Original Article

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Quick Response Code:

Website: www.jehp.net

DOI: 10.4103/jehp.jehp_1714_23

Correlates of pediculosis preventive behaviors among female adolescents using a theoretical framework: A case of health belief model

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Abstract:

BACKGROUND: Despite improving health levels, not only in developing countries but also in developed countries, pediculosis is still a threat to public health and a health problem. The aim of this study was to investigate the factors related to preventive behaviors of head lice infection in adolescent girls using a health belief model (HBM).

MATERIALS AND METHODS: The present study is a descriptive-analytical which was performed on 600 fourth-, fifth-, and sixth-grade female students in Shahroud by multi-stage sampling method. The data collection tool was a questionnaire in which validity and reliability were confirmed. Data were analyzed using descriptive tests including frequency distribution tables and analytical statistics using Pearson and Kendall correlation coefficient tests and multiple regression.

RESULTS: There was a significant positive correlation between head lice prevention behaviors in students and perceived awareness, severity, benefits, and self-efficacy. Also, the variables of perceived barriers and benefits from the constructs of HBM and mothers' age and education were identified as the final predictors of behavior.

CONCLUSION: Based on the HBM, perceived benefit structures and perceived barriers had the most impact on head lice prevention behavior in students. It is suggested that in designing educational interventions, the structures of perceived benefits and perceived barriers be emphasized as the most important behavioral predictors in the prevention of head lice infection in students. It is also strongly recommended that mothers be educated in this area.

Keywords:

Adolescent girls, health belief model, pediculosis, preventive behaviors

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Received: 24-10-2023
Accepted: 26-12-2023
Published: 28-03-2025

Introduction

Pediculosis is the most common parasitic infection worldwide, which can lead to social exclusion of infected individuals and families. Lice is not related to a particular community or social class and can afflict various stratums, especially in epidemics, as are known lice is a transmitter factor on "typhoid, recurrent epidemic fever, and ditch fever."[1]

Despite the improvement in health and the advancement of medical sciences, infection with insects, especially foreign parasites, not only in developing countries but also in developed countries is still a threat to public health and a health problem.[2] Its prevalence according to various studies is 65.7% in Bangladesh,[3] 175.64% in Algeria,[4] 15.3% in Malaysia,[5] 23.9% in Mexico,[6] and 50% in Thailand,[7] and Iran is reported 3,42%.[8]

Pediculosis of the head is seen in all parts of the world, such as Iran, especially in crowded places with poverty and lack of personal hygiene.[9] Several reasons, such as population growth, rural-urban migration,

How to cite this article: Naseri M, Ghaffari M, Rakhshanderou S. Correlates of pediculosis preventive behaviors among female adolescents using a theoretical framework: A case of health belief model. J Edu Health Promot 2025;14:126.

marginalization, and the formation of satellite cities with minimal levels of health welfare, have made pediculosis a major health risk (along with other communicable diseases) in various parts of Iran.[10] According to studies, its prevalence in southeastern Iran is 67.3%,[11] southwestern Iran is 10.5%,[12] Qom is 29.35%,[9] and in Sanandaj is 23.38%.[13]

Complications of this disease include physical disorders, economic and psychological consequences, discomfort and anxiety of the individual and parents, and unnecessary absence from school and the workplace.[14] The most important complication of lice is severe itching.[15] The disease can cause anemia even as the blood feeds on a large number of parasites.[16] Pediculosis of the head can affect people of all ages, but children are more susceptible to the infection due to activity, play, and close physical contact.[17] The prevalence of infection varies across countries, populations, and cultures; however, it is more prevalent among primary school children, girls, and women.[18] The peak prevalence of head lice infection is at the beginning of the school year, i.e. autumn.[19] The highest rate of infection is observed in 9-year-old students. This finding is similar to some studies in different parts of the world.[20,21] This can be explained by behavioral factors that make children at this age have more physical contact with friends. Physical contact, especially head-to-head communication, is one of the most important factors in transmitting head lice infection.[22]

Given that the most important way is direct contact (head-to-head) and the use of personal belongings of others, as a result, this provides the conditions for prevalence in crowded places such as schools.[23] To deal with pediculosis, factors affecting its prevalence must be identified. Some of these factors have been reported sporadically and sometimes with conflicting results in some cities of our country and some other countries. However, no comprehensive study has been conducted. In the US study, gender, age, economic status, and family size were found to be effective in pollution while hair length did not show any effect on the severity of infection.[24] In the study of Kalaleh City conducted by Nouri, it was found to be significantly effective between place of residence, occupation, level of education of parents, family dimension, educational level, presence or absence of health educator in school, and hair size.[25]

