Original Article

The Relationship between Different Levels of Health Literacy and Smoking Prevention Among Medical Sciences Student

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Abstract

Background: Higher rates of Smoking among university students have been reported in various studies. On the other hand, health literacy (HL) can improve health behaviors. In fact, identifying factors affecting the adoption of smoking preventive behaviors such as HL can help prevent and reduce the prevalence of smoking among people. The aim of this study was to identify the relationship between different levels of HL and adoption of smoking preventive behaviors among university student in 2016. **Methods:** This was a cross-sectional descriptive study. Three hundred and forty-seven dormitory students of Shahid Beheshti University of Medical Sciences in Iran were selected through single-stage cluster sampling for the study. Data were collected using a measure of HL (the HL inventory for adults-HELIA) and a designed questionnaire to assess the adoption of smoking preventive behaviors. The data were analyzed using SPSS software version. 16 and descriptive statistical and Logistic regression test. **Results:** The mean (SD) of the score for adoption of smoking preventive behaviors and HL were 45.91 (12.99) and 70.52 (14.12) out of 100, respectively. The results showed that the adoption of smoking preventive behaviors had significant relationship with variables such as HL, gender, father's education and not smoking ($P < 0.05$). **Conclusions:** Less adoption of smoking preventive behaviors was seen in students with lower levels of HL, female students, students with illiterate fathers and smokers. Therefore, it seems essential to take these factors into consideration in designing preventive programs for smoking in target groups.

Keywords: *Behavior, health literacy, smoking, students*

Introduction

Smoking leads to many preventable deaths all over the world.[1] It is estimated that the number of smokers enhanced from 1.3 billion to 1.6 billion people in 2025. Its mortality is estimated to increase to 8.3 million people in 2030 from 4.8 million in 2006.[2] Smoking is one of the most important risk factors for chronic disease in the world and its use is growing rapidly among adolescents and youth.[3] This is considered to be more important among university students, since this educated population can affect and change the attitude of all other classes of the society toward smoking.[4] There are many studies on the prevalence of smoking and its associated risk factors among university students and mostly of this studies showed that smoking was increasing among Iranian university students.[4,5] This fact indicated the importance of the university as a favorable environment for starting this high-risk behavior among the youth.[6]

It is claimed that the growing trends of smoking among university students were associated with several factors such as peer pressure, having problems in life, social acceptance, family history of smoking, low levels of parents' education, willingness to gain personality, gender (mostly men), high income, socialization with friends who are smokers, earning prestige, academic years (third and fourth year students compared to junior students), smoking in times of depression or comfort, lack of emotional support, educational failure, unemployment, family quarrels and disputes.[7-10] Also, the use of smoking has been traced among medical students.[5,11]

There is a significant relationship between health literacy (HL) and smoking status.[12] HL is a dynamic and multidimensional concept encompassing the ability of individuals to achieve the goal, communicate, and understand basic health information and services needed for proper decision-making in health care.[13]

How to cite this article: Panahi R, Osmani F, Javanmardi K, Ramezankhani A, Dehghankar L, Amini R, *et al.* The relationship between different levels of health literacy and smoking prevention among medical sciences student. Int J Prev Med 2021;12:124.

Access this article online

Website: www.ijpvmjournal.net/www.ijpm.ir

DOI: 10.4103/ijpvm.IJPVM_460_20

Quick Response Code:

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In studies by Dehghankar and colleagues[14] and Sajadi and colleagues[15] showed that more than one-third of students had inadequate and problematic HL.

So far, few studies have been done about the potential effects of HL on smoking or smoking cessation results. The studies on this issue have concluded that low HL could be considered as an independent risk factor for smoking,[3,16] smoking recurrence,[17] and weaker results of smoking cessation programs.[18] One of the latest study revealed that HL should be considered when developing targeted tobacco prevention strategies.[19] Also, Atri *et al*.,[20] concluded that improving the level of HL can lead to change people's behavior in relation to smoking. However, due to the lack of relevant texts, there is a need for further studies in this field.[20]

Because there was no study that identifies the relationship between different levels of HL and adoption of smoking preventive behaviors in Iran, this question aroused as whether adequate HL could increase the adoption of smoking preventive behaviors? Therefore, this study aimed at identifying the relationship between different levels of HL and adoption of smoking preventive behaviors among university students in 2016.

