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Original Article

The Effect of Education Based on Protection Motivation Theory on Promoting Preventive Behaviors Against Common Acute Respiratory Viral Infections Among Female Hairdressers

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Abstract

Introduction: The lack of preventive behaviors against common acute respiratory viral infections (ARVIs) in crowded workplaces, such as hairdressing salons, can contribute to the spread of these infections. Therefore, this study aimed to assess the effect of an educational intervention based on the Protection Motivation Theory (PMT) on promoting preventive behaviors against common ARVIs among female hairdressers.

Methods: This quasi-experimental study was conducted on 80 female hairdressers in Urmia, Iran (2020-2022). The hairdressers were divided into an intervention group (n=40) and a control group (n=40). The data collection tools included a demographic information form and a researcher-developed questionnaire based on the knowledge component and PMT constructs. The educational intervention for hairdressers in the intervention group was performed over one month through WhatsApp, consisting of three 45-minute sessions and one 60-minute session focused on the common cold, influenza, and COVID-19. Data were analyzed using SPSS 16.

Results: Following the intervention, the intervention group demonstrated significant increases in the mean scores of knowledge (11.97±1.62), perceived vulnerability (31.87±2.73), perceived severity (32.62±2.79), fear (28.15±1.92), response efficacy (14.40±1.08), perceived self-efficacy (19.45±1.58), protection motivation (14.85±0.42), and preventive behaviors (80.35±7.19) compared to the control group and baseline. However, there was a significant decrease in perceived rewards in the intervention group (6.20±3.20). Post-intervention, response costs in the intervention group (7.10±3.62) did not differ significantly from the control group (8.50±4.90).

Conclusion: The educational intervention, developed based on the knowledge component and PMT constructs, could promote preventive behaviors against common ARVIs among female hairdressers.

Keywords: Educational intervention, Protection motivation theory, Preventive behaviors, Respiratory tract infections, Hairdressers

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Introduction

Crowded workplaces are places for the spread of infectious diseases, including acute respiratory viral infections (ARVIs). Some of these workplaces, such as hairdressing salons, can contribute to the spread of these diseases due to the use of improper and unregulated methods for tattooing, micropigmentation, and nail extension. In addition, using shared personal items (shared towels, combs, headbands, and razors), making direct contact with customers to provide some hairdressing services, reusing some disposable items, not observing health standards, and frequently visiting the customers are other reasons for this assertion (1-4).

According to some studies, hairdressers had insufficient

knowledge about the ways of transmission or prevention and the principles of controlling infectious diseases. This gap in knowledge seriously increases the risk of infection spread in these settings (2, 3). For instance, Adoba et al reported that the prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) among barbers was 14.5% and 0.5%, respectively. The highest HBV prevalence (58.6%) was observed among barbers aged 20–29 years. Moreover, 64.5% of participants were unaware of HBV transmission modes, 64.0% did not perceive themselves at risk, and 97.0% were unaware of how HCV is transmitted. Finally, the study highlighted a high prevalence of HBV and a low level of knowledge regarding HBV and HCV infections among barbers (5).

The risk of infection transmission in hairdressing salons is not limited to blood-borne diseases. Several risk factors associated with the spread of respiratory infections have also been identified in these settings. For example, in a study by Natnael et al on hand hygiene practices during the coronavirus disease 2019 (COVID-19) pandemic and associated factors among barbers and beauty salon workers in Ethiopia, 47.1% of participants demonstrated poor hand hygiene practices, which is a critical factor in the transmission of respiratory infections such as COVID-19 (1). Moreover, Sangwijit et al indicated that most beauty salons did not comply with the COVID-19 preventive guidelines issued by the Thailand Department of Health (6).

In general, these studies reveal that hairdressing and beauty salons are potentially high-risk environments for infection transmission due to inadequate knowledge and suboptimal hygiene practices. This issue underscores the need for designing and implementing theory-based educational interventions aimed at promoting preventive behaviors against infectious diseases, including ARVIs, among hairdressers. It is noteworthy that such interventions can contribute to reducing the prevalence and overall burden of these diseases among hairdressers and the wider community.

ARVIs are caused by viruses that affect the human respiratory system, infecting cells and disrupting normal breathing. The common cold and influenza are among the most prevalent and significant types of these infections (7, 8). In addition, the COVID-19 pandemic has had a significant global public health impact, resulting in over 778 million confirmed cases and 7 million related deaths worldwide (9). ARVIs, including the common cold, influenza, and COVID-19, can lead to a wide range of physical, psychological, social, and economic consequences. In some cases, they may also be life-threatening, particularly for high-risk groups, such as infants, the elderly, and individuals with underlying health conditions (1, 10).

To design efficient educational interventions that reinforce preventive behaviors against ARVIs in hairdressers, it is necessary to use an appropriate theoretical framework. Protection Motivation Theory (PMT) is one of such frameworks. PMT has been widely utilized to explain and predict protective behaviors in response to different health threats, including respiratory infections (11, 12).

For instance, a cross-sectional study conducted by Khiskar et al demonstrated that the constructs of the extended PMT (including knowledge) collectively predicted approximately 37% of the variance in preventive behaviors against common ARVIs among female hairdressers. Among these constructs, perceived self-efficacy had the greatest predictive power, followed by response costs, perceived severity, protection motivation, and knowledge, respectively. Based on these findings, the authors of this study concluded that the extended PMT is a suitable theoretical framework for identifying the determinants of preventive behaviors against ARVIs and developing and implementing related educational interventions among female hairdressers (12).

PMT is based on the assumption that the adoption of protective behavior is directly influenced by a person's motivation to protect themselves from health threats. This motivation is shaped by threat appraisal and coping appraisal (two cognitive processes). Threat appraisal includes perceived vulnerability, perceived severity, and perceived intrinsic and extrinsic rewards, while coping appraisal involves perceived self-efficacy, response efficacy, and response costs (11).

