



## The Relationship between the Physical Literacy of Adolescents and Information Acquisition Sources of Physical Activity

Mansoure Alipour-Anbarani<sup>1</sup>, Mohtasham Ghaffari<sup>1</sup>, Ali Montazeri<sup>2</sup>, Amir Kavousi<sup>3</sup>, \*Ali Ramezankhani<sup>1</sup>

<sup>1</sup>Department of Public Health, School of Public Health and Safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

<sup>2</sup>Health Metric Research Center, Iranian Institute of Health Sciences Research, ACECR, Tehran, Iran.

<sup>3</sup>Health Promotion Research Center and Department of Epidemiology, School of Public Health and Safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

### Abstract

**Background:** Physical literacy can consciously support a healthy lifestyle. Adolescents use the Internet, parents, physical education specialists (e.g., sports club coaches and school physical education teachers), and friends to obtain information on physical activity. The purpose of this study is to determine the physical literacy of adolescents according to information acquisition sources of physical activity.

**Materials and Methods:** In this cross-sectional study, 510 Iranian adolescents aged 16 to 18 years from Tehran high schools were selected by random sampling in the 2021 academic year. The data collection tool was a researcher-made questionnaire with two parts: general characteristics and the physical literacy of adolescents 16 to 18 years. The questionnaire contained 34 items across four dimensions: information acquisition skill, information comprehension skill, information assessment skill, and self-care skill. Data were analyzed using SPSS software (version 16.0).

**Results:** The 510 adolescents in the study consisted of 256 girls (50.2%), and 254 boys (49.8%). The mean physical literacy score was  $72.32 \pm 13.98$  for male adolescents, and  $71.15 \pm 15.42$  for female adolescents and did not show a significant difference ( $p = 0.370$ ). The one-way ANOVA test did not show a significant difference between the mean score of physical literacy and age groups ( $p = 0.448$ ), but showed that adolescents who referred to the club coach for information had higher physical literacy ( $75.52 \pm 14.84$ ,  $p = 0.004$ ).

**Conclusion:** Adolescents who asked their gym coach for information on physical activity had a higher physical literacy score, indicating the confidence of teenagers in using the information from experts.

**Key Words:** Adolescents, Information sources, Iran, Physical activity, Physical literacy.

\*Please cite this article as: Alipour-Anbarani M, Ghaffari M, Montazeri A, Kavousi A, Ramezankhani A. The Relationship between the Physical Literacy of Adolescents and Information Acquisition Sources of Physical Activity. Health Provid 2022; 2(2): 109-19. doi: **10.22034/HP.2023.418463.1042**

### \*Corresponding Author:

Ali Ramezankhani, PhD, Professor, School of Public Health and Safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Email: [ramezankhaniali1@gmail.com](mailto:ramezankhaniali1@gmail.com)

Received date: Mar. 19, 2022; Accepted date: Nov. 22, 2022

## 1- INTRODUCTION

The concept of physical literacy was first introduced by Margaret Whitehead in 1993 and involves motivation, confidence, physical competence, and knowledge and understanding to engage in physical activity in life (1). Physical literacy is the basis for learning cognitive, behavioral, and methodological skills to benefit from the advantage of lifelong physical activity (2). According to the findings of studies, the mean physical literacy score of adolescents is 63% for boys and 62% for girls, with a moderate score for physical literacy, and girls usually have a lower mean physical literacy score than boys (3, 4). About one-fifth of the world's population (approx. 1.2 billion people) are adolescents (aged 10-19) (5). According to the 2016 census in Iran, adolescents aged 10-19 made up a large part of the population of the country with a population of 11.2 million (6).

Inadequate physical activity is a major risk factor for death worldwide. Approximately 2.3 million people die every year due to the lack of physical activity (7). In the last two decades, physical activity has decreased in all age groups. More than 80% of the world's adolescent population does not have enough physical activity (8). Adolescents who do not follow current physical activity guidelines are estimated at 80.3% (9). Researchers around the world have shown that economically disadvantaged girls and ethnic minorities are less physically active (10, 11). Physical activity decreases with age (12, 13). Active commuting to school and active play opportunities are declining, and sedentary activities are increasing (14).

