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Health Literacy, Healthy Lifestyle Behaviours and Physical Activity in Sports Sciences Faculty Students: A Mediation Analysis

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Ethical Statement: It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited.

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Abstract

This study aims to investigate whether the health literacy of sports science faculty students positively influences their physical activity and whether healthy lifestyle behavior plays a mediating role in the relationship between health literacy and physical activity. The research was conducted in quantitative research method and relational screening model. A total of 262 (F=110, M=152) students studying at Süleyman Demirel University Faculty of Sport Sciences participated in the study voluntarily. Personal Information Form, Turkey Health Literacy Scale-32, Health Promotion Scale, International Physical Activity Questionnaire Short Form were used for the research data. The data were analyzed using Process Macro v3.3 plug-in with model 4 and 5000 resampling method with a 95% confidence interval. As a result of the study, it was determined that health literacy did not have a statistically significant effect on physical activity in sport sciences faculty students, but healthy lifestyle behavior played a mediating role in the relationship between health literacy and physical activity. As a result, it can be said that increasing the health literacy of sport sciences students may be important in participation in physical activity by increasing healthy lifestyle behaviors. For this reason, it is recommended to include more practices that increase health literacy among students of the faculty of sports sciences.

Keywords: Health Literacy, Healthy Lifestyle Behaviours, Physical Activity, Faculty of Sport Sciences Students.

Özet

Spor Bilimleri Fakültesi Öğrencilerinde Sağlık Okuryazarlığı, Sağlıklı Yaşam Davranışı ve Fiziksel Aktivite: Bir Aracılık Analizi

Bu araştırma, spor bilimleri fakültesi öğrencilerinin sağlık okuryazarlığının fiziksel aktivitelerini pozitif yönde etkili olup olmadığı ve sağlıklı yaşam biçimi davranışının sağlık okuryazarlığı ve fiziksel aktivite arasındaki ilişkide aracı rol oynayıp oynamadığını incelemeyi amaçlamaktadır. Araştırma nicel araştırma yönteminde ve ilişkisel tarama modelinde yürütülmüştür.

Araştırmaya Süleyman Demirel Üniversitesi Spor Bilimleri Fakültesinde öğrenim gören 262 (K= 110, E=152) adet öğrenci gönüllü katılım göstermiştir. Araştırma verileri için Kişisel Bilgi Formu, Türkiye Sağlık Okuryazarlığı Ölçeği, Sağlıklı Yaşam Davranışı Ölçeği ve Uluslararası Fiziksel Aktivite Anketi Kısa Formu kullanılmıştır. Verilerin analizi Process Macro v3.3 eklentisi kullanılarak model 4 ile 5000 yeniden örneklem yöntemi ile %95 güven aralığında yapılmıştır. Araştırma sonucunda spor bilimleri fakültesi öğrencilerinde sağlık okuryazarlığının fiziksel aktivite üzerinde istatistiksel olarak anlamlı etkisinin olmadığı ancak, sağlıklı yaşam biçimi davranışının sağlık okuryazarlığı ve fiziksel aktivite arasındaki ilişkide aracı rol oynadığı tespit edilmiştir. Sonuç olarak, spor bilimleri öğrencilerinin sağlık okuryazarlığının artmasının sağlıklı yaşam biçimi davranışlarını arttırarak fiziksel aktiviteye katılımda önemli olabileceği söylenebilir. Bu nedenle spor bilimleri fakültesi öğrencilerinde sağlık okuryazarlığını arttırıcı uygulamalara daha fazla yer verilmesi önerilmektedir.

Anahtar Kelimeler: Sağlık Okuryazarlığı, Sağlıklı Yaşam Biçimi Davranışları, Fiziksel Aktivite, Spor Bilimleri Fakültesi Öğrencileri.

