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Original Research Article

A Scale Development Study: Health Belief Model Scale in Skin Cancer among Turkish University Students

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Abstract

Background: Even though skin cancer is a cancer, increasing incidence in whole world, the disease can be prevented by improving protective behaviors across it. However, individuals' attitudes and beliefs about the subject ought to be evaluated to improve skin cancer prevention behaviors of the individuals firstly. Aim of this study was to develop Skin Cancer Scale based on the Health Belief Model in order to assess attitudes and beliefs about skin cancer. ***Methods:*** This methodological study included 465 randomly selected university students who educated seven different department of a university. Data were collected with a socio-demographic form and 42 items daft scale of Health Belied Model Scale in Skin Cancer. Experts' opinions and pre-test were obtained for content validity. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was performed for construct validity. Cronbach's alpha internal consistency coefficient and test-retest correlation coefficients were calculated for reliability. ***Results:*** The internal consistency reliability coefficient of this scale was 0.86 and the item - total score correlation coefficients changed between 0.32 and 0.66. According to EFA; factor loads ranged from 0.45 to 0.86, the 26-items were divided into five sub-dimensions. To CFA, model fit indexes of the scale were found as x2 / df ratio: 2.391, the Root Mean Square Error of Approximation (RMSEA): 0.055, the Goodness of Fit Index (GFI): 0. 901, the Tucker-Lewis İndex (TLI): 0.913 and the Comparative Fit Index (CFI): 0.925. The Cronbach alpha coefficient was 0.87 for the whole scale. ***Conclusions:*** The results of the study indicated that The Health Belief Model Scale in Skin Cancer is a reliable and valid scale to measure the attitudes and beliefs about skin cancer.

Keywords: Skin cancer, validity, reliability, attitude, belief.

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INTRODUCTION

Cancer is the most common health problems in all over the world. Skin cancer is a cancer that has also considerable disease burden. According to the World Health Organization (WHO), two/three million people in worldwide are diagnosed with Squamous cell carcinoma and squamous cell carcinoma (Non-melanoma skin cancer), and 132.000 people are diagnosed with malignant melanoma annually [1]. The incidence of melanoma increases in many European countries. According to 2019 data, the incidence of melanoma in the United States is 96 480 and it is reported to be the fifth type of cancer in males and females in estimated new cases [2]. There has been a growing concern over the increased prevalence of skin cancers across the world, including Turkey. The incidence of skin cancer in Turkey is reported to be 18.9 per 100,000 people [3].

Developing the right protection behaviours against skin cancer is very important for public health. To develop prevention behaviours from skin cancer, knowledge, attitudes and beliefs about skin cancer should firstly be evaluated among population [4, 5]. The Health Belief Model argues that individual's health behaviours will be affected by beliefs, values and attitudes. Several studies [6-8] have been used to explained preventive health behaviours from varied diseases. The model suggests that people do preventive actions and show preventive health behaviours when they feel threatened by a disease or condition [7].

Studies have shown that skin cancer and sun protection behaviours are insufficient [9-12] and also the protective equipment (etc., clothing, sunglasses and

hat) are less used [10, 11] in Turkey. However, only few studies have been conducted investigating the skin cancer and preventive health behaviours in general population [3, 4, 13] and to the best of our knowledge, no study has been developed valid and reliable scale regarding to attitudes and beliefs about skin cancer in Turkey.

The Health Belief Model (HBM) is one of oldest social cognition models. The HBM aims to predict whether individuals choose to engage in a healthy action in order to reduce or prevent the chance of disease or premature death. The HBM addresses the effects of beliefs on health and the decision process in making behavioural changes. According to the HBM, there are two main types' beliefs that influence people to take preventative action: beliefs related to readiness to take action and beliefs related modifying factors that facilitate or inhibit action. The variables that are used to measure readiness to take action are perceived susceptibility to the illness and the perceived severity of illness. Benefits, i.e. the perceived advantages of action, and barriers, i.e. the perceived cost or constraints of the specific action, are the main modifying variables [14]. In this study, we aimed to develop a valid and reliable scale which based on the Health Belief Model in order to assess beliefs and attitudes toward skin cancer.

