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Determinants of Skin Cancer Preventive Behaviors Among Rural Farmers in Iran: an Application of Protection Motivation Theory

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Abstract Skin cancer is one of the most prevalent cancers, worldwide, which happens more among those with more sunlight exposure like farmers. The aim of this study was to explore the determinants of skin cancer preventive behaviors (SCPBs) among rural farmers using Protection Motivation Theory (PMT). In this cross-sectional study, multistage random sampling was employed to enroll 238 farmers referring to rural health houses (HH) in Chaldoran County, Iran. A valid and reliable instrument based on PMT variables was used. Significant correlations were found between all PMT variables with SCPBs ($p<0.05$). Hierarchical multiple linear regressions were performed with Protection Motivation and SCPBs as outcome variables. Predictors for these two outcome variables were classified in two different blocks according to their natures. Demographic characteristics ($p>0.05$) and PMT constructs ($p<0.001$) explained 3 and 63.6 % of the observed variance in Protection Motivation, respectively. Also, no significant effect was found on SCPBs by demographic variables, in the first block ($\Delta R^2=0.025$); however, in the second block, Perceived Susceptibility ($p=0.000$), Rewards ($p=0.022$), Self-efficacy ($p=0.000$), and Response Cost ($p=0.001$) were significant predictors of SCPBs ($\Delta R^2=0.432$). Health care providers may consider PMT as a framework for developing educational interventions aiming at improving SCPBs among rural farmers.

Keywords Skin cancer prevention · Protection Motivation Theory · Rural farmers

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Introduction

Cancers have the highest mortality rate after cardiovascular diseases throughout the world and are the third leading cause of death [1, 2]. Skin cancer is an increasing problem for public health, worldwide [3]. Based on the statistics reported by World Health Organization (WHO), between 2 to 3 million non-melanoma skin cancers and 132,000 melanoma skin cancers occur, annually, throughout the world [4]. In the Middle East, skin cancer is the most common cancer [5]. In terms of prevalence, it is the most prevalent kind of cancer among men [1]. According to Iran Cancer Registry Reports in 2008, skin cancer had been the most common cancer among men with 14.8 cases per 100,000 people [6].

The main reason for skin cancer is constant exposure with sunlight [7]. In addition, some other risk factors include family history, having a weak immune system [8], and exposure to ultraviolet radiation [9]. Ultraviolet radiation is the main cause of basal cell carcinoma [10] which is more prevalent among people with excess exposure to sunlight [11]. The effects of UV ray on the skin are divided into two categories: short term and long term. The short-term effects include tanning, sunburn, heatstroke, and redness, and the long-term effects

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include rapid skin aging, melanoma, and basal cell carcinoma [12].

A systematic review on worldwide incidence of skin cancer urged the need for prevention studies in this area [3]. With simple changes in everyday sun-protective behaviors such as wearing thick clothing when encountering to sunlight, applying a sunscreen with an appropriate SPF, and avoiding artificial sources of ultraviolet ray, the detrimental effects of UV ray may be prevented [13]. As preventing constant sunlight exposure is considered as a priority in skin cancer prevention, promoting sunlight protective behaviors among those with high exposure (like rural areas inhabitants) should be one of the focuses for skin cancer prevention interventions.

Despite the efforts to provide more health care services for rural areas and, thus, to decrease inequalities between rural and urban areas, rural inhabitants are dealt with more diverse health care problems and challenges [14–16]. From the most important and fundamental problems in rural areas are lack of cognitive abilities (e.g., health knowledge, attitude, and self-efficacy) and healthy behaviors [17], as well. Therefore, investigation on health-related behaviors and their determinants in such communities has a great importance, considering that such studies may provide evidence to design more sophisticated health educational interventions in efforts to address unhealthy behaviors.

Because of the nature of rural living, sunlight exposure is more prevalent among men farmers in rural areas, and thus they are at greater risk for developing skin cancer in proportion to the other people. The issue is getting worse when it is estimated that residency in a rural area put people in a disadvantaged situation in terms of skin cancer survival [18]. Ahmadi et al. [18], in a study conducted in Kurdistan Province, Iran, found that 44 % of skin cancer patients living in the urban areas had been diagnosed in stage 1 or 2, while this amount for rural residents was 27 %, showing that the patients in rural areas tended to be diagnosed at a later stage of the disease. This disparity highlights the importance of skin cancer prevention as one of the best strategies in rural areas. Therefore, educational intervention as a strategy to promote sun-protective behaviors aiming at rural farmers sounds to be critical.