Adolescents are less involved in physical activity if they are less physically literate, increasing the risk of diseases caused by a sedentary lifestyle, such as obesity and diabetes (15, 16). Adequate and regular physical activity reduces the risk of developing chronic diseases in adulthood

(8, 17). School age is one of the most important times in life to ensure health in adulthood because proper physical activity during the growth years significantly helps stabilize health, having a huge potential for increasing health in this age group (17). Considering the position of adolescents in public health, the role of adolescents should be assessed as the basis of future health (5). Adolescents use the Internet, parents, physical education specialists (such as sports club coaches and school physical education teachers), and friends to obtain information on physical activity (18). Better physical literacy requires the cooperation of all the individuals involved, including parents, managers and trainers of physical training, sports associations, and club managers (19, 20).

Physical literacy advances through acquiring knowledge and information about the nature of physical activity and its relationship with health. Specialists are responsible for ensuring the development of adolescents, researching, and gathering new information in this field. Teachers working with older age groups often specialize in physical education. All specialized teachers of physical training should understand the importance and value of physical literacy and their role in training programs. Also, the people who have responsibility in clubs, sports classes, and leisure centers are highly influential, and their efforts can be important in adolescents continuing their physical activities, evaluating their competencies, trying new and appropriate activities, and learning new skills while developing their merits (20).

In the current era, information sources such as the Internet and mobile phones have turned the world into a village, and Internet use is globally popular (21, 22). Today, the use of mass media, such as the Internet and virtual space, has a special attraction for people, which affects their values, attitudes, and social/cultural

identity. Virtual social networks can play a highly effective role in the development of specialized and general education (23). Therefore, it is necessary to use these media to encourage people to do physical activity. This way, numerous people can be trained at a low cost compared to written media and face-to-face interventions (24). They can also provide information in a short time with maximum efficiency and have positive effects on the knowledge, literacy, and attitude of the audience (25). The present study uses the physical literacy questionnaire for adolescents aged 16 to 18 years, designed based on Iranian culture and attitude (18), and aims to investigate the physical literacy of Iranian adolescents according to the physical activity information sources.

## 2- MATERIALS AND METHODS

### 2-1. Study Design

In this cross-sectional study, 510 Iranian adolescents aged 16 to 18 years from high schools in Tehran, Iran, were selected by random sampling in 2021. The adolescents' physical literacy was assessed according to the physical activity information source (such as the Internet, parents, and physical education specialists such as sports club coaches, school physical education teachers, and friends).

### 2-2. Participants and method

The study population was Iranian adolescents aged 16 to 18 studying in high schools in Tehran. The research setting was high schools for girls and boys in education districts 1, 2, 4, and 6 of Tehran. The sample size was determined based on the following formula:

$$n = \frac{z_{1-\frac{\alpha}{2}}^2 p(1-p)}{d^2}$$

Where,  $p=0.50$  (proportion of people with sufficient physical literacy),  $\alpha=0.05$ , confidence level=95%,  $d=0.05$  (margin of

error). A total of 424 samples were considered, including 10% attrition. Initially, for the samples to have proper coverage, the city of Tehran was divided into five parts: northeast, northwest, southeast, southwest, and center. Four districts (1, 2, 4, and 6) were selected randomly out of 19 education districts. Then, one high school for girls and one high school for boys were randomly selected from each district. After visiting the selected schools, the researcher first introduced himself and gave a brief explanation of the research plan to school principals. Then, in coordination with school principals and assistants, a class was randomly selected from each grade and field of study. All students in selected classes participated in the study with consent as a sample.