According to this theory, individuals develop protection motivation and the intention to adopt preventive behaviors against ARVIs when they believe that they are vulnerable to these infections (perceived vulnerability), the diseases are serious and dangerous for them (perceived severity), and they receive fewer intrinsic and extrinsic rewards from engaging in maladaptive or risky behaviors (perceived rewards). Moreover, individuals take action when they think they are capable of performing preventive behaviors (perceived self-efficacy), these behaviors can reduce or eliminate the threat (response efficacy), and the costs of performing these behaviors (e.g., spending money, time, or energy) are perceived as lower than their benefits (perceived response costs). Protection motivation, in turn, leads to the adoption of preventive behaviors. In this theory, the fear construct serves as an intermediate variable between perceived vulnerability and perceived severity. Therefore, when individuals perceive themselves as vulnerable to serious health threats, their level of fear increases, thereby motivating them to adopt preventive or protective behaviors (11, 13).

Similar studies have applied an expanded form of PMT by incorporating the knowledge construct, since knowledge about respiratory infections also predicts the adoption of preventive behaviors (11, 14). Thus, the present study has included the knowledge construct within its theoretical framework and employed an extended version of PMT.

Considering the importance of preventing the spread of respiratory infections in crowded workplaces, such as hairdressing salons, and the lack of theory-based

interventional studies targeting the prevention of common ARVIs (i.e., the common cold, influenza, and COVID-19) among hairdressers, this study aims to assess the effect of a PMT-based educational intervention on improving preventive behaviors against common ARVIs among female hairdressers.

It is worth mentioning that one of the main reasons for selecting the PMT as the theoretical framework in the present study is its suitability for the nature of the topic under investigation. This study focuses on promoting preventive behaviors against common ARVIs, which closely aligns with the function of PMT. Additionally, the theory is extensively used to explain and predict health intentions and behaviors that protect individuals against harmful health threats. Hence, PMT is highly appropriate for designing and implementing educational interventions aimed at enhancing preventive behaviors against ARVIs (11, 12). In addition, since preventive behaviors against ARVIs are often driven by perceived risk and fear, PMT is particularly well-suited because it explicitly incorporates fear as a mediating construct, which is not a core component in most other models (15).

Materials and Methods

Study Design

This quasi-experimental study, with a pre-intervention and post-intervention design and a control group, was conducted from October 2020 to March 2022. Individual randomization was impossible due to ethical and practical limitations. Randomly assigning participants working in the same workplace to different groups could lead to dissatisfaction, perceived inequity, and reduced cooperation. Furthermore, budget and time limitations made it impossible to implement a full-scale randomized controlled trial. Therefore, a quasi-experimental design was chosen as the most feasible and ethically acceptable option. Further, comprehensive health service centers were used as allocation units (clusters) and randomly assigned to intervention or control groups. This approach minimizes the risk of contamination between groups and facilitates the practical implementation of the intervention in real-world conditions (16).

Participants and Eligibility Criteria

The statistical population included all female hairdressers working in Urmia, Iran. The inclusion criteria were a minimum of elementary education [1], access to a smartphone or tablet equipped with WhatsApp Messenger and the ability to use it [2], physical and mental readiness to participate in the study [3], no participation in similar research or educational programs in the past six months [4], a written informed consent form [5], and fluency in Persian [6]. On the other hand, the exclusion criteria included incomplete questionnaire responses, unwillingness to continue participation, occurrence of unexpected events (e.g., death or illness), absence from more than one training session, and migration during the study period.

Sample Size Calculation

The minimum required sample size was determined based on a similar study conducted by Ansari et al (17), which reported the means and standard deviations of the "perceived rewards" construct after a PMT-based educational intervention as 62.00 ± 18.53 and 73.60 ± 17.39 in the intervention and control groups, respectively. Using these values and considering a 95% confidence level and 80% statistical power, the sample size was calculated using the formula for comparing two independent means. Based on these parameters, the minimum required number of participants per group was estimated to be 37. To account for a potential dropout rate of 10%, the final sample size was increased to 40 participants per group, yielding a total of 80 participants.

Sampling Method

A multi-stage sampling method was used, with health centers serving as clusters. First, Urmia was divided into north and south regions. Each comprehensive health service center in these regions was considered a cluster. In each region, two comprehensive health service centers were selected from the clusters using simple random sampling (by lottery), resulting in a total of four centers. Then, random allocation was performed at the cluster level, whereby one center in each region was randomly assigned to the intervention group and the other to the control group, using the same lottery method. Subsequently, a list of female hairdressers was compiled by visiting the selected centers and coordinating with center authorities. It should be noted that these hairdressers were covered by each center and met the inclusion criteria for the study. Next, 20 participants were selected from each center using simple random sampling (by lottery), resulting in a total sample of 80 individuals across the four centers.

Subsequently, the phone numbers of the selected female hairdressers were obtained from the respective centers. Each selected hairdresser was then contacted by phone, during which the general purpose of the study was briefly explained. Afterward, those who verbally agreed to participate were asked to suggest a convenient time for the research team to visit their workplace in person. During the in-person visit, further explanations, including detailed information about the study objectives, procedures, and ethical considerations, were provided to build trust and encourage cooperation. If the hairdresser agreed to participate, a direct link to the electronic informed consent form was sent to them for completion. If any selected female hairdressers declined to participate, sampling continued following the same procedure until the target sample size was achieved (Figure 1).