METHODS

This methodological study included 465 randomly selected university students who educated seven different department of a university, Manisa, Turkey, between September 2018 and March 2019. The size of the sampling in validity and reliability studies should be ideally ten-fold the number of items [15,16]. Through simple random sampling, 465 university students who agree to participate were included in this study. The inclusion criteria were as follows: aged ≥ 18 years, able to speak Turkish and to be willing to participant. The participants consisted of these: The Faculty of Health Sciences students (48.4%), The Faculty of Science and Letters students (39.8%), and The Faculty of Business students (11.8%). Purpose, benefits and risks of the study were told and written consent forms were taken from them.

This study protocol was confirmed on 27th June 2018 by the Research Ethics Committee of Health Sciences of Manisa Celal Bayar University Faculty of Medicine, Manisa, Turkey (Ethical Board number #20.478.486). All procedures were made with respect to the Helsinki Declaration (1964 and later versions). Participants were informed about aim and nature of the study. Data were obtained by the first author through face-to-face interviews using a socio-demographic form and 42-items daft scale of Health Belied Model Scale in Skin Cancer. Each interview took approximately 20 minutes.

Socio-demographic form

The socio-demographic form elicited personal information such as age, gender, skin type, hair and eyes colour.

Health Belief Model Scale in skin cancer: The following stages were tracked to develop this scale:

Pool of items: The aim of this stage was to set item connections, by composing as many items about attitudes and beliefs for skin cancer based on Health Belief Model (HBM). Therefore, a wide literature review of HBM, skin cancer, attitudes, and beliefs scale was conducted. The data with the researchers' experience were combined and based on HBM. A pool of items was made ready by the researchers from the literature.

Refining items: The aim of the stage was to separate and improve the items. Moreover, the sketch scale of 49-items pool was subtilized with a final control in detecting content validity and item relevance by 15 experts (including two dermatologists, seven nurse instructors in medical nursing department, one nurse instructor in surgical nursing department, four nurse instructors in public health nursing department, one doctor instructor public health department) who were has an interest about development of scale. Seven items with content validity <0.60 recommended by experts [17] were excluded in the scale. Empirical scale is formed of 42-item and five-point Likert type (e.g., "strongly agree", "agree", "undeceive", "disagree" "strongly disagree").

Pretesting: The aim of the stage was to detect the empirical scale could be read, comprehend and take time by university students. 20 university students (8 male and 12 female) were filled in face-to-face interviews. The university students were recuperated the clearness of empirical scale and erroneous of similar items were removed from the scale by the researchers.

Reliability and construct validity

The aim of the stage was to trial the items in the sample, detect the primary components containing the scale, and state the reliability of the scale. The original scale, in Turkish language, was implemented to 465 university students and whole analysis and assessment were applied by using Turkish version.

Statistical analysis was made via Statistical Package for Social Science (SPSS 21.0) software on computer (SPSS, Chicago, IL, USA). Socio-demographic characteristics and scores of scale were examined using arithmetic averages and standard deviation.

To determine the validity, the content and construct validity were used. In content validity, this scale items were presented to experts for their opinions,