### 2-3. Data collection

The data collection tool was a valid and reliable questionnaire (18) consisting of two parts: personal characteristics with 12 items and physical literacy of adolescents with 34 items and 4 dimensions. Personal characteristics included age, gender, and educational grade, field of study, parents' education, parents' occupation, sports club membership, and source of receiving physical activity information. The physical literacy section included 34 items across four domains: information acquisition skill (8 items), information comprehension skill (11 items), information assessment skill (6 items), and self-care skill (9 items). The five-point Likert scale rated the responses as never (1 point), rarely (2 points), sometimes (3 points), most of the time (4 points), and always (5 points) (18).

Based on the cut-off points of 50, 66, and 84, the physical literacy of adolescents was rated at four levels: insufficient (scores 0 to 50), not sufficient (50.1 to 66), good (66.1 to 84), and excellent (84.1 to 100) (26). Data was collected by filling out a questionnaire as a self-report. Due to the concurrence of data collection in the

present study with the COVID-19 pandemic, the method of completing the questionnaire was in-person in some schools and online in others. Data collection was performed in two months (April to May 2021). Students completed 406 questionnaires out of 955 questionnaire visits on the Press Line website, and 126 questionnaires were completed in person. After reviewing 532 completed questionnaires, those with information deficiencies were excluded from the research process, and finally, 510 questionnaires with complete information were included in the research for analysis (510 questionnaires were higher than the sample size because more questionnaires were sent to the Press Line system for online completion).

#### **2-4. Inclusion criteria**

Participants were included in the study if they were aged from 16 to 18, a student at the time of study, actively participated in the study, had no physical disability, and had informed consent to participate in the research.

#### **2-5. Exclusion criteria**

Withdrawal from continuing to participate in the research and incomplete questionnaires were the exclusion criteria.

#### **2-6. Validity and reliability of the tool**

The psychometric properties of this tool have been investigated in previous studies in Iran, and the validity of the tool has been confirmed in terms of content, appearance, and culture. Cronbach's alpha reliability for this tool was reported as 0.93. Accordingly, this tool is valid and reliable in Iran (18).

#### **2-7. Data analysis**

Normality was tested using the Kolmogorov-Smirnov test. Descriptive statistics (frequency, mean, and standard deviation), and inferential statistics (independent t-test, one-way ANOVA test)

were used to analyze the data. SPSS software version 16.0 was also used for statistical analysis. A p-value less than 0.05 was considered statistically significant.

#### **2-8. Ethical considerations**

Ethical confirmation was obtained from the Research Center of Public Health and Safety School of Shahid Beheshti University of Medical Sciences (IR.SBMU.PHNS.REC.1398.125).

Conscious consent to participate in the study was received in writing from each participant. Participants were assured that the information received was confidential.

### **3- RESULTS**

Out of 510 Iranian adolescents aged 16 to 18 years participating in the study, 256 (50.2%) were girls. In terms of frequency and percentage of adolescents, 134 were 16 (26.3%), 207 were 17 (40.6%), and 169 were 18-year-old (33.1%). 313 adolescents (61.4%) stated that the maximum hours of using cyberspace per day is between 1 and 4 hours. In addition, 58.6% of adolescents were members of sports clubs, and 42.4% reported the Internet as the first point to get answers to physical activity questions. (Table 1).

According to the physical literacy score, 6.7% of adolescents (34 students) have insufficient physical literacy, 28.6% (146 students) have not sufficient physical literacy, 43.7% (223 students) have good physical literacy, and 21% (107 students) had excellent physical literacy. According to the independent t-test, there was no significant difference between the mean physical literacy score in male and female adolescents ( $p=0.370$ ). The mean physical literacy score of male adolescents ( $72.32\pm13.98$ ) was higher than female adolescents ( $71.15\pm15.42$ ), but the difference was not significant ( $p=0.405$ ) (Table 2).