Data Collection Tool

The data collection tool was a researcher-designed questionnaire consisting of two sections. The first section

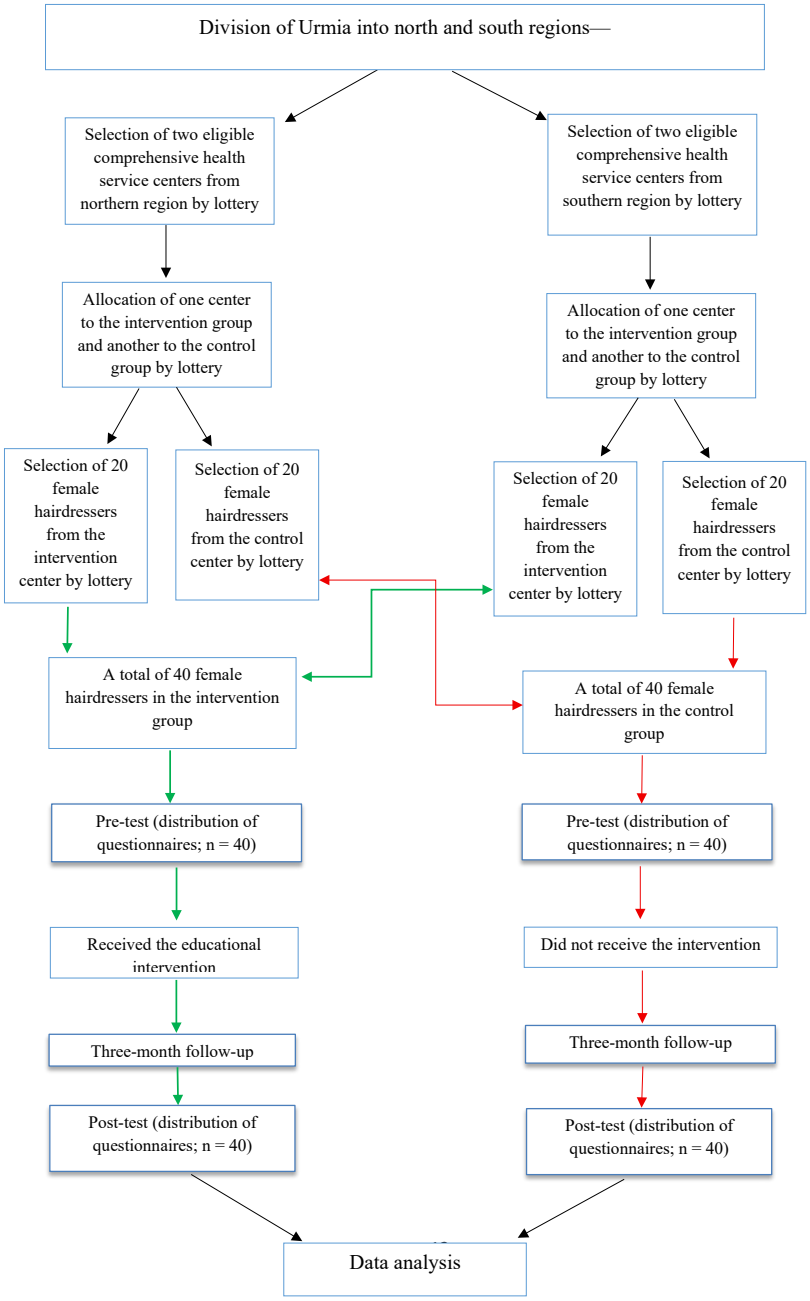

Figure 1. Flowchart of the Study Design

gathered demographic information, including age, marital status, education level, income level, work experience, history of participation in training courses related to respiratory viral infections (RVIs), and access to personal protective equipment against RVIs in the workplace. The second section comprised questions based on the knowledge component and PMT constructs, such as perceived vulnerability, perceived severity, fear, perceived intrinsic and extrinsic rewards, response efficacy, response costs, perceived self-efficacy, protection motivation regarding RVIs (e.g., the common cold, influenza, and COVID-19), and preventive behaviors related to these infections. The initial items were developed through a literature review (18-20) and consultation with experts in relevant fields, including specialists in infectious diseases, health education, and epidemiology. Following the development of the questionnaire, its validity and reliability were evaluated and confirmed.

Validity and Reliability of the Data Collection Tool

Both face validity (qualitative and quantitative) and content validity (quantitative) were assessed to determine validity. For qualitative face validity, ten individuals from the target population were interviewed face-to-face, and their feedback was used to revise the questionnaire. Moreover, the impact score of each item was calculated for quantitative face validity. A panel of 10 experts in relevant fields, including two infectious disease specialists, five health education professionals, and three epidemiologists, was consulted for this purpose. Items with an impact score

greater than 1.5 were retained in the questionnaire, while those scoring below this threshold were removed from the questionnaire (21).

The aforementioned expert panel evaluated the quantitative content validity. Two indices were calculated: the content validity ratio (CVR), based on the criterion of necessity, and the content validity index (CVI), which assesses relevance, clarity, and simplicity. According to Lawshe's table, a CVR value above 0.62 was required for each item, based on a panel of 10 experts. Items that did not meet this threshold were removed from the questionnaire. For CVI, items with a score above 0.79 were considered acceptable, and scores between 0.70 and 0.79 were considered questionable and in need of revision. In addition, scores below 0.70 were deemed unacceptable and eliminated accordingly (21).

Cronbach's alpha coefficient was utilized to assess the reliability of the questionnaire. The pilot version of the questionnaire was distributed among 30 individuals from the target population. After completion, Cronbach's alpha was 0.772, 0.763, 0.808, 0.918, 0.894, 0.835, 0.938, 0.836, 0.892, and 0.917 for knowledge, perceived vulnerability, perceived severity, fear, perceived rewards, response efficacy, response costs, perceived self-efficacy, protection motivation, and preventive behaviors, respectively. All values indicated acceptable reliability for the respective constructs (21).