and then after pre-testing. In determining construct validity, the EFA was applied. The results of analyses for the factor analyses like Kaiser Meyer-Olkin (KMO) test, Bartlett's Test of Sphericity and Rotation Method were also estimated for EFA. KMO test was used to determine whether the sample size was sufficient. It has been reported that a score of KMO higher than 0.80 was acceptable [18, 19]. Barlett's test was used to detect whether data were appropriate for factor analyses. It has been reported that a "p" score of Barlett' test less than 0.50 was significant and data were suitable for factor analyses [20]. CFA was performed via The AMOS program version 21 for Windows. Model fit indices and factor loads of the items were examined in confirmatory factor analyses. To assess the fit of the described model, the fit indices were stated as follows: The ratio of the chi-square statistic to the degrees of freedom ($\chi 2$/df) ought to be less than 3 [21] the Goodness of Fit Index (GFI) ought to be exceed 0.90 and the Comparative Fit Index (CFI) ought to be exceed 0.95 [22] the Root Mean Square Error of Approximation (RMSEA) ought to be between 0.05 and 0,08 [21] the Adjusted Goodness-of-Fit Index (AGFI) ought to be exceed 0.80 [23] the Incremental Fit Index (IFI) ought to be between 0.90 and 0.95 [22] the Parsinomy Googness of Fit Index (PGFI) ought to be between 0.50 and 0.95 [21], the Tucker-Lewis Index (TLI) ought to be between 0.90 and 0.95 [22].

To determine reliability, internal consistency [Cronbach's alpha, item analysis (item–total, item–remainder, and item–discrimination indices)] and test–retest coefficients were used. A score of less than 0.40 was assumed unreliable, scores setting from 0.40 to 0.59 were assumed less reliable, scores setting from 0.60 to 0.79 were assumed reliable, scores setting from 0.80 to 1,00 were assumed most reliable [18,19]. For the test–retest reliability, the scale was applied again in following four weeks. The relationship between 2 applications was assessed via Pearson's product-moment and inters class correlation analysis. Pearson correlation coefficient (r) setting from 0 to 0.29 was assumed most poor, 0.30 to 0.49 was assumed poor, 0.50 to 0.69 was assumed average, 0.70 to 0.89 was assumed strong, and scores higher than 0.90 was assumed very strong [24]. Interclass correlation coefficient (ICC) setting from 0 to 0.25 was assumed poor, 0.26 to 0.49 was assumed poor, 0.50 to 0.69 was assumed average, 0.70 to 0.89 was assumed strong, and scores higher than 0.90 was assumed very strong [25, 26]. Probability values (p) less than 0.05 were considered statistically significant.

RESULTS

Socio-Demographic Characteristics of University Students

The average age of students was 19.83±1.24 (18-25) years, the majority of them were women (70.5%) and also, the most of them (81.6%) lived in overexposure to sunlight in Turkey.

Validity of the Scale

Five factor groups were gotten according to component factor analysis. These five factors composed the dimensions of the scale. KMO value (0.856) demonstrated that the correlation between scale items was sufficient. The result of the Barlett Test for Sphericity (x^2 =5398.984 p<0.001) indicated that the data were suitable to drive factors. When these components were evaluated through the screen plot (Figure 1), there was a break point at the five factors and there is a quick fall in the graph after this point. Therefore, the number of factors was delimited to five in this scale.

These five factors could explain 58.99% of the total variance. It expressed that the factor loading of items of the scale different from 0.44 to 0.86 (Table 1). While the first questionnaire composed of 42- item, the number of the items was reduced to 26. According to literature (Plichta & Kelvin 2013), if the factor loading of any item is under 0.30, this item is ejected from the related scale. Hence, seven items were ejected from the scale because of its factor loading < 0.30.

The model fit was assessed using CFA. The analysis was performed on the 26 identity items by using maximum likelihood method of estimation. The results of fit indices clearly demonstrated that the five-factor model of identity functions maintained a good fit to the data (x^2/df= 2,391; GFI= 0,901; CFI= 0,925; RMSEA= 0,055; AGFI= 0,876; IFI=0,925; PGFI=0,721; TLI=0,913). Figure 2 show Standardized Solution of the Five-Factor Model of the Functions of Identity.

These factors were named as Factor 1: Perceived Susceptibility, Factor 2: Self-Efficacy, Factor 3: Perceived Benefits, Factor 4: Perceived Severity and Factor 5: Perceived Barriers according to the item expressions.

Reliability of the Scale

Cronbach's alpha value was found 0.87 for the scale. The stability testing showed an all ICC score > 0.83 p<0.001. Pearson's r value was found to be 0.71 p<0.001 (Table-2).