**Table-1:** The general characteristics of the participants (n = 510).

Variables	Number	%
<b>Gender</b>		
Boy	254	49.8
Girl	256	50.2
<b>Age (year)</b>		
16	134	26.3
17	207	40.6
18	169	33.1
<b>Academic year</b>		
10	157	30.8
11	155	30.4
12	198	38.8
<b>Field of study</b>		
Vocational Training	103	20.2
Technical Training	96	18.8
Humanities	108	21.2
Experimental Sciences	111	21.8
Mathematics & Physics	92	18
<b>Sports club membership</b>		
No	211	41.4
Yes	299	58.6
<b>Initial source of response</b>		
Physical education teacher	60	11.8
Sports club coach	116	22.7
Parents	80	15.7
Friends	38	7.5
Internet	216	42.4
<b>Using of cyberspace in a day (hour)</b>		
1-4	313	61.4
5-8	142	27.8
9-12	55	10.8

**Table-2:** Comparison of mean scores of adolescents' physical literacy and its dimensions based on the gender.

Domains of physical literacy	Girl		Boy		P-value
	Mean	SD	Mean	SD	
Acquisition	32.12	6.31	32.22	5.59	0.852
Comprehension	44.76	7.97	44.74	7.23	0.978
Assessment	23.18	4.60	23.55	4.08	0.341
Self-care	30.74	7.88	31.85	7.48	0.102
Total physical literacy score	71.15	15.42	72.32	13.98	0.370

SD: Standard deviation.

The one-way ANOVA test did not show a significant difference between the mean score of adolescents' physical literacy and age groups ( $p= 0.448$ ). However, there was a significant difference between different ages in the self-care area ( $p= 0.012$ ). The

mean score of 18-year-old adolescents' physical literacy was higher than 16- and 17-year-old adolescents ( $72.93 \pm 14.40$ ), but the difference was not significant ( $p= 0.448$ ) (**Table 3**).

**Table-3:** Comparison of mean scores of adolescents' physical literacy and its dimensions based on age groups.

Age (year)	Dimensions of physical literacy								Total physical literacy score	
	Acquisition		Comprehension		Assessment		Self-care			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
16	31.78	6.06	44.05	7.99	23.41	4.43	31.08	7.58	70.99	15.00
17	32.36	6.21	45.13	7.54	23.19	4.50	30.31	7.91	71.32	14.82
18	32.16	5.56	44.84	7.36	23.54	4.12	32.66	7.36	72.93	14.40
P-value	0.761		0.438		0.733		0.012		0.448	

SD: Standard deviation.

The one-way ANOVA test showed a significant difference between the mean score of adolescents' physical literacy and the source of receiving information ( $p=0.004$ ). Adolescents who referred to their club coach had higher physical literacy ( $75.52\pm 14.84$ ). The post-hoc test showed a significant difference in the mean physical literacy score of adolescents between the source of receiving information from the club coach and parents ( $p=0.008$ ). In addition, the one-way ANOVA test also showed a significant difference in the mean physical literacy score with information source, acquisition ( $p=0.004$ ), assessment

( $p=0.047$ ), and self-care ( $p=0.001$ ), but it did not show a significant difference in comprehension ( $p=0.088$ ) (**Table 4**). The independent statistical t-test showed a significant difference between the mean score of adolescents' physical literacy and membership in the sports club ( $p=0.001$ ) so that the mean score of adolescents' physical literacy who were not members of the sports club was higher than other students ( $74.63\pm 14.58$ ). It also showed a significant difference between the mean score of adolescents' physical literacy in the domains of acquisition ( $p=0.011$ ), and self-care ( $p=0.001$ ) with membership in a sports club (**Table 5**).

**Table-4:** Comparison of mean scores of adolescents' physical literacy and its dimensions based on the source of receiving physical activity information.

Source of receiving information	Dimensions of physical literacy								Total physical literacy score	
	Acquisition		Comprehension		Assessment		Self-care			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Physical training teacher	30.25	5.41	43.67	7.34	23.08	4.00	31.15	7.05	69.23	13.24
Club coach	32.64	6.09	45.43	7.72	24.28	4.14	34.35	6.92	75.52	14.84
Parents	30.99	6.00	43.50	7.36	22.49	4.55	29.82	7.15	68.36	13.98
Friends	31.32	5.71	43.03	7.82	22.68	4.16	30.61	7.37	68.85	14.81
Internet	33.03	5.89	45.45	7.058	23.40	4.45	30.36	8.12	72.21	14.92
P-value	0.004		0.088		0.047		0.001		0.004	

SD: Standard deviation.

