Rrelationship of health literacy and regular physical activity self-efficacy with body mass index in adolescent girls aged 15-18 years

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ABSTRACT

Background and Objective: Health literacy exerts a positive effect on the improvement of self-management behaviors. Along with lifestyle, it is among the social factors affecting health. Self-efficacy is a predictor of health behaviors, including physical activity. With this background in mind, the present study aimed to determine the relationship between health literacy and regular physical activity self-efficacy with body mass index in adolescent girls aged 15-18 years.

Materials and Methods: This descriptive-analytical study was conducted based on a cross-sectional design in 2016-2017 academic year. In this study, 439 students were selected from Chenaran using multistage cluster sampling. Data were collected using demographic information questionnaire, health literacy questionnaire, and regular physical activity self-efficacy questionnaire and analyzed in SPSS software (version 16) using appropriate statistical tests.

Results: The mean age of participants was reported as 16.51±1.03 years (age range: 15-18). The mean body mass index was 21.3± 3.64, and the mean score of health literacy was obtained at 0.78±0.93. The results also revealed that there was a significant difference between the mean scores of students' health literacy in the four levels of body mass index (P<0.0001). The self-efficacy of regular physical activity in obese and overweight students was lower, compared to that reported in students with normal BMI.

Conclusion: In general, health literacy, physical activity self-efficacy, and body mass index in students were not optimal. This finding highlights the need for health education intervention programs based on the components of health literacy and self-efficacy.

Paper Type: Research Article
Keywords: Health Literacy, Adolescents, Self-Efficacy of regulate exercise, Body Mass Index

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Introduction

Adolescence is a period of learning through action. As they grow older, adolescents begin to make independent decisions and manage their health(1). Puberty changes put adolescents at risk of high-risk health behaviors, such as physical inactivity and poor eating habits(2). Regular physical activity is one of the leading factors in maintaining good health and has been proposed as one of the 15 behavior change priorities to promote health(3). Despite the proven benefits of regular physical activity in all age groups, sedentary lifestyles are still common in adolescents, adults, and the elderly around the world(4).

Excess body weight

has become a paramount issue in adolescent health in recent years. World Health Organization has considered overweight and obesity in children and adolescents a widespread problem in developed and developing countries(5) . The rapid increase in the prevalence of obesity as a multifactorial problem has been attributed to environmental and cultural factors and physical activity, rather than genetic in the last 20 years(6). Health literacy is the capacity to understand and act upon messages that are central to critical judgments and decisions not only within health care settings but also about health(7) .

Personal responsibility for health, as well as self-care, has dramatically enhanced in modern and developed countries. Access to health-related information and awareness of healthcare and disease issues is an important determining factor in health. It is anticipated that people use this information to enjoy good health. This active role of individuals requires a high level of health literacy. The Institute of Medicine Report defines health literacy as the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions(8) .

Today, the issue of health literacy in adolescents has assumed particular importance, especially due to their increasingly access to electronic health information most of which may not be reliable. People with high levels of health literacy take greater advantage from health outcomes, compared to people with low health literacy. Therefore, the empowerment of teens with effective communication skills and awareness of health care issues is a vital factor in the elimination of health inequalities(9) .

Studies have shown that self-efficacy is associated with various health-related behaviors, such as diet, physical activity, and health-promoting lifestyle(10). Lam and Yang examined the association of low health literacy with overweight and obesity in adolescents aged 12-18 in China. The mentioned study reported that obesity is associated with low levels of health literacy(11). Research conducted at the Centers for Disease Control and Prevention has demonstrated that 80% of the risk for cardiovascular disease, as well as 70% of deaths due to heart attacks, can be reduced by lifestyle changes(12) .

This issue is highlighted considering that most studies emphasize the poor condition of numerous lifestyle components of Iranian adolescents. For instance, alarming reports have been presented on the consumption of prepared foods, the time allotted for watching TV or computer games, and the level of physical activity(13) . Although some factors, such as gender, age, and genetics cannot be changed for lifestyle modification, specific cognitive-behavioral factors, such as self-efficacy can be considered to promote healthy behaviors(2) .

According to Bandura, the sense of self-efficacy is an essential prerequisite for behavior change(14). One of the most important predictors of behavior is perceived self-efficacy which is defined as people's beliefs in their capabilities to control the events which affect their lives. Self-efficacy beliefs determine how people feel, think, and act (15). In addition, self-efficacy plays a peculiar role in modulating the relationship between knowledge and behavior (15, 16). There is a paucity of studies on the relationship between self-efficacy of regular physical activity, health literacy, and body mass index in adolescents in Iran. Therefore, the present study aimed to investigate the relationship of regular physical activity self-efficacy and health literacy with body mass index in female high school students in Chenaran in 2016.