Theory-based interventions are more effective in influencing health-related behaviors compared to non-theoretical approaches, as they provide a reasonable framework to develop interventions and a guide for their evaluation [19]. To do so, health researchers have used lots of theories in order to create positive changes in health-related behaviors. Protection Motivation Theory (PMT) is one of those theories used frequently as a framework for educational interventions. This theory was introduced by Rajers in 1975 and since then has been accepted, extensively, as a framework to predict health-related behaviors and design health educational interventions [20, 21]. PMT is one of social cognitive theories that are helpful in assessing the cognitive mediation process of behavioral changes in terms of threat and coping appraisal [22].

In PMT model (Fig. 1), threat appraisal component includes (1) perceived severity (a person's estimation of the severity of a disease), (2) perceived vulnerability (a person's estimation of the probability of constructing a disease), and (3) intrinsic and extrinsic rewards (get rewards from the implementation of a behavior). Also, coping appraisal includes (1) the response efficacy (an individual's expectancy that implementing the recommendations can remove a threat), (2) self-efficacy (belief in one's ability to carry out a recommended plan of action successfully), and (3) the response cost (beliefs about how costly performing the recommended response will be to the individual) [20, 24]. Previous studies have shown that PMT may be useful in predicting health-related intentions and behaviors like breast cancer screening, dietary behaviors, and smoking cessation [21, 24]. McClendon et al. conducted a study to reduce skin cancer risk factors applying PMT and concluded that PMT may be useful as a guide on how to use specific techniques in changing inconsistent attitudes toward SCPBs and, also, reforming behavioral risk factors for skin cancer [25].

This study was conducted to examine the determinants of Skin Cancer Preventive Behaviors (SCPBs) among rural area farmers utilizing PMT model. Identifying skin cancer influential factors in such studies may be helpful in designing interventional efforts aiming at skin cancer prevention. The questions that guided the study were as follows:

1. What is the pattern of performing skin cancer preventive behaviors among farmers in a rural area?
2. To what extent do the threat and coping appraisals and protection motivation predict SCPBs among rural area farmers?
3. May PMT model be applied as a framework for designing interventional programs aiming at skin cancer prevention among rural area farmers?

Methods

Participants

The present cross-sectional study was conducted in Chaldoran, a mountainous county in West Azerbaijan, the northwestern part of Iran. The majority of rural men residents in this county are farmers working in their own farms from sunrise to sunset, and thus their exposure to the sunlight is high. This 3-month study took place from August to July 2015. Multistage random sampling was employed to recruit 248 rural farmers in the study. Almost all rural farmers in this area are men, and the number of women farmers is scarce.

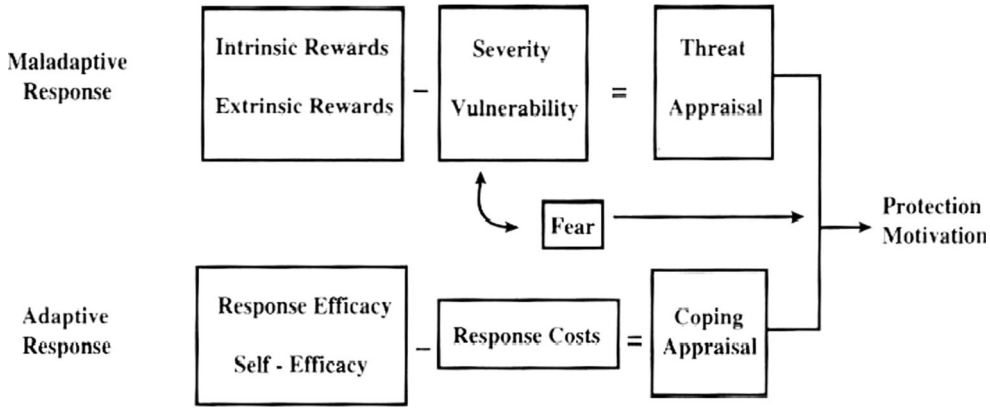

Fig. 1 Cognitive mediating processes of Protection Motivation Theory (Rogers and Prentice-Dunn, 1997) [23]

Most of women are doing livestock and household works at home. Therefore, it was decided to focus on men as farmers in the present study. Ten farmers refused to participate in the study, and finally 238 questionnaires were collected (response rate = 95.9 %).