INTRODUCTION

Health is a multifaceted concept that encompasses the physical, mental, social, and spiritual dimensions of individuals' lives. According to the World Health Organization (WHO), it is defined as "a state of complete physical, mental, and social well-being, not merely the absence of disease and infirmity" (58). Individuals' health literacy encompasses their ability to comprehend, evaluate, utilize, and make decisions regarding health-related information. It extends beyond merely reading health materials to include critically assessing, understanding, and applying this information in everyday life. Health literacy empowers individuals to access and effectively utilize information concerning their own health. This capability plays a crucial role in various domains, including disease prevention, adoption of healthy lifestyles, and more efficient utilization of healthcare services (54). Health literacy skills encompass distinguishing accurate and reliable health information, making informed decisions about treatment options, and effectively communicating about health issues. Additionally, it is important to establish more effective dialogue with physicians, correctly use prescribed medications, and make the best use of healthcare services (48).

Health literacy plays a crucial role in navigating information from various sources such as media, the internet, and other platforms in today's technologically advancing world. Despite the convenience of accessing information, the ability to distinguish between accurate and reliable sources forms the foundation of health literacy skills. Furthermore, health literacy can help mitigate health disparities. Enhancing individuals' capacity to comprehend, assess, and utilize health information not only benefits personal health management and disease prevention but also contributes significantly to improving community health. These skills are invaluable for optimizing personal health and maximizing the benefits of healthcare services (5).

Currently, it's reasonable to argue that enhancing health literacy could influence individuals' adoption of healthier lifestyle habits and participation in physical activity. This is because increased awareness about health empowers people to make informed decisions regarding their well-being and better equips them to tackle health issues (6, 61, 8).

Healthy lifestyle behaviors encompass all the actions individuals undertake to uphold their well-being throughout their lives (2). These behaviors consist of a range of habits and routines aimed at promoting individuals' overall health. Such practices include maintaining a balanced diet (4, 22), engaging in regular physical activity (52, 12), managing stress (10, 16), ensuring sufficient sleep (50), refraining from tobacco and alcohol consumption (19, 9), prioritizing health screenings (42, 57, 44), and nurturing social relationships. Embracing healthy lifestyle behaviors can elevate overall quality of life and play a pivotal role in preventing numerous health issues (60).

Health literacy and healthy lifestyle behaviors can also positively affect people's participation in physical activity. Because the knowledge and awareness of the person about health can lead to behaviors that might improve their health (18).

One of the most important factors that protect and improve one's health is physical activity (35). Physical activity can improve factors such as cardiovascular health (30), weight control, muscle and bone health, mental

health, stress management, sleep quality (43, 3, 49), psychological resilience, as well as protection from serious chronic diseases such as hypertension, Type II diabetes, obesity, osteoporosis and cancer (37, 1, 32, 56).

In addition to doctors, nurses and other health professionals, graduates of sports sciences faculties are the people who will inform and guide people about healthy behaviours. After graduation, students of sports sciences faculties can work as physical education and sports teachers in schools affiliated to the Ministry of National Education, exercise specialists or coaches in sports halls, sports clubs and health centers, sports specialists and coaches in institutions and organizations affiliated to the Ministry of Youth and Sports, or recreational leaders to improve public health. Thus, they can apply the knowledge, attitudes, and behaviours they have acquired both to their own lives and to the lives of their presidents. Therefore, students of sport sciences faculties should have the competence to influence the people they serve due to their professional responsibilities and social roles. Therefore, it is important to examine the health literacy, healthy lifestyle behaviours and physical activity behaviours of these students and the relationships between them.

Based on this context, the primary objective of the research is to explore whether the health literacy of students in the faculty of sports sciences significantly correlates with physical activity. The secondary aim is to assess whether healthy lifestyle behaviors play a mediating role in the association between health literacy and physical activity.

At this point, answers to the following research questions were sought.

- Does health literacy of sport sciences faculty students affect physical activity positively and statistically significantly?
- Does healthy lifestyle behaviours mediate the relationship between health literacy and physical activity of sport sciences faculty students?

METHOD

Research Model

This study was carried out utilizing a quantitative research approach and a relational survey framework. "The relational survey model is a research model to determine the presence and/or degree of change between two or more variables together" (31).

Participants

The participants in the study were determined according to " convenience sampling ", which is one of the non-probability sampling methods. The research was conducted on 262 students studying at Süleyman Demirel University Faculty of Sport Sciences in the 2023-2024 academic year. The distribution of the students participating in the study according to their characteristics is presented in Table 1.