Among the basic measures to control this insect can be raising the level of awareness of students, parents and school officials about lice infection, improving preventive behaviors such as regular bathing, daily combing of hair, not using other personal belongings of classmates, combs, brushes, scarves, veils, etc., regular washing and ironing of school clothes, hair control, at least twice a week by students and parents, report any contamination observed to school officials and the nearest health centers.[26-28] To control and prevent head lice, it is necessary to try to increase the level of awareness of the people.[29,30] Studies have shown that the activities of health educators have played an important role in increasing awareness and, consequently, reducing the rate of infection.[29] At the level of attitude, the feeling of shame and embarrassment is a barrier that can affect the incompleteness of treatment.[31,32] Teaching proper health behaviors is inevitable in any society. Students and parents need the right education and behaviors to know and practice the right way of life, maintain health, and avoid diseases, and in this regard, health education is a key role.[33] On the other hand, increasing the effectiveness of health education interventions depends on the proper use of theories and models.[34]

One of the comprehensive models that play an effective role in disease prevention and healthy behavior is the health belief model (HBM).[35] The HBM can be considered the most common theory used in health education and promotion; this theory emerged first in the last decades of the twentieth century from 1950 to explain the failure of screening programs. The underlying concept of the health belief model lies in the fact that a person's beliefs or perceptions about a disease and the strategies available to reduce its incidence determine his or her health behavior. A wide range of interpersonal factors affect a person's personal perception of health behavior.[36] The various dimensions of this model are perceived sensitivity (the mental belief that a person may suffer from a disease or a harmful state as a result of a particular behavior), perceived severity (belief in the extent of the damage caused by a disease, or state of injury, generated by a particular behavior), perceived barriers (belief in the expected costs of pursuing a new behavior), perceived benefits (belief in the benefits of proposed methods to reduce the risk or severity of the disease or detrimental effect of a particular behavior).[37] Most studies have shown that people who have a broad understanding of the sensitivity and severity of the disease are more likely than others to take action. They do protection and prevention (these are two dimensions of the pattern of health belief), so people's perception is one of the determining factors in the implementation of preventive behaviors [Figure 1].[38]

Figure 1 shows the schematic presentation of HBM.

Since no research has been conducted on head lice infestation and related factors in Shahroud, and on the other hand, the information obtained indicates the highest prevalence of head lice in primary schools,[39-41] and considering that preliminary and diagnostic studies with the aim of examining the current situation and

needs assessment and recognizing the most important factors related to health are the first steps to design, implement, and evaluate health education and health promotion interventions. The present study aims to investigate factors related to preventive behaviors. Head pediculosis was performed in female primary school students in Shahroud using a HBM.

Material and Methods

Study design and setting

This research was a descriptive correlational study that was performed on primary school students in Shahroud in Jan–Oct of 2020.

Study participants and sampling

The sampling method is multi-stage. Due to the fact that different areas of Shahroud are not the same in terms of cultural level, economic, and social status, it is divided into two classes (a class that has a higher level in terms of culture and economy and a class that has a lower level in terms of culture and economy). In each class, ten schools were selected by cluster randomized sampling; ten were selected (a total of 20 schools) and then in each school, fourth-, fifth-, and sixth-grade students were selected based on the inclusion criteria and sample size randomly (30 samples per cluster).

The sample size was estimated based on the previous study;[42] according to the formula and considering the effect size of 1.5, the number of samples was estimated to be 600 people.

$$n = \frac{Z^2_{1-\frac{\alpha}{2}} S^2}{d^2}$$

Inclusion and exclusion criteria

Inclusion criteria included students studying in the fourth, fifth, and sixth grades of elementary school, students' willingness and informed consent to participate in the study, obtaining written consent from parents to participate in the study, and no head lice infection. The exclusion criteria were incomplete completion of the questionnaire.

Procedure

The students' head examinations were performed to check for infection (lice eggs or adult lice). Examination of the head under adequate light was observed by seeing one of three conditions: adult lice, immature lice, or live lice eggs (active infection). If no eggs or lice are observed during the examination, the person is healthy or dead lice eggs are found. Infection is considered inactive (previous). To prevent the transmission of lice to other people, a disposable glove and a sealant were used for each person, which was transferred to the trash after consumption. Most of the examination time was dedicated to the upper ear and back areas, which are the most infected areas, 770 students were examined and (600 healthy individuals) were identified and studied.