The final questionnaire consisted of 71 items, and knowledge was measured using 14 items (e.g., *What is the minimum recommended duration for handwashing to prevent RVIs [in seconds]?*). Further, perceived vulnerability was assessed with 7 items (e.g., *Due to frequent customer visits, the risk of contracting RVIs is higher in hair salons*). Perceived severity included 7 items (e.g., *If someone contracts an RVI in my hair salon, it can damage my professional reputation*). Furthermore, fear was estimated using 6 items (e.g., *I am afraid that my own health and the health of my clients can be endangered by contracting RVIs*). Moreover, perceived rewards were evaluated with 4 items (e.g., *Not following preventive behaviors against RVIs can reduce costs*). Response efficacy included 3 items (e.g., *Practicing preventive behaviors against RVIs in the hair salon can protect both employees and clients from infection*). Response costs were measured with 4 items (e.g., *Practicing preventive behaviors against RVIs leads to financial loss*). Additionally, perceived self-efficacy was assessed through 4 items (e.g., *Despite all the difficulties, I can practice preventive behaviors against RVIs*). Protection motivation included 3 items (e.g., *I intend to practice preventive behaviors against RVIs in the hair salon*). Finally, preventive behaviors were evaluated using 19 items (e.g., *Customer appointments are managed in a way to prevent crowding in the hair salon*).

The knowledge questions were multiple-choice with four options: one correct answer, two incorrect answers, and one "I don't know" option. Correct answers were scored as 1, while incorrect and "I don't know" responses were scored as 0. A higher total score reflected a higher level of knowledge. Items related to the PMT constructs (excluding behavior) were rated using a five-point Likert-type scale: strongly disagree (1), partially disagree (2), neutral (3), partially agree (4), and strongly agree (5). In addition, preventive behavior items were rated on a four-point Likert-type scale: never (1), sometimes (2), often (3), and always (4). A higher score in each construct indicated a more favorable status in that domain. However, the scoring was reversed for perceived rewards and response costs; a lower score in these two constructs represented a better status.

Pre-Test Phase

During the pre-test phase of the study, a direct link to the electronic questionnaire was sent via WhatsApp to participants in both the intervention and control groups. The questionnaires were completed as self-reports, with guidance provided by the interviewer when necessary.

Intervention Description

Based on the pre-test results, as well as the knowledge component and the constructs of the PMT, an educational intervention was designed focusing on common cold, influenza, and COVID-19, along with their associated preventive behaviors, for implementation in the intervention group. Examples of preventive behaviors against ARVIs in hairdressing salons include managing client appointments to avoid overcrowding, washing hands with soap and water properly and frequently, and wearing face masks during work, especially when in close contact with clients or during outbreaks. These measures also encompass refusing to serve clients who do not use personal protective equipment during outbreaks, using disposable personal items (e.g., single-use towels and head coverings), regularly disinfecting frequently touched surfaces and shared tools (e.g., scissors and tweezers) after each use, maintaining physical distancing as much as possible, and ensuring proper ventilation in the salon environment.

To implement the educational intervention, participants in the intervention group were divided into four subgroups of ten individuals, and a separate WhatsApp group was created for each. Moreover, educational sessions were delivered to each group over the course of one month, consisting of three 45-minute sessions and one 60-minute session.

One night before each session, the educational content, along with supplementary audio and video files and assignments, was sent to each group via WhatsApp. Participants were then asked to choose a preferred time for the next day's session between 8:00 a.m. and 8:00 p.m. At the selected time, group members engaged in discussions, exchanged views, and participated in question-and-answer sessions related to the content and assignments. After completing the training sessions, the intervention group received an educational package containing

pamphlets and posters in order to help reinforce the material. Meanwhile, the control group continued with their routine education based on the existing health center programs. To uphold ethical standards, a brief training package was also provided to the control group upon completion of the study. Details of the educational intervention are presented in Table 1.

Post-Test Phase

Three months after the implementation of the educational intervention, the questionnaires were re-administered using the same method as the pre-test. The electronic questionnaire link was again sent via WhatsApp to participants in both intervention and control groups, who completed it as self-reports with interviewer guidance available when necessary. During the three-month follow-up period (the interval between the pre-test and the post-test), biweekly reminder phone calls (each approximately 10 minutes) were made to participants in the intervention group, resulting in a total of six calls per participant. Each call focused on reinforcing the key educational messages delivered during the primary intervention sessions (e.g., the importance of hand hygiene and mask usage), reminding participants to review the provided educational materials (e.g., pamphlets and posters), and encouraging them to maintain the recommended preventive behaviors.

It is necessary to clarify that the post-test was conducted 3 months after the last educational session (17, 22). Accordingly, in this study, the post-test was also performed 3 months after the intervention. According to a systematic