Methods

Design and participants

This was a cross-sectional descriptive study. The study population consisted of all students living in dormitories of Shahid Beheshti University of Medical Sciences in Tehran, Iran. The participants were selected using single-stage cluster sampling. First, a list of 14 dormitories in which students of medical sciences lived was provided. Then, among these dormitories, 4 dormitories (2 dormitories for girls and 2 dormitories for boys) were randomly selected, and all students living in these 4 dormitories who had the inclusion criteria, were entered into the study.Ethical approval was received from the ethics committee of the Tarbiat Modares University (ID: IR.TMU.REC.1394.172, Date: December 19, 2015). (No. 6599).

Based on statistical considerations, one of the objectives of this study was to determine the level of students' HL. After referring to the previous study, the prevalence of HL among university students was 71%.[14] So, according to the Cochran formulas of sample size, at least 316 students were required to participate in this study. Considering a probable 10% drop out, 347 students were selected as the final sample size.

The criteria for entering the study included: the willingness of people to enter the study, being students and studying in undergraduate level, being in the second or third year of study at the university, having Iranian nationality and living in the dormitories of Shahid Beheshti University of Medical Sciences. Also, the incomplete completion of questionnaires and unwillingness to continue the study were considered as the exclusion criteria.

The questionnaires

Three questionnaires were used to collect the data.

1. Demographic and background information including age, gender, marital status, years of education, experience of probation, the amount of physical activity per week, parents' education level, having close friends who smoke, employment status and determining the status of the individuals in terms of smoking (smoker or non-smoker)
2. HL Inventory for Adults (HELIA) which is used for measuring HL. This questionnaire includes 33 items measuring 5 major dimensions including reading, gain access, understanding, appraisal, decision-making, and application of health information. The score on each dimension or the total questionnaire range from 0 to 100 where the higher scores indicate better conditions. The scores between 0 and 50 were considered as inadequate, 50.1-66 as problematic, 66.1-84.0, as adequate, and 84.1-100 as excellent HL. The psychometric properties of the questionnaire were well documented. This questionnaire has some advantages such as separately covering various aspects of HL, using items in a linguistically simple manner, and generality.[21] For HELIA questionnaire the alpha coefficient was calculated to be 0.72 for reading, 0.79 for gain access, 0.86 for understanding, 0.77 for appraisal and 0.89 for decision making and use of health information.[21] Furthermore, in the study of Panahi *et al*.,[22] the validity and reliability of the aforementioned questionnaire were tested in a sample of university students. Drawing on the results of confirmatory factor analysis, this questionnaire was desirable fit. Furthermore, in the study, the Cronbach's alpha coefficient was as follows: reading dimension: 0.84, access: 0.85, understanding: 0.90, assessment dimension: 0.77, decision-making: 0.86, health information application: 0.86, and for the entire questionnaire was 0.94. Overall, the results of the study showed that the HELIA questionnaire could be used for university students[22]

3. A researcher-designed questionnaire was used for measuring the adoption of smoking preventive behaviors. This questionnaire contains 15 items for example; "What is your reaction to other people's smoking?" Scoring was done from 0 to 2, so that the best answer took 2 and the worst was given zero. So, the total score for each person ranged from 0 to 30. Then the scores were transformed to a 0-100 scale, in which the higher scores indicated better conditions. The level of adoption of preventive behaviors were classified in two undesirable level (scores less than 50% of the total score) and desirable one (50-100% of the total score).[13] To check the content validity, this questionnaire was given to 15 experts and their comments on modification and removing some items were taken into consideration. Finally, CVI and CVR for behavior questions were calculated to be 0.91 and 0.90, respectively. Also, to check the reliability, this questionnaire was distributed among 30 students and its Cronbach's alpha was calculated to be 0.85. In this study, it was contractual experience of smoking was told to people who had at least one smoking thread during their lifetime. It was also referred to as a smoker who smoked daily or occasionally *at the time of the study*. A non-smoker was told that until the time of the research, he did not even have a history of smoking. As will as, in this study, students who already smoke placed in the group of smokers and the students who had experience of smoking in the past along with current non-smokers were placed in non-smokers group.[5,23]

Data collection

All students were asked to fill up the questionnaires and they were asked to answer the questions honestly. Completion of the questionnaires was carried out at the dormitories of the students.

Data analysis

After collection, the data were entered into the SPSS software version. 16 for analysis. The data were analyzed using descriptive statistical methods and Logistic regression test. The significance level was set at 0.05 level.

