest possible score is 208. In this study, the mean score was 137.53 ± 22.96 in nursing students. It can be seen that the healthy lifestyle behaviors of nursing students included in this study are at a medium level. This result is similar to the findings of other studies examining students' health promotion behaviors [6, 18]. Polat et al. [28] stated that nursing students practiced health-promoting behaviors at a moderate level. These results show that nursing students have difficulty in transferring their knowledge and experiences about healthy lifestyle behaviors they acquired during their study period.

Exercise and proper nutrition protect individuals from chronic diseases, infections, stress. It has many positive effects on weight control, cardiovascular diseases, some cancers, obesity prevention, mental health, self-esteem, and body image. Proper nutrition, exercise, weight control are main elements in reducing the harmful effects of chronic diseases such as heart diseases, stroke, cancer, and diabetes. Unhealthy behaviors create burdens for individuals, their families, and the health economy as they increase health care costs. More than half of the students in this study have normal weight range and only 47.5% of them have reported to exercise on a regular basis. This result shows that half of the students take care of their health habits and they pay attention to their nutrition and activities. It is also observed that students do not pay attention to sleep patterns. Nutrition, sleep, and exercise in a healthy lifestyle are very important for the protection of body and mental health, and the prevention of chronic diseases. Our results are similar to those in the literature [6, 8, 29, 30]. Considering this situation, nursing students who are supposed to be future role models in the health care of the patients are faced with problems in obtaining healthy lifestyle behaviors by themselves.

It is reported that regular physical activity reduces the risk of coronary heart disease and stroke, diabetes, hypertension, colon cancer, breast cancer, and depression and overweight. However, in most of the studies with nursing students, the lowest mean score of the HPLP scale is reported to belong to the physical activity subscale [31]. Our study results are similar to the literature [6, 9, 28, 32]. In Iran, Rezaei-Adaryani [33] noted that medical nursing had low scores for exercise. Wittayapun et al. [34] stated that exercise scores were lower among nursing students; nutrition, and stress management were also low. The reason for these results may be the intense nursing education curriculum in general. In our study, physical activity was the lowest practice followed by nutrition and stress management among health-promoting lifestyle behaviors of nurs-

ing students. According to the study by Polat et al. [28] the health responsibility, nutrition, and stress management scores of students in the fourth-year were significantly high. In our study, a significant relationship is found between the classes of nursing students and the interpersonal relationship and health responsibility of the HPLP-II subscale. Fourth-year students have the highest mean interpersonal relations scores and the first-year students have the lowest. This may be explained by the fact that there are interpersonal communication courses including communication labs in the nursing education curriculum. Besides, the communication of nursing students with patients and other health professionals in their clinical practice may have contributed to better score interpersonal relations in the HPLP-II scale.

Based on education and experience, nurses are often assumed knowledgeable regarding the importance of health-promoting behaviors, such as healthy eating, physical activity, and stress management. However, this knowledge may not translate into sustainable change [19] because developing healthy lifestyle behaviors may not only be through education. These behaviors are significantly affected by the age, gender, marital status, family income status, and socio-economic status of nursing students [35]. In our study, although there was no significant correlation between the total scores of the HPLP-II scale and the sociodemographic characteristics of the students, a statistically significant relationship was found between the sub-dimensions of the scale. The mean nutrition subscale score of male students is significantly higher than of female students. There have been studies that support our findings [9, 27, 28, 32].

The average physical activity, spiritual growth, and stress management scores were higher for students whose families' income is higher than their expenses. Previous studies also show that positive social and economic factors affect people's health-related behavior positively [9, 28, 31, 35]. Besides, a good economic status enables the use of sports and wellness centers. The study of Bostan and Beşer [36] stated that those with a higher income had higher mean score of the HPLP-II scale and subscales.

Studies have shown that unhealthy lifestyles, such as smoking, a poor diet, a sedentary lifestyle, excessive alcohol consumption are leading to chronic illnesses. The unhealthy lifestyle of nursing students during late adolescence can have long-term adverse effects on their health in adulthood. Smoking is an indicator of unhealthy life behavior; nurses who are smoking cannot be a good role model for the general public and patients. In this study, the difference between smokers' scores on the HPLP-II scale compared to non-smokers was not significant. However, the mean stress score of non-smokers was found to be significantly higher than of smokers. Similar to another study conducted with nursing students, non-smoking students had higher scores on nutrition, physical activity, and stress management on the HPLP-II scale [9, 37]. The mean score of nutrition and spiritual growth subscale of students who do not use alcohol is high in our study. Besides, in our study, the HPLP-II scale score of nursing students dealing with some hobby is significantly higher than those who do not have a hobby. In our study, the HPLP-II score an average of the nursing students with good sleep patterns health responsibility, physical activity, spiritual growth, stress management averages were high. All these results support the need for regular sleep, non-smoking, and a hobby to develop healthy lifestyle behavior.

Today, nursing students will be role models for the patients they will provide care in the future. For this reason, they must acquire healthy lifestyle behaviors during the study period. Enabling students to use mobile health applications on their smartphones makes it easier for them to learn fast, integrate applications, such as sleep, weight, and exercise into their lives. In our study, nursing students have constant internet access and almost all of the nursing students stated that they use mobile health applications. Students who use mobile health applications achieved higher nutritional and interpersonal relations average scores than students who do not use mobile health applications.

Limitations of the study

The main limitation of the current study is that it has been conducted at one university. The second limitation refers to the number of students who responded to the survey. Of those invited to take part in the study, 35% of 156 students did not complete or return the questionnaire.

Implications of the Results for Education and Clinical Practice

Addressing health care practices in more detail in the nursing curriculum, and researching various mobile health applications will contribute to the development of healthy behaviors. The adoption of mobile health applications by nurses, especially during their study period, will enable them to provide care that is more appropriate for their patients in the future. The goal is to educate nurses who care about their own health, so that they can contribute to the health habits of their relatives and community. As a result, in the future, it can contribute to the prevention and reduction of chronic diseases or to increase the self-management of individuals with chronic diseases.

CONCLUSIONS

This study shows that student nurses' healthy living habits are moderate and most of them use mobile health applications. However, the physical activities and exercise habits of nursing students in this study are low.

It is advisable to use smartphone health applications as a way to manage healthy habits of nursing students, and to include mobile health applications in education of nurses.

Funding Sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author Contributions

Conceptualization, B.Ç and S.K.; Methodology, B.Ç.; Software, G.T.; Validation, B.Ç., G.T. and S.K.; Formal Analysis, G.T.; Investigation, S.K; Resources, B.Ç.; Data Curation, S.K.; Writing – Original Draft Preparation, B.Ç., G.T. and S.K..; Writing – Review & Editing, B.Ç., G.T. and S.K.; Visualization, B.Ç.; Supervision, S.K.; Project Administration, S.K.

Declaration of Conflicting Interests:

The authors declare no conflict of interest.

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