Table 1. The Educational Intervention

Session	Intervention Construct	Goal	Heading of Educational Topics	Educational Methods	Educational Materials and Aids	Education Time	Assignments Given at the End of Education	Evaluation Method
First	Knowledge	Stating the educational objectives and increasing the knowledge of the intervention group about common ARVIs	1. Welcoming participants and introducing the members (introduction and communication) 2. Defining and classifying common ARVIs (i.e., cold, influenza, and COVID-19) 3. Explaining the causes of common ARVIs 4. Describing transmission routes of these diseases and highlighting the most common route 5. Presenting symptoms and signs of common ARVIs	Web-based training, lectures, question-and-answer, and practical demonstration	Mobile phones, tablets, audio-visual clips, photographs, booklets, posters, and pamphlets	45 minutes	The hairdressers in the intervention group were asked to review the provided educational materials, watch the accompanying videos, and submit a report on the possible routes of common ARVI transmission within hairdressing salons.	Conducting pre- and post-tests using a researcher-developed questionnaire to assess knowledge
Second	- Perceived vulnerability - Perceived severity - Fear	Increasing perceived vulnerability, perceived severity, and fear toward common ARVIs among participants in the intervention group	1. Presenting the incidence and prevalence of common ARVIs 2. Identifying risk factors in hairdressing salons contributing to the spread of common ARVIs and emphasizing their potential dangers for hairdressers 3. Describing complications and negative consequences of common ARVIs for individuals, families, occupations, and social relationships	Web-based training, lectures, and question-and-answer	Mobile phones, tablets, audio-visual clips, booklets, posters, and pamphlets	45 minutes	The hairdressers in the intervention group were requested to review the provided educational materials, watch the accompanying videos, and submit a report on the risk factors in hairdressing salons contributing to the spread of common ARVIs. Moreover, they were asked to take note of the symptoms and complications of common ARVIs and share this information with their peers.	Conducting pre-test and post-test using a researcher-developed questionnaire to assess perceived vulnerability, perceived severity, and fear
Third	- Perceived intrinsic and extrinsic rewards - Response efficacy	-Reducing perceived intrinsic and extrinsic rewards of unhealthy behaviors that increase the risk of contracting common ARVIs - Increasing response efficacy of preventive behaviors against common ARVIs in the intervention group	1. Introducing healthy alternative behaviors to replace unhealthy ones and correcting misconceptions about the rewards of maladaptive behaviors 2. Specifying behaviors that help prevent common ARVIs (e.g., washing hands frequently and wearing face masks during work) 3. Highlighting the benefits of preventive behaviors against common ARVIs in hair salons (e.g., protecting staff and clients, fostering responsibility toward oneself, family, and clients)	Web-based training, question-and-answer, and group discussion	Mobile phones, tablets, audio-visual clips, booklets, posters, and pamphlets	45 minutes	Hairdressers in the intervention group were asked to discuss misconceptions about perceived rewards of maladaptive behaviors and exchange ideas to reduce them, as well as to provide a list of benefits of adopting preventive behaviors against common ARVIs.	Conducting pre- and post-tests using a researcher-developed questionnaire to assess perceived rewards and response efficacy

Table 1. Continued.

Session	Intervention Construct	Goal	Heading of Educational Topics	Educational Methods	Educational Materials and Aids	Education Time	Assignments Given at the End of Education	Evaluation Method
Fourth	- Response costs - Perceived self-efficacy	-Reducing response costs of preventive behaviors against common ARVIs - Increasing perceived self-efficacy for performing preventive behaviors against common ARVIs	1. Reassuring participants about low-cost preventive behaviors against common ARVIs (e.g., "Washing your hands only takes 20 seconds," and the like) 2. Teaching strategies for adapting to and coping with physical, psychological, and economic barriers (e.g., lack of money, time, or energy) 3. Correcting misconceptions about preventive behaviors against common ARVIs, especially those related to perceived costs 4. Teaching preventive behaviors against common ARVIs (e.g., proper handwashing with soap and water, correct methods for wearing and removing face masks, appropriate use of tissues when coughing or sneezing, and safe disposal of contaminated materials—in small, practical steps) 5. Utilizing credible role models (e.g., showing videos of well-known cinema and television actors carefully practicing ARVI preventive behaviors) 6. Providing verbal persuasion and reinforcement 7. Introducing relaxation techniques to help manage stress associated with implementing a new behavior or changing behavior. 8. Sending motivational messages with the keyword "I can" to encourage commitment to preventive behaviors against common ARVIs 9. Conducting follow-ups to reinforce and sustain the recommended preventive behaviors among participants	Web-based training, question-and-answer, group discussion, and practical demonstration	Mobile phones, tablets, audio-visual clips, booklets, posters, and pamphlets	60 minutes	The hairdressers in the intervention group were requested to present a list of real and perceived barriers related to preventive behaviors against common ARVIs, prioritize them, suggest the best solutions to overcome these barriers, and regularly perform and observe preventive behaviors against common ARVIs in their salon.	Conducting pre- and post-tests using a researcher-developed questionnaire to assess response costs and perceived self-efficacy

Note. COVID-19: Coronavirus disease 2019; ARVs: Acute respiratory viral infections.

review, a minimum period of 3 months is required to judge behavior change retention (23).

Ethical Considerations

Ethical approval for conducting this research was obtained from the Research Ethics Committee of Urmia University of Medical Sciences (IR.UMSU.REC.1400.130). Additionally, a written introduction letter was obtained from the Vice-Chancellor for Research and Technology at Urmia University of Medical Sciences to present to the authorities of the selected comprehensive health service centers. The researcher visited all selected centers in person to explain the study objectives. Participants were provided with a comprehensive explanation regarding the aim and methods of the study and were assured of voluntary participation and withdrawal from the study at any time. Furthermore, their information was kept confidential by the researcher, and the study results were reported in aggregate form. Moreover, written informed consent was obtained from all participants. All intervention materials, along with an educational overview, were provided to the control group after the completion of the study.

Data Analysis

The obtained data were analyzed using SPSS, version 16. Descriptive statistics, including means, standard deviations (SD), percentages, and frequencies, were used, along with analytical tests, including the Kolmogorov–Smirnov test, chi-square test, Fisher's exact test, independent t-test, Mann–Whitney U test, paired t-test, and analysis of covariance (ANCOVA). The results were considered statistically significant at $P<0.05$. Effect sizes for the ANCOVA were reported as partial eta squared (η_p^2), with values interpreted as small (0.01), medium (0.06), and large (0.14) in accordance with Cohen's guidelines (24). Considering that the raw scores of different constructs (e.g., knowledge, perceived vulnerability, and preventive behaviors) are measured on different scales, direct comparison of these scores is inappropriate. Therefore, effect sizes (η_p^2) were used as a standardized metric to

compare differences across constructs (25).

Results

There were no statistically significant differences between the intervention and control groups regarding age, work experience, marital status, education level, income level, participation in training courses related to RVIs, and access to personal protective equipment in the workplace before the educational intervention (Table 2).