Measure

Data were collected using a questionnaire designed by Kolivand *et al*., and its validity and reliability were measured.[43] This questionnaire consists of two parts: the first part which includes demographic characteristics and age variables, parents' education, parents' occupation, number of family members, student's previous infection, infection of other family members, and number of rooms in the house (ten questions). The second part of the questions related to the students' knowledge about lice infestation was measured in 31 items (score between 0 and 62) with "yes, no, and I do not know" options. The "yes" option was given a score of one, "I do not know" a point of one, and the option of "no" was given a score of zero. The questions are related to other constructs of the HBM and are 29 items in five subscales. All questions are three-choice and are weighed with the options I agree (score 3), I have no opinion, (score 2), and I disagree (score 1). Perceived susceptibility measures and perceived severity in head lice infection 6 are items each (score between 6 and 18), perceived benefits of performing 7-item head lice prevention behaviors (score between 7 and 21), perceived barriers to head lice prevention behaviors are 9 items (score between 9 and 27), and perceived self-efficacy for head lice prevention behaviors is 6 items (score between 6 and 18). Also, preventive behaviors were measured with four multiple-choice questions (score between 4 and 16) which in each question the most points are awarded to the correct options.

Ethical consideration

Before completing the questionnaire, the objectives of the research, the confidentiality of information, and how to complete the questionnaire were explained to students. The confidentiality of all questionnaires was anonymous, and the coding method was used. After completing the questionnaire to observe research ethics and the usefulness of the study, a training class was held for the students and lice infestation, its transmission and prevention methods, as well as treatment methods were explained. This study was approved by the ethics committee of the relevant organization with the code IR.SBMU.PHNS.REC.1398.171.

Data analysis

The collected data were coded through a questionnaire and entered into a computer, then analyzed using SPSS16 software. To describe the characteristics of research units from descriptive statistics including frequency distribution tables and graphs and analytical statistics (using tests

such as Pearson and Kendall correlation coefficient) and to determine the relationship between demographic characteristics (age, gender, family size, education, and occupation of parents) and any multiple regression analysis was used as one of the constructs of the HBM with the behavior of preventing head lice infestation.

Results

The mean age of the students was 10.92 years with a minimum and maximum of 10 and 12 years. 49.8% were the first child. Most of the samples had self-employed fathers (39.7%) and (85%) most of the mothers were housewives, also 40% of fathers and 39.3% of mothers had a diploma [Table 1].

74.8% of students had straight hair and 41.8% had short hair. 42.5% of students had a history of lice and 85% of students had a health educator at school [Table 2].

Kendall correlation coefficient was used to determine the correlation between demographic variables and pediculosis-preventing behaviors. The results showed that there is a positive correlation and a significant relationship between students "age, mother's age, father's education, and mother's job and education and economic status of the family with students" behavior. However, there was an inverse correlation between mothers "jobs and students" behavior and a significant relationship [Table 3]. There was no significant correlation between the number of family members, birth rank, age of fathers' and students' behavior.

Based on the results obtained from the Pearson correlation coefficient, there is a positive and significant correlation between knowledge, perceived susceptibility, perceived severity, perceived benefits, and perceived self-efficacy with preventive behavior [Table 4]. There is also a significant inverse correlation between perceived barriers and preventive behavior.

Stepwise multiple regression was used to predict behavior based on demographic variables and health belief pattern constructs. According to the results, in the first model, regression analysis of the perceived barrier structure with standard beta (-0.278) and ($P < 0.001$) was determined as the most important predictor of behavior. In the second model, the variables of perceived barriers with standard beta (-0.234) and the age variable with standard beta (0.133) were determined as the most important predictors of behavior, respectively. In the third model of regression analysis, it was found that the variable of perceived barriers with standard beta (0.217), the variable of age with standard beta (0.201), and the variable of perceived benefits of HBM constructs with standard beta (0.109) as behavior predictors were determined. In the fourth model of regression analysis, the variables