Table 1. Participant Demographic Characteristics

Variables		Frequency (f)	Percentage%
Gender	Female	110	42,0
	Male	152	58,0
Age	18-22	220	84,0
	23-27	39	14,9
	≥28	3	1,1
Department	Coaching Education	82	31,3
	Physical Education and Sports Teaching	101	38,5
	Sport Management	79	30,2
Class Level	1. Grade	66	25,2
	2. Grade	63	24,0
	3. Grade	77	29,4
	4. Grade	56	21,4
Body Mass Index	Underweight	22	8,4
	Normal	209	79,8
	Overweight	28	10,7
	Obesity First Degree	3	1,1
Physical Activity Level	Low	20	7,6
	Moderate	93	35,5
	High	149	56,9
Total		262	100

Data Collection Tools

Personal Information Form

The personal information form consists of 6 questions asking the gender, age, department, class, height (cm) and body weight (kg) of the sport sciences students. In addition, body mass index was calculated by using the formula "body weight (kg) / height (m2)" from the data obtained about the height and weight of the students and classified as underweight (<18.5), normal (18.5-24.9), overweight (25.0- 29.9), Obesity first degree (30.0-34.9), Obesity second degree (35.0- 39.9), Obesity third degree (≥40.0).

Health Literacy

To measure the health literacy of sport sciences students, the Turkish Health Literacy Scale (TSOY-32) adapted from the European Health Literacy Survey (HLS-EU) was used (41). Unlike the original scale, this scale was prepared by taking two basic dimensions instead of three. As such, it comprises eight elements: care and provision, disease prevention/health promotion aspects, along with four procedures within these aspects: obtaining health-related data, comprehending health-related data, assessing health-related data, and employing/utilizing health-related data. Therefore, it was formed as a 2x4 matrix. The scale consists of 32 questions in total and is in 5-point Likert format and is scored as (1= "Very Difficult", 2= "Difficult", 3= "Easy", 4= "Very Easy", 0= "No Opinion"). In this way, total and average scores can be calculated. In the evaluation of the scale, the scores were categorized between 0-50 as in the HLS-EU scale. For this, the following formula was used: Index = "(mean-1) x (50/3)". The index in this formula expresses the average of the answers given by the respondents to each question. Based on this mean value, individuals' health literacy levels can be categorized into four groups: insufficient health literacy (0-25), challenging - restricted health literacy (>25-33), sufficient health literacy (>33-42), and outstanding health literacy (>42-50). The reliability of the scale was calculated with Cronbach's alpha internal consistency coefficient. It was 0.88 for the Treatment and Service at dimension, 0.86 for the Disease Prevention and Health Promotion sub-dimension, and 0.92 for the overall scale. It is stated that the scale is valid and reliable in people aged 15 and over (41). Within the scope of the research, the reliability of the scale was calculated with Cronbach's Alpha internal consistency coefficient. In the sub-dimensions of the scale, Treatment and Service was 0.89, Disease Prevention / Health Promotion was 0.91 and 0.94 was found for the overall scale.

Healthy Lifestyle Behaviour

The Health Promotion Scale, originally devised by Chen et al. (15) and subsequently translated into Turkish by Ebem (20), was employed to assess the healthy lifestyle practices of students in the faculty of sports sciences. This scale includes a total of 34 items, 6 sub-dimensions (Nutrition, Health Responsibility, Appreciation of Life, Social Support, Exercise, Stress Management) and a 5-point Likert scale (1= Never, 2= Rarely, 3= Occasionally, 4= Usually, 5= Always). The scale can be calculated separately as total and sub-dimensions. The scores that can be obtained from the scale vary between 34-170. The increase in the scores obtained from the scale indicates that the healthy life behaviours of the individuals increase. Test-retest reliability was used for the reliability of the scale. Accordingly, it is stated that Nutrition 0.93, Health Responsibility 0.88, Appreciation of Life 0.81, Social Support 0.80, Exercise 0.85, Stress Management 0.86 and 0.90 for the overall scale. It is stated that the scale is valid and reliable in university students aged 18 and over (20). Within the scope of the research, the reliability of the scale was calculated with Cronbach's Alpha internal consistency coefficient. In the sub-dimensions of the scale; Nutrition 0.76, Health Responsibility 0.79, Appreciation of Life 0.74, Social Support 0.70, Exercise 0.75, Stress Management 0.85 and 0.91 for the overall scale.