Finally, the scale included 26-item with five-point Likert type. It was improved to measure the five components of the HBM: Perceived Susceptibility, Self-Efficacy, Perceived Barriers, Perceived Benefits and Perceived Severity. The new scale was named as Health Belief Model in Skin Cancer Scale. Each of sub-dimensions' mean scores shown Table-3. Each of items was coded from 5 to 1. But, items of Perceived Barriers were reverse coded. Higher scores indicate a stronger level of perceived susceptibility, perceived severity, perceived benefits and a better level of self-efficacy. However, lower scores indicate a stronger level of perceived barriers.

Table 1: Total Variance Explained According Factor Analysis

Factors	Items	Factor Loading	Eingen value	% of varience	% Cumulative variance
Factor 1	I19	.445	6.641	25.541	25.541
	I20	.759			
	I21	.786			
	I22	.858			
	I23	.862			
	I24	.796			
Factor 2	I34	.534	2.275	10.582	36.123
	I35	.748			
	I36	.843			
	I37	.824			
	I38	.788			
	I39	.764			
Factor 3	I12	.712	2.368	9.107	45.231
	I13	.768			
	I14	.765			
	116	.513			
	I17	.621			
	I18	.681			
Factor 4	I4	.728	1.988	7.645	52.876
	I5	.673			
	I6	.742			
	I7	.801			
Factor 5	I27	.739	1.592	6.123	58.999
	I28	.719			
	I31	.673			
	I33	.606			

Table-2: Internal Reliability and Temporal Stability of Each of Sub-dimension

Sub-dimension	Items	r		p		ICC		p		Cronbach α
Perceived Susceptibility	If I regularly check self skin-examination, the possibility of early detection of skin cancer is increased.	0.54	0.71	0.00	0.00	0.70	0.86	0.00	0.00	0.89
	When there is a suspicious change (nevus, freckles and warts, etc.). in my skin, İt is helpful to consult a specialist									
	It is very important for me to detect changes (nevus, freckles and warts, etc.). in my skin.									
	It is very important for me to maintain the health of my skin.									
	It is important for me to detect skin cancer early.									
	I think that It is important to do interventions to prevent skin cancer.									
Self-Efficacy	I can notice changes (nevus, freckles and warts, etc.) in my skin.	0. 66		0,00		0.79		0.00		0.86
	I can choose the appropriate sunscreen to my skin type.									
	I can choose my recommended sunglasses to use under the sun.									
	I can choose my recommended hat to use under the sun.									
	I can choose my recommended umbrella to use under the sun.									
	I can choose my recommended clothes to use under the sun.									
Perceived	If I avoid being in the sun between 10 a.m. and 4 p.m., my chances of skin									

Benefits	cancer are reduced.	0.72		0.00		0.83		0.00		0.79
	If I wear a wide-brimmed hat (straw hat, etc.) in the sun, my chances of having skin cancer are reduced.									
	If I wear a long-sleeved shirt and long trousers in the sun, my chances of having skin cancer are reduced.									
	If I use a sunscreen with a sun protection factor (SPF) of 30 or more before sun exposure, my chances of having skin cancer are reduced.									
	If I use a sunscreen with a sun protection factor (SPF) of 30 or more before sun exposure, my chances of skin having cancer are reduced.									
	f I use an umbrella in the sun, my chances of having skin cancer are reduced.									
Perceived Severity	1. If I have skin cancer, I may not be able to continue my life normally.	0.51		0.00		0.67		0.00		0.77
	I think that skin cancer is a serious disease.									
	'm afraid of having skin cancer.									
	If I have skin cancer, my whole life can change.									
Perceived Barriers	It is unnecessary to check self skin-examination.	0.66		0.00		0.79		0.00		0.65
	It takes a lot of time to do self skin-examination									
	I do not believe that it is helpful to use sunscreen before going to the sun.									
	I do not believe that it is helpful to use umbrella in the sun.									