Before the educational intervention, no statistically significant differences were found between the intervention and control groups in terms of the mean scores for knowledge and the constructs of perceived severity, fear, perceived rewards, response efficacy, perceived self-efficacy, protection motivation, and preventive behaviors against common ARVIs ($P>0.05$). However, following the intervention, these differences became statistically significant ($P<0.05$). In contrast, no significant difference was observed between the intervention and control groups regarding the mean score of response costs either before or after the intervention ($P>0.05$). The independent t-test revealed a statistically meaningful difference between the intervention and control groups in the mean scores of perceived vulnerability at the pre-intervention stage ($P<0.05$). This difference remained significant ($P<0.05$) after the educational intervention, based on ANCOVA results controlling for the pre-intervention scores (Table 3).

The results of the intra-group comparison (Table 3) indicated a statistically significant difference in the intervention group in the mean scores of all constructs before and after the educational intervention ($P<0.05$). Conversely, these differences were not statistically significant in the control group ($P>0.05$).

Discussion

Our findings confirmed the effectiveness of the PMT-based educational intervention in enhancing knowledge about common ARVIs among female hairdressers in the intervention group. Similar results have been reported in previous studies, highlighting the positive impact of theory-driven health education interventions on increasing knowledge about RVIs. For example, the mean knowledge score related to influenza and its preventive behaviors demonstrated a significant increase in the intervention group after implementing educational

Table 2. Comparison of Demographic Characteristics Between the Two Groups at the Pre-Intervention Phase

Qualitative Variable			Intervention Group n (%)	Control Group n (%)	*P*-Value
Marital status		Single	11 (27.5)	13 (32.5)	[a]0.626
		Married	29 (72.5)	27 (67.5)	
Education level		Elementary	5 (12.5)	5 (12.5)	[b] 0.523
		Middle school	8 (20.0)	4 (10.0)	
		Diploma	16 (40.0)	24 (60.0)	
		Associate	4 (10.0)	3 (7.5)	
		Bachelor	6 (15.0)	3 (7.5)	
		Master	1 (2.5)	1 (2.5)	
Income level		Low	5 (12.5)	7 (17.5)	[a]0.604
		Medium	31 (77.5)	27 (67.5)	
		Good	4 (10.0)	6 (15.0)	
Participation in training courses related to RVIs		Yes	0 (0.0)	0 (0.0)	[a]1
		No	40 (100)	40 (100)	
Access to personal protective equipment in the workplace	Mask	Yes	38 (95.0)	38 (95.0)	[b] 1
		No	2 (5.0)	2 (5.0)	
	Gloves	Yes	37 (92.5)	34 (85.0)	[b] 0.481
		No	3 (7.5)	6 (15.0)	
	Disposable hairdressing gown	Yes	10 (25.5)	3 (7.5)	[b] 0.066
		No	30 (75.0)	37 (92.5)	
	Disinfectants	Yes	38 (95.0)	33 (82.5)	[b] 0.154
		No	2 (5.0)	7 (17.5)	
	shield Face	Yes	13 (32.5)	17 (42.5)	[a]0.356
		No	27 (67.5)	23 (57.5)	
Quantitative variable			Mean ± SD	Mean ± SD	
Age (year)			36.37 ± 8.06	35.02 ± 8.40	[c] 0.466
Work experience (year)			9.80 ± 6.73	8.22 ± 5.33	[d] 0.375

Note. n: Number; SD: Standard deviation; a: Chi-squared test; b: Fisher's exact test; c: Independent t-test; d: Mann-Whitney U test.

Table 3. Mean Scores of PMT Constructs Related to Common ARVIs in the Two Groups at Pre-Intervention and Post-Intervention Phases

Construct	Research Phase	Group		*P*	η_p^2	*P-adjusted***	η_p^2
		Intervention Mean ± SD	Control Mean ± SD				
Knowledge	Pre-intervention	8.75 ± 1.56	8.42 ± 2.25	[a]0.456			
	Post-intervention	11.97 ± 1.62	8.40 ± 2.20	*[b]0.001	0.545	[b]0.001	0.547
	P-within	[c]0.001	[c]0.900				
Perceived vulnerability	Pre-intervention	27.87 ± 4.21	20.27 ± 2.66	[a]0.001			
	Post-intervention	31.87 ± 2.73	20.15 ± 2.45	*[b]0.001	0.659	[b]0.001	0.679
	P-within	[c]0.001	[c]0.058				
Perceived severity	Pre-intervention	29.02 ± 4.76	28.07 ± 5.59	[a]0.416			
	Post-intervention	32.62 ± 2.79	27.52 ± 5.57	*[b]0.001	0.421	[b]0.001	0.431
	P-within	[c]0.001	[c]0.052				
Fear	Pre-intervention	25.10 ± 4.33	26.35 ± 4.12	[a]0.191			
	Post-intervention	28.15 ± 1.92	26.15 ± 3.86	*[b]0.001	0.233	[b]0.001	0.226
	P-within	[c]0.001	[c]0.387				
Perceived rewards	Pre-intervention	8.52 ± 4.70	8.45 ± 4.69	[a]0.943			
	Post-intervention	6.20 ± 3.20	8.65 ± 4.32	*[b]0.001	0.193	[b]0.001	0.200
	P-within	[c]0.001	[c]0.578				
Response efficacy	Pre-intervention	13.65 ± 1.80	13.40 ± 2.02	*[b]0.561			
	Post-intervention	14.40 ± 1.08	13.52 ± 1.63	*[b]0.001	0.129	[b]0.002	0.127
	P-within	[c]0.005	[c]0.473				
Response costs	Pre-intervention	7.50 ± 4.15	8.90 ± 5.49	[a]0.211			
	Post-intervention	7.10 ± 3.62	8.50 ± 4.90	*[b]0.471	0.007	[b]0.623	0.003
	P-within	[c]0.005	[c]0.333				
Perceived self-efficacy	Pre-intervention	18.50 ± 2.64	18.77 ± 2.23	[a]0.617			
	Post-intervention	19.45 ± 1.58	18.65 ± 2.10	*[b]0.002	0.120	[b]0.002	0.126
	P-within	[c]0.010	[c]0.418				
Protection motivation	Pre-intervention	14.27 ± 1.46	13.95 ± 2.42	[a]0.471			
	Post-intervention	14.85 ± 0.42	13.85 ± 2.30	*[b]0.001	0.205	[b]0.001	0.172
	P-within	[c]0.006	[c]0.421				
Preventive behaviors	Pre-intervention	71.87 ± 7.35	69.02 ± 7.95	[a]0.100			
	Post-intervention	80.35 ± 7.19	68.47 ± 8.16	*[b]0.001	0.375	[b]0.001	0.395
	P-within	[c]0.001	[c]0.457				