Based on National Health Care System (NHCS) in Iran, Chaldoran County is divided into four rural areas which are covered by independent rural health care centers (RHCCs). Every RHCC, in turn, covers some health houses (HHs) in proportion to its population. HH is the first level of contact with rural population in the NHCS, which delivers primary health care services (such as health education, maternal and child health, health nutrition education, and so on) to these populations. These centers cover one (as the main village within which HH is situated) and/or some other villages (as satellite villages) depending on the population of the villages, geographical situations, and the communication facilities and channels, as well. In this study, two HHs were randomly selected from every four HCCs (eight HHs). As the health information of all rural areas' inhabitants is recorded in the HHs, the respondents were randomly selected based on their health records existed in the HHs in order to be invited to participate in the study.

The literate respondents completed the self-administered PMT-based questionnaire. As official educational language in Iran is Persian, all literate people were dominant to the Persian self-administered questionnaire. Also, interview method was used to collect data from the illiterates. All the interviews with illiterates/those with elementary education were conducted by the first author. The local languages in this area are Kurdish and Azeri. As the first author was dominant to these languages as well as Persian, there was no problem in documenting the answers in Kurdish/Azeri languages into the Persian questionnaire.

Inclusion criteria for this study included male gender, working as a farmer in spring and summer, and with no history of skin cancer in the family. Exclusion criterion was as follows: refusal for participation in study. Before providing the participants with the questionnaire, the purpose of the study was explained and all those accepted the participation signed consent form. Those who refused to participate were excluded from the study.

Measures

In order to collect data, a valid and reliable instrument [7] was used. In 2013, Tazval et al. [9] developed this questionnaire aiming to assess PMT constructs among rural farmers in Ilam—another Iranian province. As this instrument was developed, in Persian, to be used among farmers in rural settings, no prior specific change was needed. An expert panel (including three health educationist, one psychologist, and one community health nurse with specific experience in skin cancer prevention) confirmed its validity. In order to assess the reliability, a pilot study conducted on 35 rural farmers who did not included in the final sample. The Cronbach α of the scales found in the pilot and main studies are presented in Table 2. A brief description of the questionnaire is as follows:

Demographic Data Form included four questions and was developed by researchers to obtain data related to the participants' age, education, economic status, and family size (the number of household members living together). In order to assess economic status, in a single item, the respondents were asked to rate their own economic status as good, fair, or weak.

PMT Questionnaire included seven constructs: Perceived Susceptibility, Perceived Severity Towards Skin Cancer, and Internal and External Rewards from Performing SCPBs, as well as Self-efficacy, Response Efficacy and Response Cost. Perceived Susceptibility, Perceived Severity, and Rewards from Performing SCPBs comprised 5, 8, and 12 items, respectively. Also, Self-efficacy, Response Efficacy, and Response Cost comprised 5, 7, and 13 items, respectively. For all six constructs, the items were rated on a five-point Likert-type scale ranged from 1 to 5 (1 = totally disagree through 5 = totally agree). The higher the scores, the more susceptibility and severity toward skin cancer, and the more the rewards from

performing SCPBs were concluded. Also, the higher the scores, the more self-efficacy, response efficacy, and response cost toward conducting SCPBs were concluded.

Protection Motivation comprised four items rated on a five-point Likert-type scale ranged from 1 to 5 (1 = totally disagree through 5 = totally agree). The higher the score, the higher motivation for performing SCPBs was concluded.

Finally, SCPBs included four items in a five-point Likert scale ranging from "never" (1) to "always" (5). The items consisted activities to avoid the sunlight including wearing long sleeve shirt and wide-brimmed hat, applying sunscreen, and avoiding the sun at middays.