**Table-5:** The comparison of mean scores of adolescents' physical literacy and its dimensions based on sports club membership.

Club membership	Dimensions of physical literacy								Total physical literacy	
	Acquisition		Comprehension		Assessment		Self-care			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
No	32.97	5.62	45.51	7.66	2.78	4.15	33.25	7.21	74.63	14.58
Yes	31.60	6.13	44.21	7.52	23.07	4.47	29.92	7.74	69.73	14.51
P-value	0.011		0.058		0.070		0.001		0.001	

SD: Standard deviation.

#### 4- DISCUSSION

The present cross-sectional study aimed to determine the relationship between the physical literacy of adolescents and sources of information on physical activity among 510 Iranian students of the selected high schools in Tehran, Iran. The one-way ANOVA test showed that adolescents who referred to the club coach to receive information had higher physical literacy than other adolescents ( $75.52 \pm 14.84$ ,  $p=0.004$ ).

In the present study, 42.4% of adolescents considered the Internet as the first source of receiving information on physical activity. Another study found that 75% of young people aged 15-24 used the Internet for acquiring information (27), and in another study, more than 80% of adolescents used the Internet for acquiring health information (28), consistent with the results of the present study. Due to the wide access of adolescents to the Internet, physical literacy skills can be improved through educational interventions using the Internet. However, in the study of Ghanbari et al. (29), about 50% of adolescents named their parents as the first source of acquiring information.

In the study of Brown et al., about 31% of students mentioned their parents as the primary source of health information (30), inconsistent with the results of the present study. In addition, this study found a significant difference between the mean

physical literacy of adolescents and the source of receiving physical activity information ( $p=0.004$ ), which showed that adolescents who used their sports club coach to receive physical activity information had a higher physical literacy score ( $75.52 \pm 14.84$ ,  $p=0.003$ ). The club coach has specialized information on physical activity that is suitable for the needs of adolescents, so they usually use the information of the club coach in a practical way, as they trust their specialized information. According to the current study, 61.4% of adolescents stated that the maximum number of hours of using cyberspace per day is between 1- 4 hours.

A national study in the United States (2010) reported that children and adolescents aged 8-18 years spent more than 7.5 hours a day in cyberspace (31), and this rate was close to 9 hours in 2015 for adolescents aged 13-18 (32). Saunders et al. found that boys spend more time in cyberspace than girls. In recent years, the use of cyberspace by adolescents has increased unprecedentedly, and it is possibly the most frequent activity (except sleeping) during the day (33).

Based on the findings of the present study, the mean physical literacy score of male adolescents was higher than female adolescents but not significantly ( $p=0.370$ ), which may have a decreasing effect on girls' physical activity due to the

role of culture and social norms in observing hijab and coverage during physical activity in open places such as parks. In Tremblay et al.'s study, the mean physical literacy score of boys was higher than girls, which was not consistent with the results of the present study (4). However, in the studies of Mirali et al., and Blanchard et al., the mean physical literacy score of knowledge and comprehension of girls was higher than boys (34, 35).

The findings of the current study showed no significant relationship between the mean score of physical literacy and age groups ( $p = 0.448$ ), which was consistent with the findings of Longmuir et al. (36). In addition, the mean score of adolescents' physical literacy of the 18-year-old age group was higher than the other age groups, which is consistent with the results of the study by Blanchard et al. (34). Tremblay et al. and Nikkho et al. found that the mean score of physical literacy decreased with age, which was not consistent with the results of the present study (4, 37).

