

# Cognitive Factors Associated to Pediculosis Preventive Behaviors Among Mothers of School-Age Children in Chaldoran County, Iran

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**Background:** Despite the improvement of living standards and public health as well as conducting the specific programs based on pediculosis control guidelines, Head Lice Infestation (HLI) is still a worldwide health concern. The purpose of this study was to investigate the cognitive factors associated to school-age children's HLI among mothers in an urban community.

**Subjects and Methods:** In this cross-sectional study, a multi-stage cluster random sample of 619 mothers of students in elementary schools of Chaldoran County, located in North-West of Iran, was recruited to participate in the study. Data were collected applying a set of questionnaires including socio-demographic and cognitive-behavioral factors, including Pediculosis Preventive Behaviors (PPBs), HLI knowledge, threat appraisal, as well as HLI prevention perceived self-efficacy, response efficacy, and perceived collective family efficacy.

**Results:** Statistically significant differences were found in the children's HLI by their mother's age and performance in PPBs ( $p$ -value=0.001). Hierarchical multiple linear regressions were performed with PPBs as outcome variable. According to their natures, the predictors for this outcome variable were classified in two different blocks. Demographic characteristics ( $p > 0.05$ ), and cognitive constructs ( $p < 0.001$ ) explained 9% and 21.1% of the observed variance in PPBs, respectively. Pediculosis was found as an epidemic among the students, particularly female students, of Chaldoran County, which call for action by health stakeholders and policymakers.

**Conclusion:** The healthcare providers are recommended to develop HLI prevention programs, within which the mothers and their school-age children as well as school managers and public places' employers are considered as the core target groups for interventions. Besides PPBs, response efficacy and perceived collective family efficacy to perform the behaviors should be considered as the core categories while designing such prevention programs.

**Keywords:** pediculosis, family health, school health, head lice, collective efficacy

## Introduction

Head Lice Infestation (HLI) is a worldwide health concern, affecting people of all ages with different socioeconomic status, particularly school-aged children.<sup>1,2</sup> HLI might cause distress and anxiety in children and other family members, and impose additional costs on the family and the health system.<sup>3,4</sup> It has also social and psychological negative consequences, and may lead to failure in academic performance.<sup>5</sup>

According to reports, the occurrence of HLI is varied in different populations. In the past two decades, the reported prevalence has a variation from 1% to 20% in the Europe.<sup>6</sup> In developing countries, however, it has risen to over 40% among

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children.<sup>7</sup> The rate of infestation is reported to be 1.2% in Turkey,<sup>8</sup> 4.8% in the Netherlands,<sup>9</sup> 35% in Brazil,<sup>9</sup> 29.7% in Argentina<sup>10</sup> and 28.8% in Venezuela.<sup>11</sup> In Iran, evidence has indicated the prevalence rate of 8.8% and the female to male gender ratio of 5:5, respectively.<sup>12</sup> In a previous study by Ziaoddini et al<sup>13</sup> in west Azerbaijan, the prevalence rate was reported to be 9.11%. The high level of HLI prevalence may be associated to the incorrect use of the pediculicides, non-adherence to treatment, lack of HLI diagnosis,<sup>14</sup> and reduction in the efficiency of Permethrin shampoo from 97% in the 1990s to 30% in 2010.<sup>15</sup>

Numerous factors are associated with the increasing rate of HLI including high population density; insufficient health facilities, lack of healthcare providers in school, not washing hair regularly,<sup>16</sup> the duration of HLI, and the nature of “hair to hair” contact.<sup>17</sup> The most common age group infested with lice is 3- to 12-year-old children. Moreover, one of the possible reasons is related to culture and social norms of each community.<sup>18</sup> Therefore, understanding the social context of populations can be beneficial in exploring the predisposing factors of pediculosis.<sup>19</sup>