Participants and public involvement

No participators were involved in developing the hypothesis, the specific aims or the research questions, nor were they involved in developing plans for the design of the study. No participators were involved in the interpretation of study results or write up of the article. There are no plans to disseminate the results of the research to study participants or the relevant participant community.

Declaration of ethical

Ethical approval was received from the ethics committee of the Tarbiat Modares University (ID: IR.TMU.REC.1394.172, Date: December 19, 2015). The aims and procedures of the study were explained to the participants. The anonymity and confidentiality of the study were assured and the participants then signed informed consent letters. The investigators guaranteed that there were no conflicts of interest.

Results

Characteristics of the participants

After completing the questionnaires, 7 students were excluded from the study due to incomplete questionnaires and the final analysis was performed on 340 ones. The mean (SD) of the participants' age was 22.93 (4.05) years and 40% (136) of them were male. Only 12% (41) were married and 41% (141) were sophomore. Accordingly, 27% (92) reported that they were working, and 41.6% (142) had close friends who smoked. In terms of experience of probation, only 3.5% (12) had such an experience. Moreover, 8.8% (30) never did exercise and 37.2% (126) of the participants stated that their father had diploma and only 2% (7) stated that their mother's level of education was Masters degree and Ph.D. Our results indicated that 76.2% (259) were non-smokers and 23.8% (81) were smokers.

Health literacy

The results showed that the mean (SD) of the score HL among participants was 70.52 (14.12) from 100. The percentages of students with inadequate, problematic, adequate, and excellent HL levels were 9.2% (31), 28% (94), 43% (145), and 19.8% (67), respectively.

Adoption of smoking preventive behaviors

The mean (SD) of adoption of smoking preventive behaviors score in students was 45.91 (12.99) from 100. In 72% (245) of the students, adoption of smoking preventive behaviors was at undesirable level and it was at desirable levels in 28% (95) of them. Table 1 shows their demographic and background characteristics, health literacy and adoption of smoking preventive behaviors levels.

Factors associated with the desirable adoption of smoking preventive behaviors

Logistic regression was used for investigating the factors influencing the adoption of smoking preventive behaviors and the following results were obtained:

- There was a significant association between the adoption of smoking preventive behaviors and gender, so that, the chance of desirable adoption of smoking preventive behaviors in male students was 3.57 times more than female ones
- There was a significant relationship between the adoption of smoking preventive behaviors and level of parents' education, so that, the chance of desirable adoption of smoking preventive behaviors in students whose parents were high school graduates was about

Table 1: Demographic and background characteristics, levels of health literacy and adoption of smoking prevention smoking behaviors in students participating in the study

	Smoker (*n*=81) *n* (%)	Non- smoker (*n*=259) *n* (%)
Age		
Under 20 years old	19 (23.5)	65 (25.1)
20-29 years old	56 (69.1)	178 (68.7)
30-39 years old	5 (6.2)	13 (5)
40 years old and over	1 (1.2)	3 (1.2)
Gender		
Female	35 (43.2)	169 (65.6)
Male	46 (56.8)	90 (34.4)
Marital status		
Single	69 (85.2)	226 (87.3)
Married	10 (12.3)	31 (12)
Divorce or death of spouse	2 (2.5)	2 (0.8)
Years of education		
Sophomore	31 (38.3)	108 (41.7)
Third-year student	50 (61.7)	151 (58.3)
Experience of probation		
Yes	7 (8.6)	5 (1.9)
No	74 (91.4)	254 (98.1)
Father's education level		
Illiterate	6 (7.4)	27 (10.5)
High school	21 (25.9)	61 (23.6)
Diploma	37 (45.7)	89 (34.5)
Associate Degree and Bachelor's Degree	13 (16)	62 (24)
Master degree and Ph.D.	4 (4.9)	19 (7.4)
Mother's education level		
Illiterate	11 (13.6)	46 (17.8)
High school	32 (39.5)	89 (34.4)
Diploma	24 (29.6)	73 (28.2)
Associate Degree and Bachelor's Degree	13 (16)	45 (17.4)
Master degree and Ph.D.	1 (1.2)	6 (2.3)
Having close friends who smoke		
Yes	54 (66.6)	87 (33.7)
No	27 (33.3)	171 (66.3)
Physical activity per week		
Everyday	11 (13.5)	19 (7.3)
Most days	21 (26)	90 (34.7)
Sometimes	30 (37)	110 (42.5)
Rarely	12 (14.8)	29 (11.2)
Never	7 (8.6)	11 (4.2)
Employment		
Yes	31 (38.3)	59 (22.8)
No	50 (61.7)	200 (77.2)
Level of health literacy		
Inadequate	7 (8.6)	24 (9.4)
Problematic	34 (42)	60 (23.4)
Adequate	27 (33.3)	118 (46.1)
Excellent	13 (16)	54 (21.1)
Level of adoption of smoking preventive behaviors		
Undesirable	58 (71.6)	187 (72.2)
Desirable	23 (28.4)	72 (27.8)