However, among the physical literacy areas, only the self-care area in the study age groups showed a significant difference ( $p=0.008$ ), showing that the mean self-care score of the 18-year-old age group was higher than other groups. In the studies by Rui-Si et al., and Nystrom et al., it was found that adolescents with a lower body mass index score have higher physical literacy (38, 39). In the studies of Brown et al. and Rui-Si et al., it was shown that adolescents with higher participation in physical activities had a better physical literacy score. Adopting healthy habits and behaviors as a form of self-care in adolescence supports a healthy lifestyle in adulthood, which is consistent with the results of the present study (3, 38).

Self-care behaviors in adolescents are influenced by their physical literacy, indicating the need to pay more attention

to physical literacy in prevention programs. Teaching physical literacy skills along with effective educational interventions for adolescents can be appropriate measures to perform physical activity and maintain adolescents' health.

In the present study, 58.6% of the participating adolescents stated that they are members of a sports club. A significant relationship was observed between the mean score of adolescents' physical literacy and membership in a sports club ( $p=0.001$ ). However, it was found that adolescents who were not members of the sports club had a higher mean physical literacy ( $74.63\pm 14.58$ ).

In addition, some adolescents may temporarily not declare themselves as members of a sports club due to the outbreak of COVID-19 or exam days at the time of completing the questionnaire. Due to the importance of high physical literacy in adolescents, which leads to higher physical activity and improves the health of teenagers, the education organization, in cooperation with municipalities, should establish sports clubs at reasonable prices for adolescents (40, 41).

#### 4-1. Study Limitations

- 1) The reluctance of some students to participate in the study, who had to be encouraged to participate to overcome this limitation by stating the importance and benefits of this project;
- 2) A lack of cooperation of some schools, introduced by another school by making the necessary coordination with the education department of the mentioned district; and
- 3) The self-report method in completing the physical literacy questionnaire, making it difficult to compare observable differences between individuals.



## 5- CONCLUSION

According to the findings of the present study, adolescents with high physical literacy used the information of the gym coach more because of their trust in the knowledge of the physical education specialist in having accurate information and performing sports movements correctly, as well as having a good relationship with the coach. Therefore, it is necessary to use physical activity trainers in schools to improve the physical literacy of teenagers. In addition, the use of mass communication tools such as the Internet has an effective role in improving the physical literacy of teenagers due to its easy access, low cost, and greater attractiveness in teaching physical activity information.

## 6- ACKNOWLEDGMENTS

The study authors appreciate health education and promotion specialists and physical education professionals, as well as school principals and students participating in the study. This study is part of the first author's doctoral dissertation on health education and health promotion.

**7- CONFLICT OF INTEREST:** None.

## 8- REFERENCES

- Whitehead, M. *Physical Literacy: Throughout the Lifecourse*. 1st ed. New York: Routledge; 2010.
- Tremblay M, Lloyd M. Physical literacy measurement-the missing piece. *Physical and health education journal*. 2010;76(1):26-30.
- Brown DM, Dudley DA, Cairney J. Physical literacy profiles are associated with differences in children's physical activity participation: A latent profile analysis approach. *Journal of Science and Medicine in Sport*. 2020;23(11):1062-7.
- Tremblay MS, Longmuir PE, Barnes JD, Belanger K, Anderson KD, Bruner B, et al. Physical literacy levels of Canadian children aged 8–12 years: descriptive and normative results from the RBC Learn to Play–CAPL project. *BMC Public Health*. 2018;18(2):1036.
- UNICEF. *Progress for Children: A report card on adolescents*. New York USA: UNICEF;2012.
- National Census of Population and Housing. Tehran, Iran: Statistical Center of Iran, 2019.
- Shirvani ZG, Ghofranipour F, GHarakhanlou R, Kazemnejad A. Examination of factor structure of the developed theory of planned behavior with the action and coping planning scale of physical activity in the wives of the military personnel. *Journal Mil Med*. 2015;17(1):25-33.
- Fakhrzadeh H, Djalalinia S, Mirarefin M, Arefirad T, Asayesh H, Safiri S. Prevalence of physical inactivity in Iran: a systematic review. *Journal of cardiovascular and thoracic research*. 2016;8(3):92.
- Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, et al. Global physical activity levels: surveillance progress, pitfalls, and prospects. *The lancet*. 2012;380(9838):247-57.
- Lämmle L, Worth A, Bös K. Socio-demographic correlates of physical activity and physical fitness in German children and adolescents. *The European Journal of Public Health*. 2012;22(6):880-4.
- Brophy S, Rees A, Knox G, Baker J, Thomas NE. Child fitness and father's BMI are important factors in childhood obesity: a school based cross-sectional study. *PloS one*. 2012;7(5):e36597.
- Kwan MY, Cairney J, Faulkner GE, Pullenayegum EE. Physical activity and other health-risk behaviors during the transition into early adulthood: a longitudinal cohort study. *American journal of preventive medicine*. 2012;42(1):14-20.
- Erwin HE, Beighle A, Morgan CF, Noland M. Effect of a low-cost, teacher-directed classroom intervention on elementary students' physical activity. *The Journal of school health*. 2011;81(8):455-61.
- Reilly JJ, Penpraze V, Hislop J, Davies G, Grant S, Paton JY. Objective measurement