Physical Activity

International Physical Activity Questionnaire Short Form was used to determine the physical activity level of sport sciences faculty students. The questionnaire was developed by Craig et al. (17) and adapted to Turkish by Öztürk (45) and validity and reliability analyses were performed on university students. The questionnaire is a short self-report form based on recalling the last seven days to determine physical activity levels. The questionnaire inquires how many days and how long (minutes) they sat, walked, did moderate and vigorous physical activity in the last seven days in order to determine their physical activity levels. When calculating these physical activity areas, the MET (Metabolic Equivalent of Task) of the activity is obtained with the formula "x days x minutes". MET represents a multiplier of the resting metabolic rate and delineates the energy expended during physical activities. MET values are determined as 1.5 for sedentary behavior, 3.3 for walking, 4.0 for moderate activity, and 8.0 for vigorous activity. The total MET minutes per week of physical activity is calculated using the formula "(walking + moderate intensity + vigorous + vigorous + sedentary)". Based on the resulting total score, an individual's physical activity level can be categorized as low (<600 MET min/week), moderate (600-3000 MET min/week), or high (3000 MET min/week) (45).

Data Collection

Permission was obtained from the authors by e-mail for the use of the scales before the data were collected. Permission was obtained from the dean of sports sciences faculty for the research. The approval of the ethics committee of Süleyman Demirel University University Ethics Committee dated 14.02.2024 and numbered E-87432956-050.99-687725 was obtained. The data of the study were collected face-to-face in a quiet classroom environment with the voluntary participation of the participants.

Data Analyses

Statistical Package for Social Sciences (SPSS) version 23.0 was used to analyse the data. Before analyzing the data, it was checked whether there were missing or incorrect answers. Then, missing data and outlier analyses were performed. As a result of the analysis, it was determined that there were 10 extreme data in the data set and the analyses were carried out by excluding them from the analysis. Descriptive and inferential statistics were used in the analysis of the research data. In addition to frequency, percentage, arithmetic mean analyses, kurtosis, and skewness values of the descriptive data were calculated. In order to examine whether the research data were normally distributed, kurtosis and skewness values were examined whether they were between +1.5 and -1.5 (53, 24) and it was found that the data were normally distributed (Table 2). Parametric analyzes were used because the data showed normal distribution. Pearson correlation analysis was used for relationship analysis. The level of relationships was considered as 0.00-0.30 low, 0.30-0.70 medium and 0.70-1.00 large (14). For mediation analyses, regression analysis based on the bootstrapping method was performed and indirect effects were reported in line with binary confidence interval (CI) values (27). In these analyses, age, gender, department and grade level variables were kept under control. The analyzes were carried out with model 4 using the Process Macro v3.3 plug-in developed by Hayes (27). The analysis was carried out

with 5000 resampling methods with a 95% confidence interval (Confidence Interval, CI). In this context, the significance of the mediation role is evaluated according to the criterion that the lower (BootLLCI) and upper (BootULCI) confidence intervals of the bootstrapping results do not contain the value (0). In the literature, instead of the causal approaches of Baron and Kenny (7) and the mediation analyses of Sobel test, it is stated that modern approaches provide more reliable results. Bootstrapping method stands out at this point (26; 27, 47, 40). Bootstraping method is one of the most popular methods of testing the mediation role because it does not require the normality assumption to be met, can be used effectively in smaller sample groups (n < 25), provides the opportunity to control the factors that may affect the relationships between variables and minimises the TYPE 1 error rate (46).

FINDINGS

The descriptive statistics of sport sciences faculty students' health literacy, healthy lifestyle behaviours and physical activity and the relationships between these variables are presented in Table 2.