Materials and Methods

Study population and sampling method

This cross-sectional study included adolescent students who were selected using cluster sampling from high schools in Chenaran in the academic year 2016-2017. The sampling method was as follows: among the three education districts of Chenaran and suburbs, the education district of Chenaran city was randomly selected and in Chenaran, all public girls' high schools were selected for research.

Inclusion criteria were as follows: 1) 15-18-year-old high school students who have completed the consent, 2) no physical problems, special disease, disability, and mental disorders, 3) Iranian nationality, and 4) residing in Chenaran. On the other hand, the exclusion criterion entailed incorrectly completed questionnaires and the occurrence of special events during the study period which led to disease.

The statistical population included high school students in Chenaran who were selected using the multi-stage cluster sampling method. The sample size was estimated at 364 cases based on the variable of body mass index in the study conducted by Ezzati Rastegar et al. (17) using the formula of comparing the mean of the variables and considering 95% confidence and acceptable error 0.05. Considering sample attrition, this number increased to 400, and finally, 439 people participated in the study. Participation in the current research was completely voluntary, the questionnaire sheets were anonymous, and participants were assured of the confidentiality of their responses. Before the commencement of the study, written consent was obtained from all participants. It is noteworthy that written approval was received from the relevant authorities, including the Faculty of Health and Education of Chenaran and the relevant schools.

Research tools

Data was collected using a questionnaire that contained the following three sections:

1. Demographic information questionnaire: It encompasses items about age, weight, height, occupation of parents and their education, the habit of regular exercise, and the number of hours devoted to activities, such as working with computers, cell phones, and watching TV.

2. Newest Vital Sign (NVS) health literacy questionnaire developed by Weiss et al. in the United States. This questionnaire contains six questions based on the label of food (ice cream). This questionnaire takes 3 min to administer and measures both reading comprehension and numeracy skills which are needed to understand both language and numbers in health contexts. In this questionnaire, 1 point was considered for each correct answer. Health literacy scores of 0-6 classified into 4 levels (0-1= inadequate literacy, 2-3= borderline literacy, 4-6= adequate literacy,1-100 high literacy).

To complete Newest Vital Sign, participants

received a nutrition label from an ice cream container printed in color on A 5 paper. The subjects were asked to answer the questions after studying the label. This process was performed for all students. The content of the NVS questionnaire has been validated according to experts' opinion. The Cronbach's alpha for this questionnaire was obtained as 0.8 based on the study conducted by Javadzadeh et al. (18) indicating the appropriateness of the internal consistency of this questionnaire.

3. Regular physical activity self-efficacy scale (Bandura 2006) which includes 18 items(19, 20) . Each item expresses self-efficacy of regular physical activity on a 5-point Likert scale ("extremely sure", “Very sure”, “Sort of sure”, “Not very sure”, and " not at all sure scored as 5, 4, 3, 2, 1(score range=18-90). Accordingly, it was classified as low self-efficacy (18-35), low self-efficacy (36-33), medium self-efficacy (54-71), and high self-efficacy (72-90).

The content validity of the regular physical activity self-efficacy questionnaire has been confirmed using experts' opinion. The Cronbach's alpha value for this questionnaire was calculated at 0.898 by the researcher pointing to the appropriate internal consistency of this questionnaire(21) . Cronbach's alpha coefficient was used to determine the reliability of the regular physical activity self-efficacy questionnaire rendering a value of 0.89. Moreover, face validity was determined by the completion of the questionnaire by 10 female students aged 15-18 in Chenaran within 10 days from the commencement of the study.

Prior to the study, necessary changes were made in the type of items, and options were matched. Thereafter, to determine the content validity, the questions of the regular physical activity self-efficacy questionnaire were sent to 15 professors, including 5 nutritionists, 4 health education specialists, and 6 educational management specialists. Content validity ratio (CVR) and content validity index (CVI) were used to evaluate content validity quantitatively. To determine the content validity index in this study, experts' opinions were inquired regarding the relevance of the questions to the objectives of the research. Moreover, the criteria of simplicity and the clarity of the questions were determined.

To determine the content validity, experts' opinions on scale items were assessed based on three criteria: simplicity and fluency, relevance or specificity, and clarity or transparency in the 4-point Likert scale ranging from1-4 for each item, and the content validity index was calculated. According to the table of critical CVR reported by Lawshe, if CVI is above 79% and CVR is above 49%, the items will be considered appropriate. In the present study, the CVR and CVI of the regular physical activity self-efficacy questionnaire were obtained at 0.97 and 98.98, respectively.