of physical activity and sedentary behaviour: review with new data. *Archives of disease in childhood*. 2008;93(7):614-9.

15. Valadi S, Hamidi M. Studying the level of physical literacy of students aged 8 to 12 years. *Research on Educational Sport*. 2020;8(20):205-26.

16. Santoro K, Speedling C. The case for investing in youth health literacy: One step on the path to achieving health equity for adolescents. *NIHCM Issue Brief* 2011; October, 1-15. Retrieved from <http://www.NIHCM.org>.

17. Peyman N, Alipour-Anbarani M. The Effect of Training Diabetes Prevention Behaviors on Promotion of Knowledge, Attitude and Practice of Students for Prevention of Diabetes in Mashhad City. *Int J Pediatr*. 2015;1.3(2-2):501-7.

18. Alipour-Anbarani M, Ghaffari M, Montazeri A, Kavousi A, Ramezankhani A. Development and Psychometric of a Physical Literacy Questionnaire for Young Adolescents (16 - 18 Years of Age): A Mixed-Method Study. *Shiraz E-Med J*. 2023;24(9):e138738.

19. Marashi T, Safari-Moradabadi A, Ahmadi F, Alipour-Anbarani M. The effect of education based on the theory of planned behavior on the promotion of physical activity and knowledge of students about diabetes prevention. *International Journal of Health Promotion and Education*. 2020:1-13.

20. Whitehead M, Murdoch E. Physical literacy and physical education: Conceptual mapping. *Physical Education Matters*. 2006;1(1):6-9.

21. Khojasteh S, Mir Hosseini SA. [The relationship between social networks and mental health and national and religious identity of secondary school students in district 1 of Kerman city (Persian)]. *A Biquarterly Journal of Education Sociology*. 2018; (11):99-112. <https://www.magiran.com/paper/1873348>

22. Jafari Harandi R, Bahrami S. [The effect of Internet addiction, mental and spiritual health of students in Qom (Persian)]. *Information Management Science and Technology Quarterly*. 2019; 5(1):55-77. DOI:10.22091/STIM.2019.1376.

23. Dust Mohammadi M Khojasteh S. [Investigating the relationship between the use of social networks with self-confidence and mental health of faculty members and students of Payame Noor University in Kerman (Persian)]. *Iranian Journal Culture at the Islamic University*. 2019; 8(2):251-72. <https://www.magiran.com/paper/1888751>

24. Marcus B H, Nigg C R, Riebe D, Forsyth L H. Interactive communication strategies: implications for population-based physical-activity promotion. *American Journal of Preventive Medicine*, 2000;19:121-6.

25. Levin-Zamir D, Lemish D, Gofin R. Media Health Literacy (MHL): development and measurement of the concept among adolescents. *Health education Research* 2011;26:323-35.