Several cognitive-behavioral and environmental factors may also act as obstacles to control the HLI. Understanding and recognizing these barriers may be also helpful in HLI prevention programs.<sup>20</sup> In this regard one of the factors that may affect the control of HLI is reported to be the perception of family members about pediculosis and its preventative behaviors.<sup>21</sup> Additionally, unfavorable socioeconomic status, population congestion, lower living standards, poverty status, poor health, and gender are reported as contributing factors. In Iran, in recent decades, the infestation rate has been increasing due to uncontrolled population growth, migration to cities, and marginalization around the cities which all have resulted in the creation of small communities with inadequate health facilities.<sup>22</sup>

Despite the progress of healthcare programs in Iran and specific programs based on the pediculosis control guidelines, head lice are common and have progressive prevalence among school-age children. Our aim in the present study was to examine the associations between cognitive factors and PPBs among mothers of school age children in Chaldoran County, Iran.

## Subjects and Methods

### Participants and Sampling

This cross-sectional study was carried out among 619 mothers with school-aged children in Chaldoran County,

North-West of Iran from September to October, 2017. Multistage random sampling was employed to recruit participants in the study. In the first step, from the 12 primary schools in the County, four schools with 739 students were randomly selected, and then the mothers of the students were invited to participate in the study. G\*Power software was used to estimate the required sample size based on the following parameters: level of confidence = 95%, power = 80%, correlation coefficient = 0.145, and a design effect = 2. The required sample size was estimated to be about 739. In total, 619 mothers participated in the study and all mothers completed the written questionnaire (Response Rate = 83.7%). The participants aged from 20 to 40 years and the mean age of mothers was 34, SD = 5.85. Via phone calls, the mothers were invited to participate in an initial session in the schools. In a private room in the schools, they were provided with the questionnaires in a self-report manner.

This study was approved by Ethics Committee in Tabriz University of Medical Sciences (Ethics Code: IR.TBZMED.REC.1396.600). Informed written consent was obtained from all the participants prior to formal commencement of data collection.

## Measures

In order to collect data, a researcher-made questionnaire based on cognitive-behavioral constructs was developed. The questionnaire was prepared by reviewing other questionnaires applied in similar studies.<sup>23–27</sup> Validity of the questionnaires was assessed by an expert panel (six health educationists, a psychologist, an entomologist and an epidemiologist). In order to assess reliability, a pilot study was performed on 20 mothers not included in the final sample. A brief description of the questionnaire is as follows:

### Demographic Characteristics

The following demographic data were obtained: age of mothers, educational grade of their children, gender and birth rank of their child, job, educational status, the frequency of bathing the child per week, the frequency of combing the hair of child per day, using personal health accessories on their children (yes/no), using personal equipment to cut the child’s hair (yes/no), regular cleansing of the child’s comb (yes/no), having children with shared sheet blanket (yes/no), having children with shared toys (yes/no), hair length of the child (perfectly shaved, less than 1cm, up to the ear, long as the hair comes to the child’s shoulders, long as the hairs come to the child’s

back), history of lice infestation in the child in the last three months (yes/no), the history of lice infestation among family members in the previous season (yes/no), using anti-lice shampoo in the case of lice infestation among family members in the previous season (yes or no), the history of participation in lice infestation educational programs in the previous season (yes or no).

### Cognitive-Behavioral Constructs

#### Knowledge About HLI

The mothers' knowledge was measured using a fourteen-item scale on the ways of transmission (e.g., Head lice can be transferred from animals such as cats and birds), identification (e.g., Head lice are most often found in the nape of neck), prevention (e.g., in case of HLI, the whole house should be sprayed) and treatment of head lice (e.g., to treat HLI, the anti-lice shampoo should be used twice a week). A three-choice answer (Yes, No, and I do not know) was considered as a response format. The Cronbach alpha for the scale was 0.735.