Confirmatory factor analysis was used to determine the construct validity, and all goodness-of-fit indices were calculated which indicated the validity of the questionnaire. Response options in the Self-Efficacy for Physical Activity (SEPA) scale are rated on a on a five-point Likert-scale, including 1) not confident, (2) slightly confident, (3) moderately confident, (4) very confident, and (5) extremely confident. The ranking was based on the number of questions in the regular physical activity self-efficacy questionnaire ranging from 18-90.

4. Body mass index (BMI): Students' height and weight were measured by the researcher and recorded in the relevant questionnaires. The students' weight was measured using Ska scales, without shoes, and with minimum clothing with an accuracy of 0.1 kg. Their height was measured using an inelastic tape meter mounted on the wall with an accuracy of 0.5 cm in a position where

the student leaned against the wall without shoes and heels with minimal coverage. The students' body mass index was calculated by dividing the students' body weight in kilograms by their height in meters squared. According to the World Health Organization, if BMI is less than 18.5, it falls within the underweight range, between 24.9-18.5 is considered normal, between 25-29.9 is overweight, and equal or greater than 30 is regarded as obese(22).

Results

Demographic characteristics

The mean age of students participating in the study was reported as 16.51±1.04, and their mean BMI index was obtained at 21.3±40.64. A summary of the demographic characteristics of the subjects is provided in Table 1.

Table 1. Frequency distribution of subjects' demographic information (female students aged 18-18 years)

Variable		Number (%)
Paternal occupation	Free-lancer	359 (90%0
	Employee	44 (10.0)
Paternal education	Illiterate-primary school	145 (33.0)
	High school education-diploma	247 (56.3)
	Over diploma	47 (10.7)
Maternal occupation	Housewife	389 (88.6)
	Employed	50 (11.4)
Maternal education	Illiterate	199 (45.3)
	High school-diploma	210 (47.8)
	Over diploma	30 (6.8)
Regular exercise	Yes	104 (23.7)
	No	335 (76.3)
Watching television or working with the computer	2 hours≤	391 (89.1)
	<2 hours	48 (10.9)
Body mass index	Underweight	263 (59.9)
	Normal	28 (6.6)
	Overweight	125 (28.3)
	Obese	23 95.2)

The mean score of regular physical activity self-efficacy was 45.79±13.42, according to which 93 (21.2%) , 93(21.2%), 233(53.1%), and 20(4.6%) participants had poor, low, moderate, and high regular physical activity self-efficacy, respectively. The response rate of the questionnaire was obtained at 2.5%. The assessment of the relationship of health literacy with other dimensions and demographic variables of the participants revealed that there is no significant relationship between health literacy and regular physical activity self-efficacy. Among the demographic variables, a significant relationship was only observed between getting or not getting regular exercise and self-efficacy of regular physical activity (P<0.01; Table 2).

Table 2. Mean and standard deviation of health literacy and regular physical activity self-efficacy in students with and without regular exercise

Physical activity Dimensions	Regular exercise Mean±SD	Absence of regular exercise Mean±SD	Test results
Health literacy	0.0±81.95	0.0±68.83	Z=1.26 P=0.2
Self-efficacy of regular physical activity	54.14±75.01	43.11±1.95	T=8.2 p<0.001

The results demonstrated that the students who watched TV or worked with a computer for less than 2 hours were not different from those who did so more than 2 hours in terms of mean scores of health literacy and regular physical activity self-efficacy (P> 0.05; Table 3).

Table 3. Mean and standard deviation of health literacy and regular physical activity self-efficacy in students with and without watching TV and working with computer

Watching tv or working with the computer Dimension	More than 2 hours Mean±SD	Less than 2 hours Mean±SD	Test result
Health literacy	0.80±0.95	0.64±0.81	z=1.08 P=0.2
Self-efficacy of regular physical activity	45.81±13.55	45.62±12.43	T=0.1 P=0.9

The results pointed to a significant difference among the students in terms of mean score of health literacy in the four levels of BMI (P<0.0001; Table 4).