26. Tavousi M, Haeri-Mehrizi A, Rakhshani F, Rafiefar S, Soleymanian A, Sarbandi F, et al. Development and validation of a short and easy-to-use instrument for measuring health literacy: the Health Literacy Instrument for Adults (HELIA). *BMC Public Health*. 2020;20(1):656.

27. Eysenbach G. From intermediation to disintermediation and apomediation: new models for consumers to access and assess the credibility of health information in the age of Web2.0. *Stud Health Technol Inform*. 2007;129(Pt 1):162-6. PMID: 17911699.

28. Ghaddar SF, Valerio MA, Garcia CM, Hansen L. Adolescent health literacy: the importance of credible sources for online health information. *The Journal of school health*. 2012;82(1):28-36.

29. Ghanbari S, Ramezankhani A, Montazeri A, Mehrabi Y. Health Literacy Measure for Adolescents (HELMA): Development and Psychometric Properties. *PLoS One*. 2016;11(2):e0149202.

30. Brown SL, Teufel JA, Birch DA. Early adolescents perceptions of health and health literacy. *Journal of School Health*. 2007;77(1):7-15.

31. Rideout VJ, Foehr UG, Roberts DF. *Generation M. Media in the lives of 8-to 18-year-olds*. California: Washington Offices and Barbara Jordan Conference Center; 2010.

Available from:  
<https://files.eric.ed.gov/fulltext/ED527859.pdf>.

32. Rideout V. The common sense census: Media use by tweens and teens United States of America: Common Sense Media; 2015 ]Available from:  
<https://www.common sense media.org>.
33. Saunders T, MacDonald D, Copeland J, Longmuir P, Barnes J, Belanger K, et al. The relationship between sedentary behaviour and physical literacy in Canadian children: a cross-sectional analysis from the RBC-CAPL Learn to Play study. *BMC Public Health*. 2018;18(2):45-65.
34. Blanchard J, Van Wyk N, Ertel E, Alpous A, Longmuir PE. Canadian assessment of physical literacy in grades 7-9 (12-16 years): Preliminary validity and descriptive results. *J Sports Sci*. 2020;38(2):177-86.
35. Mirali M. Modeling the physical literacy theory in ten-year old female students in ahvaz educational district one. *Sport Psychology Studies (ie, mutaleat ravanshenasi varzeshi)*. 2019;8(28):1-12.
36. Longmuir, P.E., Boyer, C., Lloyd, M. et al. The Canadian Assessment of Physical Literacy: methods for children in grades 4 to 6 (8 to 12 years). *BMC Public Health* 15, 767 (2015). <https://doi.org/10.1186/s12889-015-2106-6>.
37. Nikkhoo E, Imani N. Determining the validity and reliability of the Persian version of the canadian physical literacy knowledge questionnaire (PLKQ-2) in children 8 to 12 years old in miyaneh city. 8th Scientific-Research Conference on Educational Sciences and Psychology, Social and Cultural Harms of Iran; Tehran: 2020.
38. Rui-Si M, Raymond Kim-Wai S, Ming-Hui L, Yan H, Xue-Liang N. Association between Physical Literacy and Physical Activity: A Multilevel Analysis Study among Chinese Undergraduates. *International journal of environmental research and public health*. 2020;17(21):7874.
39. Nyström CD, Traversy G, Barnes JD, Chaput J-P, Longmuir PE, Tremblay MS. Associations between domains of physical literacy by weight status in 8-to 12-year-old Canadian children. *BMC public health*. 2018;18(2):1-8.
40. Ramezankhani A, Alipour Anbarani M, Saeidi M. The Factors Determining the Physical Activity of Students: A Systematic Review. *International Journal of Pediatrics*. 2019;7(8):9977-85.
41. Alipour Anbarani, M., Ghaffari, M., Montazeri, A., Kavousi, A., Ramezankhani, A. Physical Literacy of 16-18-Years Adolescents: A Qualitative Study. *International Journal of Pediatrics*, 2022; 10(1): 15116-125.