Table 2. Descriptive Statistics of Variables and Pearson Correlation Analyses

Variables	Min	Max	$\bar{X}$	Sd	Skew	Ku	1.	2.	3.
1.Health Literacy	1.04	50.0	33.94	9.53	-.400	.071	1		
2.Healthy Lifestyle Behaviours	65	170	122.88	20.24	-.158	-.140	.255**	1	
3.Physical Activity (MET min/week)	180	16284.0	4395.52	3401.54	1.03	.789	.024	.254**	1

Min: Minimum, Max: Maximum, $\bar{X}$: Mean, Sd: Standard deviation, Skew: Skewness, Ku: Kurtosis

When Table 2 is examined, it is seen that there is a statistically significant relationship between health literacy, healthy lifestyle behaviours (r=.255, p<0.01) and physical activity (r=.024, p<0.01) at low level. There was a low level statistically significant relationship between healthy lifestyle behaviours and physical activity (r=.254, p<0.01).

The statistics about the mediating role of healthy lifestyle behaviours in the relationship between health literacy and physical activity of sport sciences faculty students are presented in Figure 1.

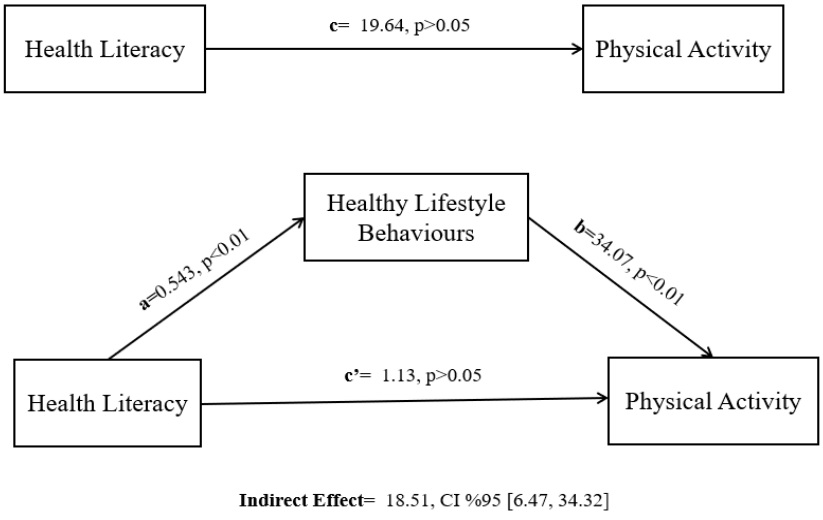

Figure 1. Research Model

When Figure 1 is examined, it is seen that health literacy has a statistically significant positive effect on healthy lifestyle behaviours (a = 0.543, S.H.= .127, t= 4.2560, p<0.01). Healthy lifestyle behaviours were found to have a statistically significant positive effect on physical activity (b= 34.07, S.H.=10.14, t=3.3591, p<0.01). On the other hand, it was found that health literacy did not affect physical activity (c=19.64, S.H=21.09, t=.931, p>0.05) at a statistically significant level. However, the combined effect of health literacy and healthy lifestyle behaviour on physical activity (c'=1.13, S.H.=. 21.40, t=0.052, p>0.05) was also statistically insignificant.

However, this does not affect the mediating role of healthy lifestyle behaviours. Because Gürbüz (26) states that the fact that the total effect (c) and direct effect (c') are not statistically significant will not invalidate the mediation model and will not prevent the mediating role. At this point, when the mediating role of healthy lifestyle behaviours between health literacy and physical activity was evaluated according to the fact that the binary confidence interval did not include the value "0", it was seen that there was a mediating role (β=18.51, CI 95% [6.47, 34.32]).

DISCUSSION AND CONCLUSION

The first objective of this study was to investigate whether health literacy has a positive and statistically significant effect on the physical activity levels of students from the Faculty of Sport Sciences. The findings revealed that health literacy does not affect students' physical activity levels. This suggests that increasing students' health literacy alone does not necessarily result in higher engagement in physical activity. In contrast, Buja et al. (13) conducted a systematic review including 19 studies examining the relationship between health literacy and physical activity in individuals aged 18 years and older. They found that 15 of these studies reported a positive relationship between the two variables, highlighting an overall trend that differs from our findings. Similarly, Julavanichpong et al. (29), in their longitudinal study involving sport science students, found that although students consistently demonstrated high levels of health literacy over a four-year period, their physical activity participation remained only moderate. This points to a disconnect between knowledge and behavior, reinforcing the idea that high health literacy does not automatically lead to increased physical activity. On the other hand, our findings are supported by Tatar (55), who also found no significant relationship between health literacy and moderate physical activity among medical students. Moreover, the Ministry of Public Health, as cited by the World Health Organization (59), noted that students often possess strong health knowledge, but this does not necessarily translate into increased participation in physical activity. These findings collectively suggest that theoretical health education may be insufficient for promoting behavioral change. Therefore, it is recommended that educational strategies incorporate experiential learning and practical applications in addition to traditional knowledge transfer. It should also be considered that the effect of health literacy on physical activity may occur indirectly through other variables.