Statistics

Data were coded numerically and entered into Statistical Package for Social Sciences (SPSS) software, version 20.0 for Windows. Summary statistics and frequency distributions were used to describe and interpret the meaning of data. An additional calculation was performed on the mean score of the variables. As the minimum possible score for no variable was 0, presenting their mean and standard deviations alone does not seem to provide a clear understanding about their level among the respondents. Therefore, mean percent was calculated applying this formula: ((mean score-minimum score) ÷ (maximum score-minimum score)) × 100. The differences between PMT constructs by demographic variables were analyzed using one-way ANOVA. Pearson correlation coefficient was applied to indicate the associations between PMT structures and SCPBs. Moreover, multiple linear regression analysis with Enter method was applied to illustrate the variations in SCPBs and Protection Motivation scores on the basis of PMT constructs. A p value less than 0.05 was considered significant at the priori.

Findings

A total of 238 individuals agreed to participate in the study. The demographic characteristics of the participants as well as their associations with SCPBs and Protection Motivation are displayed in Table 1. The mean age of participants was 35.5 ± 8.79, and the majority was in the range of 30–39 years old. The minimum, maximum, and the median of the respondents' age were 20, 59, and 35.5, respectively. No significant difference was found in SCPBs and Protection Motivation by demographic characteristics (Table 1). The only exception was for Protection Motivation, which had a statistically significant difference among the respondents by income status.

Mean, standard deviation, mean percent, number of items along with possible range, and Cronbach α in the pilot and main study for every PMT variable and SCPBs are presented in Table 2. The Cronbach α for all PMT constructs in the main study was 0.7 and more showing an acceptable to excellent internal consistency for the constructs. The level of scores for almost all variables was less than 36 %, which means that the respondents acquired less than 36 % out of the maximum possible score in almost all variables. The lowest scores were found to be for Perceived Susceptibility (15.45 %), Response Cost (19.57 %), Protection Motivation (21.56 %), and SCPBs (21.68 %).

The least and the most frequent behaviors reported by the study participants were "avoiding the sun at middays" and "applying sunscreen," respectively. The differences between SCPB items by demographic variables were assessed. Although data are not presented, the most significant differences were found in "applying sunscreen" and "wearing wide-brimmed hat" by respondents' income status ($p = 0.026$) and education level ($p = 0.038$), respectively. More concisely, farmers with a good self-reported income status applied sunscreen more than the other two groups. Also, illiterates/those with elementary level of education used hat less than the other two groups.

As the least commonly Perceived Susceptibility and Severity items, 88.2 and 94.1 % of the respondents disagreed/totally disagreed to "I am susceptible to skin cancer because of my job" and "Skin cancer makes the patient's face ugly and scary," respectively. Also, as the most commonly negative Perceived Reward item, 88.7 % agreed/totally agreed to "I can do my daily farming practices, more effectively, when I do not use any cover on my head." Moreover, as the least commonly Perceived Response Efficacy and the most commonly Perceived Cost Efficacy items, 67.6 and 31.5 % of the respondents agreed/totally agreed to "Using sunscreen has no effect on skin cancer prevention" and "If I use sunscreen, my relatives around will mock me," respectively. Also, as the most commonly negative Perceived Self-efficacy item, only 30.7 % agreed/totally agreed to "I believe that I can use sun protective cloths without any problem."

Table 3 presents bivariate correlations for PMT constructs and SCPBs. Applying Pearson correlation coefficient test, it was found that SCPBs had statistically significant positive correlations with all PMT constructs except for Response Cost that was negatively associated with SCPBs ($r = -0.240$).