Table 3: Sub-dimensions' mean scores of Health Belief Model in Skin Cancer Scale

Sub-dimensions	Number of items	Min-Max	Means±SD
Perceived Susceptibility	6	6-30	25.3±3.9
Self-Efficacy	6	6-30	20.8±3.8
Perceived Barriers	4	4-20	15.4±3.0
Perceived Benefits	6	6-30	25.0±3.9
Perceived Severity	4	4-20	9.4±3.0

Note: Min=Minimum; Max= Maximum; SD=Standard deviation

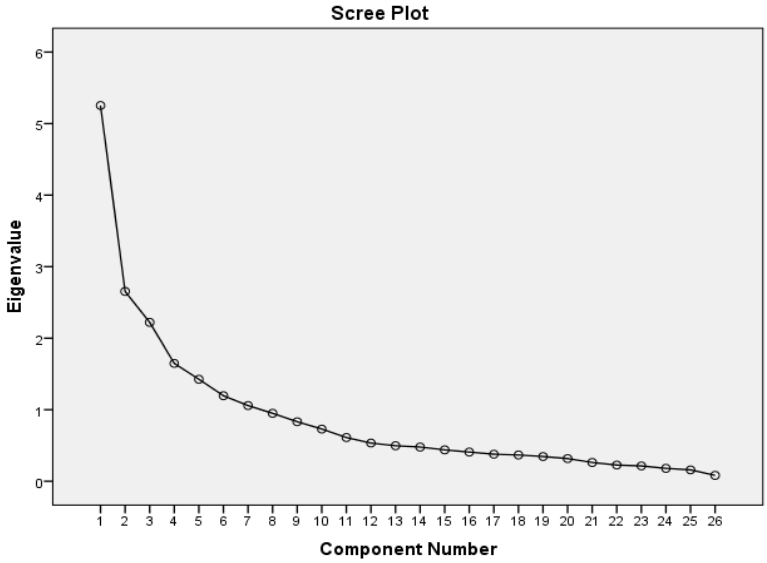

Figure-1: Scree plot of the sub-dimensions of the new scale

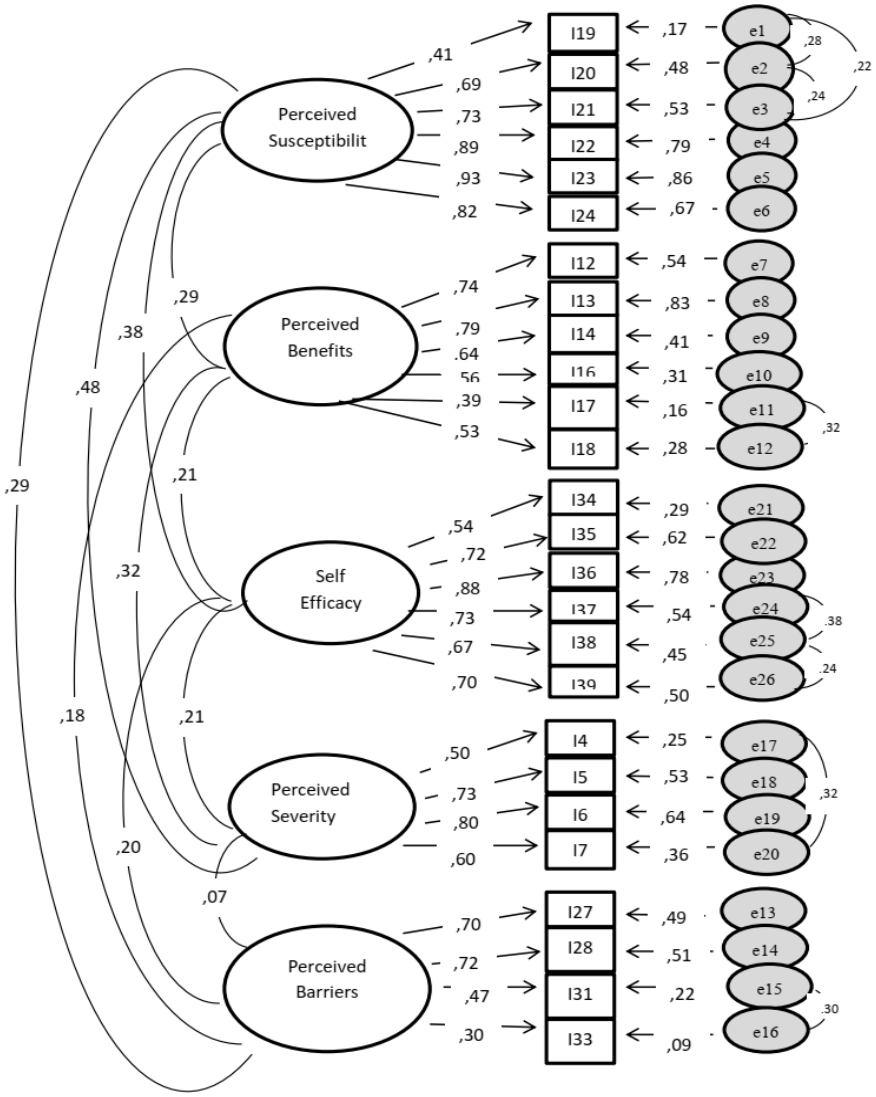

Figure-2: Standardized Solution of the Five-Factor Model of the Functions of Identity

DISCUSSION

The Health Belief Model has been utilized to prevention of disease and condition related health, such as cervical cancer, HIV/AIDS, tuberculosis, mental illness, breast cancer, diabetes, coronary artery disease, hypertension, obesity, and osteoporosis. Several studies have used varied scale and developed based on the HBM to evaluate health beliefs and attitudes toward disease and condition. When studies conducted in Turkey based on the HBM, Turkish researches have translated from original language of another HBM scale, they studied validity and reliability of the translated scale [8, 27, 28]. Few studies have developed scale which based on the HBM [6,7]. Therefore, aim of the study was to develop a new scale based on the HBM that could assess beliefs and attitudes toward skin cancer.

Validity of the Health Belief Model Scale in Skin Cancer