#### Threat Appraisal About Infestation by Head Lice

The items about threat appraisal (thirteen items) were prepared with a Likert scale as the response format. Given the 5-point scale, the score of each descriptor ranged from 0 to 4 (from strongly disagree to strongly agree). Perceived susceptibility was assessed with six items (e.g., the likelihood of infestation with head lice is high in the school environment). The total score ranged from 0 to 24. Cronbach's alpha for this scale was 0.811. Perceived severity (seven items) was investigated with seven items (e.g., HLI causes a fall in my child's educational status). The theoretical range for this scale was 0 to 28. The Cronbach alpha was found to be 0.816.

#### Parental Perceived Self-Efficacy of HLI Prevention

This scale included seven items assessing parent's beliefs about their abilities: 1) to diagnose lice and nits (e.g., I can distinguish lice from other insects); 2) to manage and treat head lice in their children (e.g., I can treat head lice if my child affected by it); 3) to get information from different sources about head lice; and 4) to plan for their child, to combing hair and bathing regularly. Participants were asked to express their perceived self-efficacy using a scale that ranged from 0 to 4 (from strongly disagree to strongly agree). Cronbach alpha was 0.829.

### Response Efficacy of Preventive Guidelines

This scale also included seven items reviewing the mother's perception about the efficiency of preventive methods to eliminate head lice; 1) individual behaviors such as combing and cutting hair (combing hair a few times a day may prevent lice infestation); 2) appropriate treatment to prevent the onset of others; 3) performing recommendations of health care providers; and 4) participating in training programs in order to prevent of lice. Mothers had five options to express their views on this scale (ranging from 0 = strongly disagree to 4 = strongly agree). The Cronbach alpha was 0.872.

#### Collective Efficacy at the Family to Control Head Lice

This scale included seven items that measured the perceptions of families on their ability: 1) to manage new challenges in participation of all family members to prevent head lice; 2) to provide emotional support in difficult times; 3) to support each other to overcome head lice in family level; and 4) to have mutual trust to solve the problem (e.g., all of family members help each other if one of them is infested by head lice, or e.g., my child tells me if she/he would be infested with head lice). To express their perceived family efficacy beliefs, participants were provided with the same 5-point response format (ranging from 0 = strongly disagree to 4 = strongly agree). The Cronbach alpha for this scale was 0.901.

#### Head Lice Detecting Behaviors

The behavioral construct included eight items about mother's performance when dealing with head lice. A dichotomous response format (Yes/No) was considered to answer the questions. The behaviors included the following items: checking the child's hair for infestation; encouraging the child to comb her/his hair every day; cutting the child's hair, ironing the child's clothes regularly; encouraging the child to clean her/his comb daily; encouraging the child to have a bath at least once a week, participating in educational programs at school about pediculosis prevention, and understanding the transmission and prevention methods of pediculosis.

#### Statistical Analysis

Data analysis was carried out using SPSS ver. 21. Descriptive statistics including frequency, mean and standard deviation, as well as the Pearson correlation coefficient test, multiple

linear regressions with Inter method was used to analyze the data. The level of significance was considered to be 0.05, a priori.

## Results

A majority of participants (88.8%) were housewives and 244 (39.4%) mothers were illiterate. No statistically significant difference was found in demographic variables by Pediculosis infestation. As shown in Table 1, a statistically significant difference was found in the HLI rate by the age of children's mothers ( $p$ -value=0.001). The HLI rate was significantly lower among students who use personal accessories for cutting hair ( $P$ -value=0.001), and use a personal mattress at home ( $p$ -value=0.024), compared to their counterparts. Ten percent of mothers reported that their child has a history of infestation with lice. In terms of PPBs, 221 (35.8%) participants reported that they have never used personal accessories when cutting their child's hair, among which 35 (59.3%) of all Pediculosis infestations were identified. Additionally, only 169 (27.1%) participants reported children's personal mattresses were used at home (Table 1).