According to PMT, Perceived Susceptibility, Rewards, Response Cost, and Self-efficacy may influence on SCPBs. Also, Perceived Susceptibility and Response Cost may influence on Protection Motivation. Considering that there were two outcome variables (SCPBs and Protection Motivation) in this study, separate hierarchical multiple linear regressions were performed in two blocks to assess the efficiency of PMT constructs over the influence of other parameters. Predictors for the two outcome variables were classified in two different blocks according to their natures:

1. Demographic characteristics block: age, level of education, income status, and family size.

Table 1 Demographic characteristics and their associations with outcome variables among the participants

Variable		*N* (%)	SCPBs		PM	
			Mean (SD)	*p* value[a]	Mean (SD)	*p* value[b]
Age	20–29	65(27.3)	7.30(1.99)	0.849	7.70(2.46)	0.700
	30–39	95(39.9)	7.52(1.73)		7.37(1.84)	
	40–49	65(27.3)	7.53(1.75)		7.30(1.95)	
	≤50	13(5.5)	7.61(1.38)		7.53(2.58)	
Level of education	Illiterate/primary level (1–5 years)	77(32.4)	7.45(1.45)	0.992	7.37(1.94)	0.797
	Middle level (6–9 years)	90(37.8)	7.48(1.84)		7.55(2.09)	
	Secondary level (10–12 years) and diploma	71(29.8)	7.47(2.05)		7.46(2.21)	
Income status	Good	93(39.1)	7.29(1.64)	0.341	7.89(2.43)	0.032
	Fair	110(46.2)	7.6(1.81)		7.21(1.76)	
	Weak	35(14.7)	7.40(2.04)		7.05(1.78)	
Family size	Less than 3	196(82.4)	7.30(1.99)	0.980	7.50(2.09)	0.793
	4 through 5	22(9.2)	7.50(2.09)		7.22(2.06)	
	More than 6	20(8.4)	7.22(2.06)		7.30(1.97)	

SCPBs Skin cancer preventive behaviors, *PM* protection motivation

[a] Significance level for PM by demographic variables

[b] Significance level for SCPBs by demographic variables

2. PMT block: This block comprised the seven different constructs of PMT.

For both analyses (Table 4), the variables classified in block 1 were the same, but for the analysis in which was Protection Motivation considered as outcome variable, the Protection Motivation construct was excluded from the list of predictors (Table 4).

Hierarchical multiple linear regressions were performed with Protection Motivation and SCPBs (Table 4) as outcome variables. As shown in Table 4, demographic characteristics of the respondents explained only 3 % of the observed variance in Protection Motivation which was not statistically significant at 0.05 level. However, PMT constructs were responsible for 63.6 % change in observed variance which was statistically significant ($p < 0.001$). The other hierarchical multiple linear regressions were performed with SCPBs (Table 4), and no significant effect was found on SCPBs by demographic variables, in the first block ($\Delta R^2 = 0.025$); however, in the second block, Perceived Susceptibility ($p = 0.000$), Rewards

Table 2 Descriptive statistics for PMT variables and SCPBs

PMT constructs	Mean (SD)	Mean percent	Number of items	Possible range	Cronbach α in the pilot study	Cronbach α in the main study
Perceived susceptibility	8.09 (2.23)	15.45	5	5–25	0.91	0.93
Perceived severity	19.75 (2.56)	36.71	8	8–40	0.61	0.72
Rewards	27.47 (3.70)	32.22	12	12–60	0.81	0.82
Response efficacy	15.13 (1.84)	29.03	7	7–35	0.93	0.92
Response cost	23.18 (3.23)	19.57	13	13–65	0.93	0.89
Self-efficacy	9.63 (0.95)	23.15	5	5–25	0.76	0.72
Protection motivation	7.45 (2.07)	21.56	4	4–20	0.70	0.70
Skin Cancer Preventive Behaviors	7.47 (1.78)	21.68	4	4–20	0.81	0.81

Table 3 Bivariate correlations of PMT variables and skin cancer preventive behaviors (SCPBs)

Constructs	1	2	3	4	5	6	7	8
1 = Perceived susceptibility	1							
2 = Perceived severity	0.512*	1						
3 = Rewards	−0.418*	0.004	1					
4 = Response efficacy	0.327*	0.219*	0.448*	1				
5 = Response cost	−0.030	−0.107	−0.363*	−0.313*	1			
6 = Self-efficacy	−0.030	0.130*	−0.022	0.210*	−0.001	1		
7 = Protection motivation	0.782*	0.406*	0.331*	0.210*	−0.085	0.017	1	
8 = SCPBs	0.534*	0.294*	0.460*	0.354*	−0.240*	0.210*	0.445*	1

*Correlation is significant at the 0.05 level (two-tailed)

($p = 0.022$), Self-efficacy ($p = 0.000$), and Response Cost ($p = 0.001$) were significant predictors of SCPBs ($\Delta R^2 = 0.432$). Perceived Susceptibility, Rewards, and Self-efficacy were, in order, the strongest and the most positive predictors, and Response Cost was a significant negative predictor of SCPBs.