6.99 times more than the students whose parents were illiterate

- There was a significant relationship between the adoption of smoking preventive behaviors and HL

levels (P = 0.032), so that, the chances of desirable adoption of smoking preventive behaviors in students with problematic, adequate, and excellent HL were 1.25, 2.34, 3.11 times more than students who had inadequate HL
- There was a significant relationship between the adoption of smoking preventive behaviors and smoking status, so that, the chances of desirable adoption of smoking preventive behaviors in non-smoking students were 2.51 times more than students who smoked
- There were not any significant relationships between the adoption of smoking preventive behaviors and age, marital status, years of education, maternal education level students, having friends who smoke, experience of probation, exercise, and employment. The study findings were shown in Table 2.

Discussion

The aim of this study was to identify the relationship between different levels of HL and adoption of smoking preventive behaviors among university students. The results of the present study showed that the HL level in most of the students was moderate, and it was inadequate and problematic in more than one-third of them. These results were in line with the results of the study by Dehghankar *et al*.[14] The results of the present study were not consistent with the results of the study by Sajadi *et al*.,[15] which reported desirable levels of HL among students. The existence of students with higher educational levels in the above study is a possible reason for the difference between the results of above study and the present study. The results of the present study were not consistent with the results of the study by Zhang *et al*.,[24] which reported low levels of HL among students. These conflicting results could be due to the difference in the sample of this study which was comprised of students from different disciplines of non-medical sciences, whereas the present study sample was comprised of various medical sciences students. Furthermore, the results of the present study were not consistent with the results of the study by Vozikis *et al*.,[25] which showed a moderate to high level of HL. The possible reasons for this discrepancy could be due to the difference in the measurement tool, the higher number of students participating in the study and the higher education level of the students.

In the present study, the levels of adoption of smoking preventive behaviors were undesirable. These results were inconsistent with the results of studies by Rahnavard *et al*.,[26] and Masoudi Boroujeni *et al*.[27] Among the reasons for this discrepancy, the differences in measuring tools, age and gender of participants as well as differences in prevention issue (in the study by Masoudi Boroujeni *et al*.) seemed to stand out. Considering the average levels of HL in this study and also the association between HL and adoption of preventive behaviors,[28,29] it was expected that the adoption of smoking preventive behaviors be moderate as well. Considering the fact that low HL in the field of information usage, compared to other fields of HL led to not taking appropriate measures in the use of health knowledge,[30] it could be stated that the undesirable adoption of smoking preventive behaviors were probably due to the low average of HL score in the area of decision-making and application of health information.

In this study, there was a significant association between HL and adoption of smoking preventive behaviors. These results were in line with the results of the study by Fu *et al*.,[19] that revealed that HL should be considered when developing targeted tobacco prevention strategies. Moreover, they were in line with the results of the study by Javadzadeh *et al*.,[31] Scott *et al*.,[32] and Izadirad and Zareban,[28] where there was a significant relationship between HL and adoption of preventive behaviors. However, this was not consistent with the results of the study by Varekojis *et al*.,[33] where there was no significant relationship between functional HL and smoking cessation. Moreover, in this study,[33] the subjects were able to quit smoking at every level of functional HL. Among the possible reasons for this discrepancy was the difference between HELIA questionnaire used in the present study and S-TOFHLA one used in that study; in fact the first one was used to measure general HL and the second was used to measure functional HL. Also, in Varekojis's study,[33] the sample size was limited and all subjects were sick and smokers and they were going to quit smoking through a kind of educational intervention. Meanwhile, two-thirds of them had sufficient HL level. Moreover, it could be stated that although these studies identified the relationship between HL and adopting preventive behaviors, they did not likely show such a relationship for low levels of HL skills. However, planning and designing communication interventions to improve these skills could maintain and repair their relationship with the adoption of health behaviors. Also regarding the association between HL and adoption of smoking preventive behaviors, it can be concluded that considering the effect of HL on the adoption of preventive behaviors,[34] and relationship between HL and smoking,[35] this result was acceptable.