Table 2 shows a comparison of PPBs between mothers with and without the history of Pediculosis infestation in their children. The frequency of regularly checking the child's hair for HLI was 42 (71.2%) versus 329 (58.8%), and regular ironing of the child's clothes (such as scarf, uniform, hats, etc.) was 35 (59.3%) versus 425 (75.9%) and was higher among mothers with non-infested children.

Table 3 shows bivariate correlations between the theoretical variables and PPBs. Applying a Pearson correlation coefficient test, statistically significant positive correlations were found between PPBs and all theoretical variables (Table 3). Hierarchical multiple linear regressions were performed on theoretical variables and PPBs, as the outcome variable.

As shown in Table 4 (step 1), all demographic and underlying variables were significant predictors of PPBs ( $p < 0.05$ ,  $R^2$  total = 0.093), except for using a personal mattress at home and the mother's job. In step 2, when the cognitive variables of the model were included in the model, age ( $p = 0.021$ ), using personal accessories when cutting hair ( $p = 0.021$ ), cleaning personal items like combs ( $p = 0.021$ ), using a personal mattress at home ( $p = 0.021$ ), the number of children with lice infestation ( $p = 0.021$ ), response efficacy ( $p = 0.021$ ), and perceived collective family efficacy ( $p = 0.01$ ) were significant predictors of PPBs ( $R^2 = 0.211$ ). Among all variables,

**Table 1** The Relationship Between Demographic Variables with Having or Not Having Pediculosis Infestation (n = 619)

Demographic Variables	Items	Not Having Pediculosis Infestation	Having Pediculosis Infestation	p-value*
		n (%)	n (%)	
Age groups	20 to 29	116 (20.7)	1 (1.7)	0.001
	30 to 39	360 (64.3)	53 (87.2)	
	≥ 40	84 (15.0)	5 (8.5)	
Literacy level	Illiterate	225 (48.5)	19 (45.2)	0.113
	Elementary	86 (18.5)	14 (33.3)	
	Secondary	117 (25.2)	7 (16.7)	
	High school	36 (7.8)	2 (4.8)	
Job	Employee	61 (10.9)	8 (13.6)	0.330
	Housewife	499 (89.1)	51 (86.4)	
Using personal accessories when cutting hair	Yes	374 (66.8)	24 (40.7)	0.001
	No	186 (33.2)	35 (59.3)	
Cleaning personal items like combs	Yes	491 (87.7)	48 (81.4)	0.123
	No	69 (12.3)	11 (18.6)	
Using a personal mattress at home	Yes	145 (25.9)	23 (39.0)	0.024
	No	415 (74.1)	36 (61.0)	

Note: \*Chi square test.

response efficacy and perceived collective family efficacy were the strongest predictors of PPBs.

## Discussion

Our aim was to investigate the cognitive-behavioral factors associated with head lice prevention among mothers with school-age children. Based on the findings, approximately 10% of families had children infested by head lice. Such a high prevalence rate of pediculosis is considered as an epidemic among the students studied, according to the definition provided by Centers for Disease Control and Prevention.<sup>28</sup> Similar with several previous studies,<sup>29–31</sup> the prevalence rate of pediculosis among the families with female school-age children was significantly higher than among their counterparts. A reason for this difference may be associated with the socio-cultural and religious factors. In some Islamic countries, like Iran, using headscarves ("hijab") is obligatory for female students in the schools. Such head coverings predispose the female students, particularly the elementary students in the areas with high prevalence rates, to be infested by head lice.