Table 1: Demographic information of the participants

Variables	Sub-group	Frequency	Percentage
Age	10-Year-old	233	38.8
	11-Year-old	181	30.2
	12-Year-old	186	31
Fathers' age	30-39	269	44.8
	40-49	331	55.2
Mothers' age	20-35	292	48.7
	36-50	308	51.3
Fathers' education	Illiterate	63	10.5
	Elementary	180	30
	Diploma	240	40
	College	117	19.5
Mothers' education	Illiterate	45	7.5
	Elementary	234	39
	Diploma	236	39.3
	College	85	14.2
Fathers' job	Worker	189	31.5
	Employee	173	28.8
	Freelance job	238	39.7
Mothers' job	Employee	90	15
	Housewife	510	85
Economic status	Poor	240	40
	Good	360	60
Family size	3 members	81	13.5
	4 members	310	52
	5 or more members	209	34.5
Birth rank	First child	298	49.7
	2nd child	215	35.8
	3rd or above	87	14.5

Table 2: Frequency distribution and percentage of subjects according to information related to pediculosis

Variables	Sub-group	Percentage	Frequency
Hair size	Short	4108	251
	Middle	40.7	244
	Long	17.5	105
Hair type	Smooth	74.7	488
	Curly	25.3	152
Infection history	Have	42.5	255
	Do not have	57.5	245
Family infection history	Have	5.8	35
	Don't have	94.2	565
Bedroom numbers	One room	16.8	101
	Two rooms	72.4	434
	Three rooms	10.8	65
Persons on a room	One	30.2	182
	Two	48.7	291
	Three	10.3	62
	Four or more	10.8	65
Education history	Have	75	450
	Don't have	25	150
Health educator	Have	85	510
	Don't have	15	90

Table 3: Correlation coefficient matrix between demographic variables and pediculosis prevention behaviors in the subjects

	1	2	3	4	5	6	7	8	9	10	11
Age	1										
Fathers' age	0.072	1									
Mothers' age	0.149**	0.644**	1								
Fathers' education	-0.042	-0.032	-0.048	1							
Mothers' education	-0.029	0.032	0.039	0.595**	1						
Fathers' job	0.066	0.044	0.051	0.109**	0.185**	1					
Mothers' job	-0.090*	-0.116**	-0.082*	-0.147**	-0.147**	-0.037	1				
Family number	0.009	0.144**	0.153**	-0.094*	-0.141**	-0.070	0.072	1			
Birth rank	-0.063	0.295**	0.270**	-0.150**	-0.130**	0.009	0.041	0.448**	1		
Economic situation	0.148**	-0.059	0.015	0.156**	0.192**	0.201**	-0.086*	-0.045	0.026	1	
Behavior	0.197**	0.078	0.135**	0.143**	0.120**	0.113**	-0.083*	0.050	-0.034	0.089*	1

**.Correlation is significant at the 0.01 level (2-tailed). *.Correlation is significant at the 0.05 level (2-tailed)

Table 4: Correlation coefficient matrix between HBM constructs and behavior in the subjects

HBM Construct	Knowledge	P. Susceptibility	P. Severity	P. Benefit	P. Barrier	Self-Efficacy	Behavior
Knowledge	1						
Perceived susceptibility	0.425**	1					
Perceived severity	0.265**	0.351**	1				
Perceived benefit	0.308**	0.348**	0.409**	1			
Perceived barrier	-0.344**	-0.232**	0.010	-0.275**	1		
Self-efficacy	0.263**	0.208**	0.226**	0.324**	-0.295**	1	
Behavior	0.185**	0.169**	0.180**	0.191**	-0.278**	0.108**	1

**Correlation is significant level at the 0.01 level (2-tailed)

Table 5: Results of regression model for predicting pediculosis-preventing behaviors based on HBM constructs

	Model	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	R	R Square
		B	Std. Error	Beta				
1	(Constant)	16.617	0.294		56.581	0.000	0.278[a]	0.077
	Barrier	-0.141	0.020	-0.278	-7.081	0.000		
2	(Constant)	15.797	0.383		41.294	0.000	0.307[b]	0.094
	Barrier	-0.124	0.021	-0.243	-6.036	0.000		
	Age	0.296	0.090	0.133	3.307	0.001		
3	(Constant)	14.446	0.633		22.827	0.000	0.324[c]	0.105
	Barrier	-0.110	0.021	-0.217	-5.254	0.000		
	Age	0.266	0.090	0.120	2.968	0.003		
	Benefit	0.070	0.026	0.109	2.673	0.008		
4	(Constant)	13.613	0.703		19.358	0.000	0.339[d]	0.115
	Barrier	-0.102	0.021	-0.201	-4.838	0.000		
	Age	0.279	0.089	0.126	3.122	0.002		
	Benefit	0.075	0.026	0.116	2.866	0.004		
	Mothers' education	0.234	0.088	0.104	2.659	0.008		

a. Dependent Variable: Behavior. a. Predictors: (Constant), Barrier. b. Predictors: (Constant), Barrier, age. c. Predictors: (Constant), Barrier, age, Benefit.
d. Predictors: (Constant), Barrier, age, Benefit, mothers' education

of perceived barriers, age, perceived benefits, and mothers' education with standard beta (0.104, 0.116, 0.126, -0.201) were the most important predictors of behavior, respectively [Table 5].