Table 4 Hierarchical regression analysis to predict Protection Motivation and SCPBs

Step/variable	*B (Step 1)*	*B (Step 2)*
Outcome variable: protection motivation		
(1) Age	−0.056	−0.009
Level of education	0.005	0.036
Income status	0.160	0.072
Family size	−0.041	0.002
(2) Perceived susceptibility		0.728
Perceived severity		0.041
Rewards		0.105
Response efficacy		−0.059
Self-efficacy		0.054
Response cost		−0.162
ΔR^2	0.030	0.636
Cumulative ΔR^2	0.030	0.666
p value	0.121	0.001
Outcome variable: SCPBs		
(1) Age	0.055	0.076
Level of Education	0.061	−0.022
Income status	0.131	0.024
Family size	0.002	0.032
(2) Perceived susceptibility		0.347
Perceived severity		0.040
Rewards		0.225
Response efficacy		0.021
Self-efficacy		0.212
Response cost		−0.146
Protection motivation		0.090
ΔR^2	0.025	0.432
Cumulative ΔR^2	0.025	0.457
p value	0.205	0.001

Discussion

This research was conducted aiming at examining the determinants of SCPBs among rural area farmers using PMT in Chaldoran County, Iran. Having a good knowledge on SCPBs and identifying their influential factors may be helpful in addressing those factors through educational interventions.

The results of the present study showed that the mean scores for all PMT constructs and SCPBs were significantly low. The level of SCPBs was about 22 % which means that less than one fourth of the rural farmers apply SCPBs in their daily farming practices. This finding is quite similar with those found by Carley et al. [26] who reported that only about 23 % of outdoor workers used SCPBs. Gould et al. [27], also, found that performing sunlight protective behaviors among adolescents was low. In another study, Morowatisharifabad et al. [28] reported that sunlight protective behaviors were higher than moderate among Kazerooni farmers in Iran, which is somewhat inconsistent with those found in the present study. A reason for this dissimilarity may be the different residency of the respondents included in the two studies, as they studied both urban and rural farmers, but we studied rural farmers, only. Another reason may be the difference in the place of studies; the first was conducted in Kazeroon, a semi-desert city, and the latter in Chaldoran, a mountainous county. So, there is a possibility that the rural farmers in this study consider themselves less susceptible to skin cancer.

Our findings showed that "avoiding the sun at middays" and "applying sunscreen" had the lowest scores among preventive behaviors. Further analysis showed significant difference in "applying sunscreen" by respondents' income status, in a way that farmers with a better income status applied sunscreen more. On the other hand, a significant difference was found in Protection Motivation by farmers' income status. It can be concluded that having a better economic situation

may lead to less perceived barrier among farmers to perform economy-related preventive behaviors and therefore may be an influential factor in motivating rural farmers to conduct such protective behaviors while exposing sunlight as a health hazard.

Similar with those found in the present study, Zare Sakhvidi et al. [29] found no difference in cancer preventive behaviors by education level of industrial workers. They noted the availability of health care services and their good quality as well as the high level of education level among the workers as possible reasons for this indifference. But, none of abovementioned reasons does apply in the present study. Unlike with their reasoning, a possible reason for this finding may be the very low level of education among these rural farmers, considering that about three fourths of them had a guidance education level and lower. Further analysis in our study showed that rural farmers with a lower level of education were less likely to use hat while on their daily farming practices. Therefore, conducting educational interventions aiming at health literacy promotion among these rural farmers is recommended.

The findings of the current study revealed significant associations between all PMT constructs with SCPBs. The strongest association was found between Perceived Susceptibility ($r = 0.534$) and Rewards ($r = 0.460$) with SCPBs, suggesting that if a farmer considers himself more vulnerable toward skin cancer and if he receives more rewards for performing SCPBs, then he may perform more SCPBs. Increasing the knowledge of rural farmers regarding susceptibility toward skin cancer and its influential consequences on family and individual health may lead to increase in their perceived threat toward the disease and thus improve in their performance in SCPBs.