**Table 2** Comparison of Mother's Behaviors in Last Month Among Infested and Non-Infested Children (n = 619)

Variables	Not Having Pediculosis Infestation (n = 560)		Having Pediculosis Infestation (n = 59)		p-value*
	No	Yes	No	Yes	
	n (%)	n (%)	n (%)	n (%)	
Checking your child hair for infestation	231 (41.2)	329 (58.8)	17 (28.8)	42 (71.2)	0.041
Encourage your child to comb her/his hair every day	199 (35.5)	361 (64.5)	22 (37.3)	37 (62.7)	0.446
Cutting your child's hair	240 (42.9)	320 (57.1)	30 (50.8)	29 (49.2)	0.149
Ironing yours and your child's clothes regularly	135 (24.1)	425 (75.9)	24 (40.7)	35 (59.3)	0.006
Encourage your child to clean her/his comb daily	194 (34.6)	366 (65.4)	26 (44.1)	33 (55.9)	0.099
Encourage your child to bathe every week	107 (19.1)	453 (80.9)	14 (23.7)	45 (76.3)	0.244
Participate in educational programs at school about pediculosis prevention	543 (97.0)	17 (3.0)	56 (94.4)	3 (5.1)	0.296
Understand transmission and prevention methods of pediculosis	502 (89.6)	58 (10.4)	49 (83.1)	10 (16.9)	0.097

Note: \*Chi square test.

**Table 3** Bivariate Correlations of Variables and PPBs

Variables	1	2	3	4	5	6
1 = Knowledge						
2 = Perceived susceptibility	0.207*					
3 = Perceived severity	0.348*	0.332*				
4 = Perceived self-efficacy	0.190*	0.181*	0.335*			
5 = Response efficacy	0.251*	0.167	0.332*	0.445*		
6 = perceived collective family efficacy	0.251*	0.229*	0.349*	0.409*	0.525*	
7 = PPBs	0.208*	0.096*	0.189*	0.248*	0.274*	0.298*

Note: \*Correlation is significant at the 0.05 level (two-tailed).

**Table 4** Hierarchical Regression Analysis to Predict PPBs

Step/variable	B (Step 1)	p-value	B (Step 2)	p-value
(1) Age groups	-0.128	0.010	-0.122	0.010
Literacy level	0.124	0.014	0.067	0.175
Job	0.022	0.661	0.044	0.374
Using personal accessories when cutting hair	0.160	0.002	0.115	0.020
Cleaning personal items like combs	0.164	0.001	0.112	0.001
Using a personal mattress at home	0.022	0.664	0.035	0.001
Lice-infested child	0.114	0.022	0.114	0.020
(2) Knowledge			0.075	0.132
Perceived susceptibility			-0.065	0.206
Perceived severity			0.088	0.103
Perceived self-efficacy			0.077	0.153
Response efficacy			0.139	0.021
Perceived collective family efficacy			0.146	0.01
R <sup>2</sup>	0.093		0.211	

On the other hand, lice infestation is a social stigma in Iranian communities, and thus, mothers feel ashamed to announce their children's infestation (particularly their daughters). All these problems may result in late diagnosis

and treatment, and consequently escalating the distribution of infestation within the communities.

The results of our study showed that the cognitive and behavioral factors, altogether predicted 21% of total

variance in PPBs. Among all variables, perceived collective family efficacy was the strongest significant predictor of the outcome variable. Perceived collective efficacy in families could act as a protective factor during crisis and stressful situations.<sup>32</sup> In other words, efficacy among family members can provide a sense of effort and perseverance for conquering the problem.<sup>33</sup> Therefore, improving collective efficacy within families may be considered an essential strategy to promote lice infestation preventive behaviors. In this regard, Lindeke et al (2018) declared that strengthening the power of families, results in better cooperation during their decision-making, which, consequently, may be helpful in protecting their children's health.<sup>34</sup> It seems that when family members have a comprehensive recognition of the problems suffered or have sick members of the family, they will try to improve his/her health and provide family members with more protection. In the instance that family members provide a supportive and protective environment for a lice infested individual, he/she may not be worried about expressing their problem with the family members. Therefore it is recommended that healthcare providers pay more attention to a family's abilities to solve health problems when designing pediculosis prevention programs.