The results showed that perceived barriers are the strongest predictor of behavior, so to predict the most important barrier to perform the behavior of all barriers (9 barriers) as a predictor entered the regression model. According to the results of the regression model, questions 4 (waking up late and lack of time, 7) (lack of personal belongings), and 5 (time-consuming regular washing of clothes) questionnaires in the barrier section, respectively, act as important predictors [Table 6].

Discussion

The aim of this study was to determine the relationship between HBM constructs (perceived susceptibility,

Table 6: Results of regression model for predicting barriers to pediculosis-preventing behaviors

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	R	R Square
		B	Std. Error	Beta				
1	(Constant)	16.405	0.296		55.481	0.000	0.345[a]	0.119
	Barrier 1	0.080	0.130	0.028	0.618	0.537		
	Barrier 2	-0.037	0.128	-0.013	-0.292	0.770		
	Barrier 3	0.088	0.101	0.036	0.879	0.380		
	Barrier 4	-0.607	0.149	-0.200	-4.083	0.000		
	Barrier 5	-0.329	0.132	-0.112	-2.488	0.013		
	Barrier 6	-0.144	0.102	-0.061	-1.411	0.159		
	Barrier 7	-0.335	0.124	-0.127	-2.705	0.007		
	Barrier 8	0.117	0.135	0.040	0.865	0.387		
	Barrier 9	-0.029	0.133	-0.010	-0.216	0.829		

a. Dependent Variable: Behavior. a. Predictors: (Constant), Barrier 4, Barrier 7, Barrier 5

perceived severity, perceived benefits, perceived barriers, and perceived self-efficacy) with head lice infection prevention behavior in students and also to determine the relationship between demographic variables and preventive behavior from head lice infection has been performed in primary school students in Shahroud.

The results showed that there was a significant relationship between fathers' jobs and head lice prevention behavior. Considering that parents' job is one of the factors that can affect the economic situation, income level, and improving the level of family health. Haghi also states that there was a significant relationship between fathers' jobs and their children's incidence of lice.[30] Also, in the study of Rafinejad *et al*.,[44] Rafiee *et al*.,[45] and Rajabzadeh *et al*. There was a statistically significant relationship between their fathers' occupations, with students whose fathers died having a higher infection rate and students whose fathers had employees having a lower pollution ratio, which was attributed to their higher education, socio-economic, and cultural status of their families.[46]

There was a significant relationship between mothers' jobs and head lice prevention behavior. In the study of Davari *et al*.,[47] Rafinejad *et al*.,[44] Modarresi *et al*.,[39] and Rajabzade *et al*., there was a statistically significant relationship between head lice infection and maternal occupation. Students who had less housewives,[46] but in the study of Farzinnia *et al*.,[48] Hosseini *et al*. there was no relationship.[10]

The family dimension is one of the variables that may facilitate the development of pediculosis due to the shared use of personal belongings and less supervision over the personal health of children. In this study, families were divided into three groups of three, four, and five members and more. (51.7%) families had four members. According to the results obtained in this study, no significant relationship was found between household dimension and preventive behavior of head lice in students. Also in the study of Moosazadeh *et al*.,[21]