Note. ANCOVA: Analysis of covariance; ARVs: Acute respiratory viral infections; PMT: Protection motivation theory; a: Independent t-test; b: ANCOVA; c: Paired t-test; SD: Standard deviation; η_p^2: Partial eta squared.

* The result of ANCOVA adjusted for pre-test score

** The result of ANCOVA adjusted for pre-test score, age, marital status, education level, income level, and work experience

interventions in studies by Farhadian et al (26) and Khani-Jeihooni et al (27), both of which aimed to promote preventive behaviors against influenza.

Knowledge is a prerequisite for changing unhealthy behaviors and adopting healthy ones (28). According to research, the success of disease prevention programs depends on individuals' understanding of disease causes, transmission routes, risk factors, at-risk populations, and the importance of early diagnosis (29). Accordingly, providing comprehensive information about common ARVIs through educational workshops, fact sheets, and mass media campaigns can enhance knowledge and promote the adoption of preventive behaviors not only among hairdressers but also across other occupational groups and the general population (28).

According to the results of the present study, the educational intervention was effective in increasing both perceived vulnerability to the likelihood of contracting common ARVIs and perceived severity regarding the symptoms and complications of these infections among female hairdressers in the intervention group. Consistent with these findings, Keshavarz et al (30) reported a significant increase in perceived vulnerability and perceived severity following an educational intervention aimed at promoting intention to engage in influenza prevention behaviors. Similarly, El Sayed et al (31), in a study conducted in Egypt on enhancing preventive behaviors against COVID-19, found that educational interventions significantly improved the mean scores of both constructs in the intervention group.

Perceived vulnerability has a strong cognitive component and is partially influenced by an individual's level of knowledge (28). Thus, the observed increase in knowledge about common ARVIs among participants in the intervention group likely contributed to their heightened perceived vulnerability. Consequently, participants in the intervention group viewed themselves as more susceptible to contracting ARVIs compared to those in the control group. This improvement in perceived vulnerability can also be attributed to specific strategies employed in the present study, including presenting statistical data on the prevalence of common ARVIs and highlighting various risk and predisposing factors that increase susceptibility among hairdressers (28). Examples of these factors include frequent physical contact with clients during the provision of services and the high volume of client visits to hair salons (1).

Regarding perceived severity, it is noteworthy that hairdressing salons are professional business environments; therefore, contamination with RVIs can negatively impact the reputation of a salon, reduce customer trust and foot traffic, and ultimately lead to financial loss. Consequently, emphasizing the occupational and financial consequences of common ARVIs is likely to have a significant influence on business owners, including hairdressers. This emphasis can increase their perception of the severity of the issue, encouraging the adoption of preventive behaviors. One educational strategy that effectively raises perceived severity is to highlight the physical, psychological, occupational, financial, and familial consequences of common ARVIs. For example, sharing a story about a hairdresser who suffered reputational damage and lost clients due to non-adherence to preventive measures (e.g., failure to wear a mask during the COVID-19 pandemic) can underscore the seriousness of the issue and reinforce the importance of protective behaviors (28).

Unlike the findings of the present study, those of a study by Ansari et al (17), examining preventive behaviors against influenza among high school students, revealed that although the educational intervention increased perceived severity, it had no significant effect on enhancing perceived vulnerability. The researchers attributed this result to the fact that most students were already familiar with influenza and, due to typically milder symptoms in this age group, did not perceive the disease as serious or feel personally at high risk. Accordingly, the difference in perceived vulnerability outcomes between their study and the present one may be attributed to variations in the characteristics of the study populations (including age and baseline awareness) as well as the nature of the diseases under investigation. While the study by Ansari et al focused solely on influenza, a relatively well-known and low-risk illness for their target group, the present study also included the novel coronavirus (COVID-19) and the common cold. At the time of this study, COVID-19 was still not widely understood among the general public. Thus, the educational intervention may have had a more pronounced impact on increasing perceived vulnerability toward this emerging disease.

In the present study, the fear of common ARVIs increased among female hairdressers in the intervention group following the implementation of the educational intervention. Given that fear functions as an intermediate construct between perceived vulnerability and perceived severity, this increase was anticipated. Hence, inducing appropriate levels of concern and anxiety about common ARVIs through strategies aimed at enhancing perceived vulnerability and severity can generate a reasonable degree of fear, which may effectively motivate individuals to adopt preventive behaviors (13). Similarly, the results of a study by Rakhshani et al on preventive behaviors against respiratory infections among hospital staff demonstrated a significant increase in the mean fear score in the intervention group, both compared to the pre-intervention level and the control group, along with significant increases in perceived vulnerability and perceived severity (32).

The educational intervention implemented in the present study could reduce perceived intrinsic and extrinsic rewards associated with unhealthy behaviors that increase the risk of contracting common ARVIs. The lower the perceived rewards for engaging in maladaptive behaviors (a lack of self-protection), the higher the likelihood of adopting preventive behaviors (33). Therefore, it is essential to identify and eliminate internal and external motivational factors that drive unhealthy behaviors. In this study, strategies used to improve the perceived rewards construct included introducing healthy alternative behaviors to replace harmful ones and correcting misconceptions and false beliefs regarding the rewards of such maladaptive behaviors.