Table 4. Mean and standard deviation of health literacy and regular physical activity self-efficacy in students with four levels of BMI

Dimensions	BMI	n	Mean±SD	Test result
Health literacy	Normal	263	0.61±0.77	P< 0.0001
	Underweight	28	0.96±1.07	
	Overweight	111	1.18±1.07	
	Obese	23	1.08±1.12	
Self-efficacy of regular physical activity	Normal	263	45.95±13.97	F=0.5 0.67= P
	Underweight	28	48.42±14.02	
	Overweight	111	45.35±13.19	
	Obese	23	44.13±4.40	

Discussion

The present study aimed to determine the relationship of body mass index with health literacy and regular physical activity self-efficacy in adolescents aged 15-18 years. The results of the present study demonstrated that 99.3% of the students under the study had inadequate and borderline health literacy. In agreement with the current study, 57.5 and 74.5% of people had limited health literacy in studies conducted by Ghanbari et al. and Saeedi et al.(7) , respectively. Nevertheless, in a study carried out by Lem and Yang (2012)(11) who used the S-TOFHLA tool, 9.1% of students had low health literacy.

In another study performed by Lina Bar, adolescent health literacy was assessed using the NVS tool. In the referred study, 12.6% of students had inadequate health literacy. The results of the two aforementioned studies are not consistent with the present study. The discrepancy in the obtained results can be ascribed to different social and cultural situations, as well as the number of participants. Based on the results of the present study, the BMI was normal in 59.9% of students. This finding is in line with the results reported in studies conducted by Saeedi et al. (7) and Dorosti Motlaq et al.(23) in which 59% and 66% of students had normal BMI, respectively.

Moreover, in agreement with the findings reported by Saeedi et al., in the present study, 6.6% of students were underweight, 28.3% were overweight, and 5.2% were obese (7). Furthermore, a statistically significant correlation was found between health literacy and adolescent body mass index. This finding is consistent with the studies performed by Laster et al. (24), Yavari and Ashtarian (7), and Lem and Young(11); nevertheless, it is not in line with the study by Saeedi et al. Almost all subjects had difficulty interpreting food fact labels (ice cream labels).

Limited health literacy is problematic since health care providers often supply nutritional advice specifically to patients with chronic diseases assuming that they can read and understand food labels. In addition, in a website survey in the United States, 34% of cased did not read the Nutrition Fact Label, and 54% of participants preferred to enjoy food without worrying about its ingredients (International Food Information Council (IFIC) Foundation, 2012)(24) . Therefore, when teaching the mechanism of interpreting Nutrition Fact Labels, it should be emphasized that these labels can provide information which would be of great help to consumers in planning healthy eating for themselves and their families.

As illustrated by the results, most students are not accustomed to regular exercise (76.3%) and spend more than 2 hours a day watching TV, working with computers and cell phones (89.1%). In accordance with these results, in

Iran, Teymoori and Lubans(25) showed that only 36% of adolescent girls engaged in physical activities. The subjects in the current study live in a small city that fosters a sedentary lifestyle due to cultural constraints. In the present study, the self-efficacy of regular physical activity in obese and overweight people was lower, compared to that in normal people; nonetheless, it was not statistically significant.

In addition, the results of this study revealed that the self-efficacy of regular physical activity is low in female students aged 15-18 years in Chenaran. A major reason is the unawareness of students, their parents, and school authorities regarding the concept and strategies of self-efficacy. Furthermore, the most formidable barriers to exercise were reported as time constraints, lack of social support, sluggishness, indifference, disbelief in the benefits of sports, low self-efficacy, insufficient sports centers, work and study loads, and lack of access to sports facilities are.

In general, the results of the present study pointed to the low self-efficacy of regular physical activity in adolescents in Chenaran. Moreover, it was found that inactivity was significantly high among the subjects, and students with abnormal BMI (underweight, overweight, and obese) had a high percentage. Overall, the results of the current study were indicative of poor health literacy (99.3%), a prevalence of 33.5% abnormal BMI (overweight and obese), and also a significant relationship between health literacy and MBI among students.

Recognition of self-efficacy strategies is of great help in the formation of health behaviors in adolescents. Health habits and patterns are formed in adolescence, and proper health behaviors at these ages contribute to health and well-being in later years. Moreover, the school environment plays a key role in the development of healthy or unhealthy habits. Therefore, it is indispensable to provide educational programs based on self-efficacy strategies and health literacy to change health habits and behaviors.

Every study has some limitations which should be addressed in the paper. One of the notable limitations of the present study was the administration of questionnaires during the final exams which may have affected the responses. Another limitation was the mere inclusion of public urban schools and the age group of adolescent girls aged 15-18 years. It is recommended to investigate students of non-government and rural schools, the age group of adolescents aged 10-4 years, non-student adolescents within the age range of15-18 years, and male students. The final limitation of the present study was the reluctance of students with obesity, overweight, and low socio-economic level to complete the questionnaire due to their poor physical condition. Although they were justified by the researcher, it takes a lot of time and the process of questionnaire completion in these people was somewhat different from other participants. However, these cases were tried to remain in the study to avoid sample size reduction.

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