Also, the results of study showed that the chances of desirable adoption of smoking preventive behaviors in students with problematic, adequate, and excellent HL were more than students with inadequate HL. The results of this study were consistent with Stewart *et al*.,[17] and Stewart *et al*.,[18] in which, lower HL level was associated with a higher possibility of smoking recurrence and weaker results of smoking cessation programs. In addition, these results were in line with Sadeghi and colleagues,[3] Stewart and colleagues,[16] Fernández and colleagues results,[29] in which there were significant correlation between lower HL and smoking. Moreover, in studies of Vozikis *et al*.,[25] Panahi *et al*.,[13] Panahi *et al*.,[36] and Izadi rad and Zareban.,[28]

Table 2: The association between desirable adoption of smoking preventive behaviors and independent variables* as obtained from logistic regression

	Univariate regression		Multiple regression	
	OR (95% CI)	*P*	OR (95% CI)*	*P*
Age				
Under 20 years old	1.00 (ref.)		1.00 (ref.)	
20-29 years old	0.335 (0.094-1.198)	0.093	0.393 (0.059-2.619)	0.335
30-39 years old	0.460 (0.121-1.747)	0.254	0.463 (0.069-3.083)	0.426
40 years old and over	0.750 (0.147-3.828)	0.729	1.111 (0.137-9.008)	0.922
Gender				
Female	1.00 (ref.)		1.00 (ref.)	
Male	2.909 (1.785-4.740)	0.0001	3.579 (1.868-6.860)	0.0001
Years of education				
Sophomore	1.00 (ref.)		1.00 (ref.)	
Third-year student	0.793 (0.487-1.292)	0.352	0.931 (0.511-1.696)	0.816
Marital status				
Married	1.00 (ref.)		1.00 (ref.)	
Single	1.405 (0.643-3.072)	0.394	2.469 (0.860-7.084)	0.093
Divorce or death of spouse	10.667 (0.987-115.359)	0.051	13.496 (0.773-235.653)	0.075
History of probation				
No	1.00 (ref.)		1.00 (ref.)	
Yes	0.318 (0.104-0.973)	0.045	0.283 (0.069-1.169)	0.081
Physical activity per week				
Never	1.00 (ref.)		1.00 (ref.)	
Rarely	0.327 (0.085-1.265)	0.105	0.378 (0.079-1.806)	0.223
Sometimes	0.582 (0.207-1.640)	0.306	0.471 (0.142-1.562)	0.218
Most days	0.576 (0.178-1.862)	0.457	0.427 (0.106-1.564)	0.344
Every day	1.021 (0.195-3.118)	0.357	1.116 (0.298-3.226)	0.191
Employment				
No	1.00 (ref.)		1.00 (ref.)	
Yes	0.853 (0.478-1.132)	0.168	1.042 (0.849-1.350)	0.532
Father's education level				
Illiterate	1.00 (ref.)		1.00 (ref.)	
High school	1.781 (0.475-6.686)	0.392	2.609 (0.393-17.316)	0.321
Diploma	3.537 (1.105-11.325)	0.033	6.995 (1.487-32.896)	0.014
Associate Degree and Bachelor's Degree	1.500 (0.473-4.755)	0.491	3.118 (0.734-13.237)	0.123
Master degree and Ph.D.	1.417 (0.424-4.735)	0.572	2.912 (0.692-12.242)	0.145
Mother's education level				
Illiterate	1.00 (ref.)		1.00 (ref.)	
High school	0.721 (0.147-3.544)	0.687	0.717 (0.294-1.890)	0.326
Diploma	0.921 (0.189-3.898)	0.478	1.083 (0.325-3.587)	0.149
Associate Degree and Bachelor's Degree	0.763 (0.197-3.213)	0.335	0.925 (0.289-3.489)	0.311
Master degree and Ph.D.	1.319 (0.262-3.636)	0.171	2.225 (0.251-10.775)	0.240
Having close friends who smoke				
Yes	1.00 (ref.)		1.00 (ref.)	
No	2.644 (0.748-9.352)	0.131	1.311 (0.281-6.106)	0.731
Level of health literacy				
Inadequate	1.00 (ref.)		1.00 (ref.)	
Problematic	0.571 (0.222-1.469)	0.245	1.252 (0.472-4.878)	0.039
Adequate	0.594 (0.302-1.168)	0.131	2.341 (1.111-10.857)	0.038
Excellent	1.612 (0.652-4.621)	0.045	3.113 (1.115-11.025)	0.032
Smoking status				
Smoker	1.00 (ref.)		1.00 (ref.)	
Non-Smoker	1.122 (0.397-3.921)	0.045	2.512 (1.017-5.959)	0.031