The second objective of this study was to examine whether healthy lifestyle behaviors mediate the relationship between health literacy and physical activity among students in the Faculty of Sport Sciences. Our findings revealed that healthy lifestyle behaviors play a significant mediating role in this relationship. When the relevant literature was examined, no study examining the relationship between healthy living behaviour, health literacy and physical activity was found. However, previous correlational studies between health literacy, healthy life behaviour and physical activity support our findings. For example, García-García et al. (23) found a positive correlation between health literacy and a healthy lifestyle among Spanish primary healthcare patients. Kasımoğlu et al. (33) and Kazak et al. (34) also observed that university students with higher health literacy engaged more frequently in health-promoting behaviors. In a similar vein, Kolnik et al. (36) reported that nursing students with better health literacy exhibited more positive health behaviors. Supporting this pattern, Ergün et al. (21) showed a strong relationship between e-health literacy and healthy lifestyle behaviors among adolescents in Balıkesir, highlighting that higher digital health literacy was linked to healthier behavior choices. Likewise, Gül et al. (25) reported a positive association between health literacy and healthy lifestyle habits among university students. Imanian et al. (28) further supported these findings by showing that patients with heart failure who had higher health literacy were more successful in adopting health-promoting behaviors and managing their condition. Moreover, studies such as those by Lange et al. (38) and Liu et al. (39) emphasized that health literacy plays a critical role in influencing a variety of health-promoting behaviors, including physical activity. Similarly, Soykan and Şengül (51) confirmed a strong link between health literacy and healthy lifestyle behaviors among university students, reinforcing the role of literacy in shaping behavior. In addition, the association between healthy lifestyle behaviors and physical activity is well-documented in the general population. For instance, Bize et al. (11) found that individuals who adopted healthier lifestyle practices were more likely to be physically active. Taken together, these findings suggest that physical activity is influenced not only by health literacy but also by the healthy lifestyle behaviors it promotes. This supports the mediating role identified in our study.

As a result, it was observed that healthy lifestyle behaviour played a mediating role in the relationship between health literacy and physical activity of sport sciences faculty students. It can be said that increasing the health literacy of sport sciences students may be important in participation in physical activity by increasing their healthy lifestyle behaviours. For this reason, it is recommended to include more practices that increase health literacy among students of the faculty of sports sciences.

Limitations of the Study

There are also some limitations in our research. The first of these limitations is the inability to ensure causality with the data obtained due to the fact that the research was designed in the relational survey model and the data were collected in a certain time period. The second limitation is the limitation of the generalizability of the study due to the determination of the participants in the research with convenience sampling method. The third limitation is that physical activity is obtained through self-report. In this method, participants have the possibility of remembering the amount of physical activity more or less. The last limitation is that the relationships specified in the model may be bidirectional. For example, participation in physical activity may affect healthy lifestyle behaviours.

Suggestions

- Future studies to improve the generalizability of the research results; It is recommended to conduct the study in different provinces and to identify participants using probability sampling methods.
- The research was designed in quantitative research method and relational survey model. It is recommended that subsequent research be designed as experimental and longitudinal studies in order to obtain more in-depth information about the relationships between variables.
- In this study, physical activity measurements were obtained using measurement tools based on participants' self-report. In subsequent studies, it is recommended that physical activity be measured using objective measurement methods (e.g. pedometer, accelerometer).
- This research was conducted on students from the faculty of sports sciences. Future studies can be repeated in different sample groups.
- It is recommended to include more practices that increase health literacy among students of the faculty of sports sciences.

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