The scale was submitted to experts for their views to analyse the content validity of the scale, and specialist views were evaluated. The scale was trailed on adequate number of population. In the event, the name of this scale was named as Deri Kanserinde Saglik Inanc Modeli Olcegi (DKSIMO) in Turkish. The English of DKSIMO was attained by combining by translations of three (3) Turkish experts versed in English. English of DKSIMO was named as HBM Scale in Skin Cancer (HBMSSC).

When factor analysis is run, sample sufficiency is a significant subject. Therefore, Bartlett's sphericity test and KMO were utilized. According to literature [18,19] Bartlett's test must be significant ($p<0.05$) statistically and the KMO value must be above 0.80. The results of the analyses in this study demonstrated that the data were suitable for factor analysis.

In literature [29] it has been suggested that 0.20 is used as the lower limit in practice in the item total correlation. So, seven items were extracted from the scale because of the item total correlation < 0.20. For the construct validity of the scale, EFA and CFA

were applied. The structure of the HBMSSC measurement evaluated by CFA shown logical model fit stating satisfactory construct validity.

According to EFA, the scale is formed five factor and 26- item. The construct validity of the items was found to be acceptable, and the Principal Component Analysis was able to account for 58.9% of the variance observed. The relationship of the items to the factors is evaluated by the factor loading value. It has been reported in the literature that factor loadings should be 0.30 and above [18, 19]. Hence, nine items were removed from scale because of its factor loading < 0.30. The factor loadings of 26 items in the scale were between 0.44 and 0.86. Finally, the scale includes 26-item with five-point Likert type.