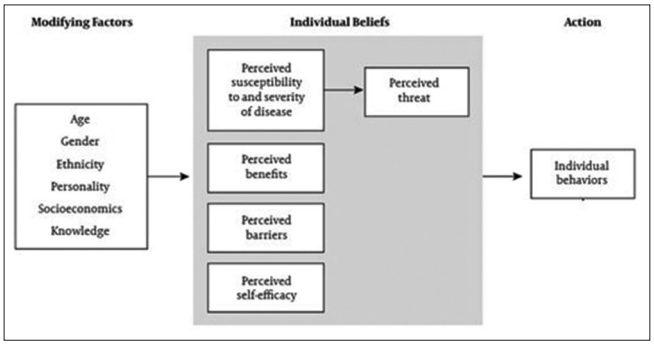

Figure 1: Schematic presentation of health belief model

Noroozi *et al*.,[49] Eivazi *et al*.,[50] and Kasiri *et al*.[51] showed a significant relationship between household size and head lice infection. It seems that the larger the household population, the less parents care about their health status, so it is expected that in large families, there will be close contact between individuals and, consequently, more pollution. However, in the study of Saghafipour *et al*.[9] and Hosseini *et al*., there was no significant relationship between the number of family members and the level of infection, which is consistent with the results of the present study. They sleep and as a result do not share the bed or the clothes and other personal belongings of others at school and home.[10]

Most of the studied families had a good economic level according to the students "report in the questionnaire. In the study, a significant relationship was observed between the students" economic status and their preventive behavior from head lice infection. In various studies, it has been seen that there is a significant relationship between family economic status and head lice, so that in families with lower income levels, the rate of infection is higher.[45,52]

The results of the present study showed that there is a significant correlation between knowledge and constructs of the HBM (perceived sensitivity, perceived severity, perceived barriers, and perceived benefits).

Improve in that these results are consistent with the results of other studies[53] conducted on pediculosis.[54]

According to studies, there is a significant relationship between knowledge and preventive behavior of pediculosis, but in the study of Daneshvar *et al*.[54] and Morovati *et al*.[55] it was observed that there is no significant correlation between knowledge and preventive behavior, also reminds us that increasing the awareness of people at risk of infection does not necessarily lead to the promotion of preventive behavior.

Based on the results of this study, there was a significant correlation between perceived susceptibility and perceived severity, perceived benefits, perceived barriers, and perceived self-efficacy, which is consistent with the results obtained by Daneshvar *et al*.[54] and Panahi.[42] Students take preventive behavior when they feel they are at risk for pediculosis, and when students admit that they are susceptible to pediculosis infection and may develop pediculosis. In this study, as in the study of Morovati Sharif *et al*.[55] and Daneshvar *et al*.[54] and the study of Panahi *et al*.,[42] a positive and significant correlation was seen between perceived susceptibility and health behavior.

In the present study, perceived severity meant that students felt threatened by pediculosis. In other words, other students perceived pediculosis infection as a serious threat. In this study, the results show that there was a significant correlation between perceived severity with perceived benefits and perceived self-efficacy and health behavior with the results of Daneshvar *et al*.[54] The studies of the visit of Didarlou *et al*.[56] and Namdar *et al*.[57] were consistent. However, there was no significant relationship with perceived barriers, which is different from the results of Daneshvar *et al*.[54] Head lice prevention behaviors had a positive and significant correlation with perceived severity, perceived benefits, perceived self-efficacy, which was similar to the study of Namdar *et al*.[57]

Finally, in regression analysis, among the constructs of the HBM, perceived barriers and perceived benefits, and among the demographic variables of students "age and mothers" education as the final predictor of behavior, the perceived barrier variable was the strongest predictor of behavior that is consistent with the study of Moshki.[53]

Perceived barriers refer to perceived negative aspects that are potential and act as barriers to performing a behavior. These potentially negative aspects affect a person's behavior and are: 1) cost-benefit, here the person first analyzes how beneficial the health behavior is. and 2) side effects, the negative side of the behavior may be potentially unpleasant, painful, uncomfortable, inappropriate, and time-consuming for the person, all of which are potentially negative aspects of the behavior. In this study, people think that washing clothes regularly is time-consuming and other obstacles can be waking up late and not having enough time to comb their hair, not having personal items (such as towels and combs) noted. Therefore, health professionals should design and implement interventions and strategies to remove barriers to pediculosis-preventing behaviors.

Conclusion

The findings showed that all constructs of the HBM are related to pediculosis prevention behavior, so researchers and planners can use this model as a suitable framework for designing and intervening programs to prevent pediculosis. And since in this study, the structure of perceived barriers has been identified as the strongest predictor, it is suggested that planners and implementers in designing and implementing programs in this field emphasize the barriers that prevent preventive behaviors and have more focus.

Study limitations

Use of questionnaires and self-report data.

Acknowledgments

This article is taken from Shahid Beheshti University of Medical Sciences, Iran. The efforts of the relevant officials of Shahid Beheshti University of Medical Sciences, education officials of Shahroud City, teachers, and students who cooperated with us in the implementation of this project are appreciated and thanked.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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