Based on the findings of our study, the HLI rate in children with older mothers was more common than those in children with younger mothers. No evidence was found to explain why the children of older mothers are infested more when compared to their counterparts. In this regard, Rajabi et al (2013), in a study on children with asthma, showed that younger mothers provided a better quality of life for their children.<sup>35</sup> As an explanation for this association we can say that by increase in the age of mother, an increase may also happen in the age gap between mother and child, and in the number of children that a mother may have, which may consequently decrease parent-child interactions or parent's attention to children's health. Additionally, an older mother may not have sufficient time or ability, or good physical health to nurture the child, so she may unconsciously ignore some childcare responsibilities, such as personal health care.

Our results also indicated that HLI was significantly lower among the students who use personal equipment when caring for their hair (such as personal brush, scissors, etc.). Similar results were reported by Alborzi et al (2004) who studied the factors that determine head lice prevalence among elementary students.<sup>36</sup> Honsen (2004), also in a study on the status of head lice control and management, emphasized personal health, including the use of personal belongings, as a substantial

strategy to control lice infestation.<sup>37</sup> In the case of only one HLI among individuals in a public place, using shared items (such as blanket, sheets, brushes, toys, clothes) may result in spreading the infestation among other members of the community. This claim has been also reported in several previous studies on rural students in Iran,<sup>38</sup> and Jordan<sup>39</sup> as well as a rapid review by Heukelbach and Feldmeier (2004).<sup>40</sup> Therefore, in the settings with high prevalence rates of lice infestation, a community mobilization approach should be considered while planning HLI prevention programs, in a way that not only the family members of those infested are involved but also the managers and employers of public places such as hairdressing saloons and boarding dorms participate.

In addition, there was a significant association between ironing cloths and HLI in the present study. Similarly, Dehghanzadeh et al (2015) in a study conducted in the north-west of Iran, showed a high contribution between ironing cloths and the prevalence of head lice.<sup>41</sup> This behavioral strategy may be proposed while family education programs are implemented in epidemic, endemic and hyper-endemic areas. For successful application of this strategy, it has been recommended to wash clothes for 20 mins in warm water (water and salt or chloride in water), and then ironing them.<sup>42</sup>

Our findings showed that the hair of lice-infested students were less frequently checked by their mothers, compared to their counterparts. In another Iranian study, the regular checks of daughters' hair was not performed by their mothers.<sup>43</sup> Riabi et al (2012) also found a significant association between the lack of regular hair check of daughters by mothers and HLI in the children.<sup>44</sup> Previous studies have emphasized that parents should be more active than formal screening programs in recognition of lice infestation in their children.<sup>45,46</sup> So, mothers should obtain the required ability to recognize head lice and nits, and should perform mechanical actions, like regular combing, to identify and remove any possible lice and nits, and prevent the infestation to be distributed among children and other family members.

## Limitation

The data collection method was a self-report by mothers, thus recall bias is warranted. Also, we studied the predictors of PPBs in one urban area of Iran and thus our findings may have limited generalizability to other regions and cultures.

## Conclusion

Our findings showed pediculosis as an epidemic among the students, particularly female students, of Chaldoran County, which call for action by health stakeholders and

policymakers in Iran. The healthcare providers are recommended to develop HLI prevention programs, within which the mothers and their school-age children, as well as school managers and public place employers, are considered as the core target groups for interventions. We found that response efficacy and perceived collective family efficacy are remarkably associated with PPBs in mothers. These findings indicated that response efficacy and perceived collective family efficacy to perform the behaviors should be considered as the core categories while designing such prevention programs. Community mobilization for fostering public cooperation across public and private sectors, including the families, may be considered as an effective strategy to improve partnership between the families and the healthcare providers and to strengthen community participation in sustainable pediculosis prevention and control.

## Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical approval to perform the study was obtained from the Ethics Committee in Tabriz University of Medical Sciences.

## Informed Consent

Informed consent was obtained from all individual participants included in the study.

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## Disclosure

The authors declare that they have no conflicts of interest regarding this study.

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