CFA is used to demonstrate the relationship between the scale and its items. It is suggested that CFA be utilized to test scale development. All of the confirmatory factor loadings in all subscales of the scale were above 0.30 [18, 19]. The factor structure detected by the EFA and CFA were supported by the results of the $\chi 2/df$, GFI, CFI, RMSEA, AGFI, IFI, PGFI and TLI. Several fit indicators (GFI, CFI, IFI, TLI) were higher than 0.90, AGFI and GFI were higher than 0.80, $\chi 2/df$ was less than 3 and RMSEA was less than 0.08, indicative of a good model fit in this study [18, 19, 21-23].

Reliability of the Health Belief Model Scale in Skin Cancer

The literature have been recommended that the acceptable minimum point for test–retest reliability is 0.70 [18, 19, 24, 30, 31]. According to the results of test–retest correlation, the HBMSSC was detected to have a high level of reliability ($r>0.70$ $p<0.001$). In addition, test-retest reliabilities evaluated by structural equation modelling recommended the scores of the five factor scale were consistent over time (ICC >0.80 $p < 0.00$). Cronbach's alpha is a value that demonstrates the correlation between responses of items. If there is a mighty correlation between items, the Cronbach's alpha value will rise. Experts state that the minimum acceptable value is 0.70 for Cronbach alpha [18, 19, 30, 31]. In this study, internal consistency of this scale was elevated and it verified to have construct validity well (Cronbach's alpha >0.80 $p< 0.00$). Besides, the scores of final scale showed well internal consistencies to evaluate attitudes and beliefs about skin cancer. The validation of the scale endorsed five distinct facets of belief and attitudes towards skin cancer, identified in five subscales. It is significant to underline that it was intended not only at the cognitive ingredient of cancer attitudes but also at the behavioural ingredients (self-efficacy of skin examination, behaviours of sun protection, etc.). Although actual behaviour cannot be evaluated via a questionnaire approach, statements are included in this scale.

In this study, the mean perceived susceptibility sub dimension score was 25.3±3.9, the mean self-efficacy sub dimension score was 20.8±3.8, and the mean perceived barriers sub dimension score was 15.4±3.0, the mean perceived severity sub dimension score was 9.4±3.0, the mean perceived benefits sub dimension score was 25.0±3.9 (Table-3). Higher scores indicate a stronger level of perceived susceptibility, perceived severity, perceived benefits and a better level of self-efficacy. However, lower scores indicate a stronger level of perceived barriers. It was purposed in the direction that can be associated with actual behaviour. It is believed that it is very significant to evaluated attitudes and beliefs about skin cancer. Because individual's real behaviour (self-examination of skin, behaviours of sun protection, using sun screen, sun glass and hot) is a possible risk or preservative factor for improving skin cancer, and the most significant way of skin cancer beliefs and attitudes examined in the context of health. The results demonstrated that reliability and validity of HBMSSC is satisfactory. Also, it evidenced to be reliable and valid and was approved to be convenient as both a clinical and research tool.

LIMITATIONS

A limitation of the study is that it cannot be generalized for the entire Turkish population, because the study population composes only the university students that could be attained by the researchers in Manisa, Turkey.

CONCLUSION

The HBMSSC is a well validity and reliability survey instrument measuring the beliefs and attitudes towards skin cancer. The scale can be used by health professionals to measure skin cancer prevention behaviour, beliefs and attitudes towards skin cancer among healthy individuals. The present authors suggest that the scale should be tested for validity and reliability for various cultures, comorbid conditions (psoriasis, vitiligo, etc.), ages and risky occupational groups such as farmer, sailor, and athletes to confirm that its factor structure is preserved. Regarding this scale, it was developed by Turkish researchers based on the HBM to measure individuals' belief and attitudes towards skin cancer. However, Turkish culture is a hybrid of Eastern and Western lifestyle, health behaviour, habits and the results of this study suggest that the Health Belief Model Scale in Skin Cancer can be adapted to Western cultures in future studies.

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AUTHORSHIP CONTRIBUTIONS

Concept: E.S.D., O.D.C., Design: E.S.D., O.D.C., Data Collection or Processing: E.S.D., Analysis or Interpretation: E.S.D., O.D.C., Literature Search: E.S.D., Writing: E.S.D., O.D.C.

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