Statistically significant positive associations were found between intrinsic and extrinsic rewards ($r = 0.460$) and protection motivation ($r = 0.445$) with SCPBs. This finding suggests that when a farmer receives more rewards from performing SCPBs, he will be more motivated to comply more with SCPBs. Tazval et al. [7] found that farmers participated in their study believed that wearing hat while working decreases their concentration. These findings suggest that the farmers do not consider themselves susceptible to skin cancer and solar radiation complications. Thus, it is recommended to consider perceived susceptibility as a priority while designing educational intervention aiming at this population.

Similar with those found in previous studies [29–31], statistically significant positive correlations were found between Self-efficacy and Response Efficacy with SCPBs. In agreement with Zare Sakhvidi et al. [29], workers with a higher self-efficacy believe that they have the ability to overcome a given problem and, therefore, they tend to perform healthy behavior while exposed in hazardous situations. Several studies have shown that promoting self-efficacy may improve preventive behaviors among different populations [32–35]. Considering self-efficacy promotion as a main strategy while designing skin cancer educational programs may promote SCPBs among rural farmers.

The findings of the present study showed a significant negative correlation between response costs and sun-protective behaviors. In other words, if a farmer perceives that responding costs to a sun-protective behavior is higher, he may less likely perform that behavior. Further analysis showed that the most commonly perceived cost efficacy noted by the farmers was "If I use sunscreen, my relatives around will mock me." In another study, Buller et al. [36] found that the most commonly perceived cost noted by construction outdoor workers was "warm clothing and perspiration." In order to alleviate such complains among workers, several measures may be conducted. Basically, a social health campaign aiming at skin cancer prevention in rural areas is recommended. Moreover, as an example, it should be recommended to the farmers, construction workers, and work employers to provide their workers with cool uniforms made from specific material like cotton-made uniforms. As another recommendation, health care centers along with agricultural organizations may sign contract with sun-protective manufacturers to provide such sun-protective equipment for farmers with some discount or may design subsidy plan to provide farmers with those equipment.

Based on our results, no significant effect was found on SCPBs by demographic variables, in the first block; however, in the second block, PMT constructs explained 43.2 % of the variance for SCPBs. In the study conducted by Morowatisharifabad et al., among drivers, PMT explained 36.5 % of the variance for risky driving behaviors [37]. Moreover, Baghianimoghaddam et al. reported that the strength of PMT on SCPBs among students was 54 %, and perceived susceptibility and self-efficacy were the most powerful predictors for SCPBs and Protection Motivation, respectively [31]. In line with these findings, Gebrehiwot and Veen [38] emphasized on the importance of PMT structures in predicting behavioral intention and motivation of farmers toward farm-level risk reduction measures. Considering the applicability of PMT in predicting SCPBs in this study, it can be concluded that PMT may be considered as an alternate methodological choice while designing educational interventions aiming at SCPBs promotion among rural farmers.

Limitation

As data collection method in the present study was based on self-report by farmers, recall bias is warranted. Also, measurement of economic status by asking respondents to rate their economic status into good, fair, or weak may be somewhat subjective. What is considered as "good" to some people may not be similar to other people. Another limitation may be the gender-specific nature design of the study which was

explained in the "Methods" section. Thus, it is recommended for future studies to include female farmers in the study as well.

Conclusion

It was concluded that PMT was a useful model in predicting cognitive determinants of SCPBs among rural farmers. The mean score for all PMT constructs and SCPBs among rural farmers in Chaldoran County were low. Therefore, conducting educational intervention efforts aiming at SCPB promotion and, consequently, skin cancer prevention among farmers are recommended. Health care providers and community health nurses in rural areas should pay much more attention toward skin cancer prevention among farmers and plan to design specific health educational program for this population applying promising health education theories like PMT. Perceived susceptibility should be paid great attention while designing such interventions. Skin-cancer-related health literacy in rural areas is another priority for future research in this area.

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