*Adjusted health literacy and demographic variables. **Method: inter

people with lower HL tried less to adopt preventive behaviors than the others. According to results of the present study, it can be concluded that lower HL is a certain conceptual interpretation of poor knowledge about smoking hazards. Also, it is related to unfavorable attitudes about smoking. As a result, lower HL can be a factor for having less knowledge, unfavorable attitude, and less adoption of preventive behaviors.

The results of the study showed that the chances of desirable adoption of smoking preventive behaviors in non-smoker students were more than smoker ones. It can be stated that behaviors such as feeling discomfort when facing smoking, trying not to be exposed to it, encouraging others to quit smoking, advising others to put out cigarettes in public, not responding to compliments for smoking, attempting to obtain information about the hazards of smoking are probably done more in non-smokers compared to smokers.

The results of this study showed that the chances of desirable adoption of smoking preventive behaviors in male students were more than female ones. However, several studies reported that smoking was more in men than women.[7,37,38] Perhaps men are more able to do preventive behaviors, such as protesting against smoking in public places, talking about the harmful effects of smoking on health, trying to quit smoking, not keeping smoking cigarette between their lips for a long time than women.

The results of this study showed that the chances of desirable adoption of smoking preventive behaviors in the students whose fathers had diploma degree were more than the students whose fathers were illiterate. In the study of Ansari *et al*.,[39] parents under diploma were listed as possible causes of tendency of students for smoking which was in line with the results of present study; but in the study of Saatci *et al*.,[40] there was found no significant relationship between the level of education of fathers and smoking. Moreover, it is possible that fathers with diploma degree compared to illiterate ones know more about smoking hazards or risks of exposure to cigarette smoke and they adopt more smoking preventive behaviors. With regard to the relationship between education level of fathers and the students' knowledge about the factors related to the prevention of addiction,[27,41] it can be concluded that the adoption of smoking preventive behaviors among the students of educated fathers was mostly more than the students with illiterate fathers.

This study seems to be the first study to measure the relationship between different levels of HL and adoption of smoking preventive behaviors in Iran. The limitations of this study were: ignoring other HL skills such as self-efficacy, communication, and calculation, as well as ignoring the cultural backgrounds and skills such as speaking, listening and having cultural and background knowledge of people, small sample and sampling in the dormitories. Data collection was self-report and this was another limitation of this study. Another limitation was the lack of specific tools to measure HL about smoking.

Conclusions

Less adoption of smoking preventive behaviors was more in students with lower levels of HL, female students, students with illiterate fathers and smokers. Therefore, it is essential that in designing training programs, the health providers pay more attention to these factors. The target group in this study that consisted of undergraduate students living in dormitories who were in the second or third year of their study. So the results of this study cannot be generalized to other age and student groups. Hence, conducting other studies is recommended in various populations and groups (in terms of age, education level and place of residency). It also seems necessary to design a special tool to measure HL in the field of smoking in all age groups.

Strengths and limitations of this study:

- This study seems to be the first study to measure the relationship between different levels of HL and adoption of smoking preventive behaviors in Iran
- Ignoring other HL skills such as self-efficacy, communication, and calculation
- Ignoring the cultural backgrounds and skills such as speaking, listening, and having cultural and background knowledge of subjects
- Small study sample
- Lack of specific tools to measure HL about smoking.

Availability of data and material

Data set: The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgments

This manuscript is a part of a PhD thesis in the school of medicine, Tarbiat Modares University. The authors wish to express their special thanks to all of the participants and respected authorities of dormitories supervised by Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Financial support and sponsorship

This work was supported by the School of Medicine, Tarbiat Modarres University of Iran (No. 6599).

Conflicts of interest

There are no conflicts of interest.

Received: 10 Aug 20 **Accepted:** 24 Dec 20
Published: 29 Sep 21

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