Likewise, in a study conducted by Matlabi et al aimed at promoting preventive behaviors against COVID-19, the mean score of perceived rewards significantly decreased in the intervention group following a PMT-based educational intervention. In their study, the educational content sought to highlight and explain the risks associated with certain motivational factors that could lead employees toward maladaptive behaviors, increasing their vulnerability to COVID-19 (33).

The findings of the present study indicated a considerable increase in the mean score of response efficacy in the intervention group after the educational intervention. This suggests that the strategies employed to enhance the response efficacy construct could effectively improve the perception of female hairdressers in the intervention group regarding the benefits of adopting preventive behaviors against common ARVIs. These educational strategies included clearly specifying the behaviors that help prevent common ARVIs (e.g., frequent handwashing and wearing face masks during work) and highlighting the benefits of adopting such preventive behaviors in hair salons (e.g., protecting salon staff and clients from infection and fostering a greater sense of responsibility

toward oneself, one's family, and clients) (1, 28).

This result aligns with the findings of studies conducted by Rakhshani et al (32), Matlabi et al (33), and Elgzar et al (34), demonstrating a significant increase in response efficacy in the intervention group following an educational intervention based on PMT. Contrarily, Ansari et al reported no significant improvement in response efficacy after the intervention (17). The differences in findings related to the response efficacy construct between the present study and the mentioned study, as well as other potential inconsistencies with this study's results, can be attributed to variations in study population characteristics, measurement tools, educational content, and intervention implementation methods.

Based on the findings of the present study, the educational intervention designed to improve response costs was not sufficiently effective. The nature of the hairdressing profession presents inherent barriers to adopting preventive behaviors against common ARVIs, many of which are related to financial, time, and energy demands. These barriers include a high volume of client visits, crowded workspaces, and the need for substantial quantities of personal protective equipment (e.g., masks, gloves, and disinfectants). Such structural and logistical challenges may be difficult to overcome through educational strategies alone, especially within the scope of a short-term intervention. Additionally, although the intervention targeting response costs aimed to address misconceptions about preventive behaviors against common ARVIs, particularly those related to perceived costs, and to promote cost-benefit awareness, it may not have been sufficient to change deeply rooted beliefs, especially in the absence of financial or organizational support. Therefore, it is recommended that future interventions be conducted to combine educational content with supportive policies and incentives (e.g., financial subsidies or access to free protective equipment) to more effectively reduce perceived response costs (28).

Our findings highlight that the implemented educational intervention effectively enhanced the perceived self-efficacy of female hairdressers in the intervention group regarding the adoption of preventive behaviors against common ARVIs. Accordingly, it is suggested that future interventions aiming to promote such preventive behaviors among hairdressers incorporate strategies specifically designed to improve perceived self-efficacy. One example of these strategies includes teaching preventive behaviors against common ARVIs, such as proper handwashing with soap and water, correct methods for wearing and removing face masks, appropriate use of tissues when coughing or sneezing, and safe disposal of contaminated materials—in small, practical steps. Other examples are utilizing credible role models (e.g., showing videos of well-known cinema and television actors carefully practicing ARVI preventive behaviors), providing verbal persuasion and reinforcement, and introducing relaxation techniques to help manage stress associated with implementing a new behavior or changing behavior (28). This finding is consistent with the results of studies conducted by Ansari et al (17), Rakhshani et al (32), and Elgzar et al (34), indicating significant improvements in self-efficacy among participants in the intervention group following educational interventions.

The findings further revealed that the educational intervention, designed and implemented based on the knowledge component and the constructs of PMT, was effective in promoting protection motivation and preventive behaviors against common ARVIs among female hairdressers in the intervention group. In other words, the strategies employed to enhance knowledge and PMT constructs not only improved those specific components but also ultimately strengthened protection motivation and protective behaviors against common ARVIs. In line with these results, the findings of studies by Ansari et al (17), Rakhshani et al (32), and Matlabi et al (33) confirmed that PMT-based educational interventions significantly increased both protection motivation and preventive behaviors against respiratory infections in the intervention groups.

One limitation of this study was the use of a self-reported questionnaire for data collection, and participants may not have provided fully accurate or truthful responses. Several measures were implemented to address this potential issue and improve data accuracy. All questionnaires were completed anonymously, without collecting names or any identifiable information. In addition, participants were assured of full confidentiality to encourage honest participation. Another limitation was that the study was restricted to female hairdressers in a specific geographic area, which may limit the generalizability of the findings. Accordingly, it is recommended that future studies replicate and evaluate this educational intervention in other regions and among male hairdressers in order to assess its broader applicability and effectiveness across different populations.

Conclusion

According to our findings and observed positive changes, the educational intervention, designed based on the knowledge component and constructs of PMT, along with the strategies, methods, content, tools, and other educational resources employed, could successfully promote preventive behaviors against common ARVIs among female hairdressers. Therefore, it is suggested that this educational intervention be integrated into routine healthcare services provided to female hairdressers as a simple, low-cost, and effective approach. Implementing such educational-supportive programs can help prevent and control these infections at the community level by encouraging protective behaviors within this high-risk occupational group. Finally, the knowledge, expertise, and experience of health educators, particularly those working in comprehensive health service centers, should be leveraged to effectively prevent and control common

RVIs through promoting preventive behaviors among female hairdressers.

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Competing Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval

All methods of this study were carried out in accordance with the Helsinki declaration. The ethical approval for conducting this research was obtained from the Research Ethics Committee of Urmia University of Medical Sciences (IR.UMSU.REC.1400.130). Written informed consent was obtained from all individual participants included in the study.

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