

**Development Study of Health Belief Model Scale for Lung Cancer and its Screening****Melike Demir Dogan<sup>1\*</sup>, Alime Sul<sup>2</sup>, Gulsum Aynaci<sup>3</sup>, Hatice Curuk<sup>4</sup>, Sedanur Yesilyurt<sup>5</sup>**<sup>1</sup>Department of Nursing, Gumushane University Faculty of Health Sciences, Gumudhane, Turkey, melekd@gmail.com<sup>2</sup>Istanbul, Turkey, alimesl198@gmail.com<sup>3</sup>Konya, Turkey, aynacigulsum@gmail.com<sup>4</sup>Lokman Hekim Etlik Hospital, Ankara, Turkey, mervecuruk06@gmail.com<sup>5</sup>Maçka Ömer Burhanoğlu Physical Therapy and Rehabilitation Hospital, Trabzon, Turkey, yslyrtsdnr61@gmail.com**\*Corresponding author**

Melike Demir Dogan, BSc, MSc, PhD, Associate Professor Gumuşhane Üniversitesi Sağlık Bilimleri Fakültesi Bağlarbaşı Mahallesi 29100 / Gumushane GSM: 05334828957, Email: melekd@gmail.com

**Submitted:** 25 May 2021; **Accepted:** 01 Jun 2021; **Published:** 05 Jun 2021**Citation:** Melike Demir Dogan, Alime Sul, Gulsum Aynaci, Hatice Curuk and Sedanur Yesilyurt, (2021) Development study of health belief model scale for Lung Cancer and its Screening. *Int J Cancer Res Ther*, 6 (2):12-17.**Abstract****Aim:** The aim of this study was to conduct the validity and reliability study of the Health Belief Model Scale for lung cancer and its screening.**Methods:** In the first stage, permissions for the use of the scale were obtained and the Champion's Health Belief Model Scale was arranged for lung cancer. 150 students, who agreed to participate in the study, were included in the study and the data were collected using test-retest method with a two-week interval. Correlation between the two measurements was calculated using intraclass correlation coefficient. Internal consistency reliability was evaluated by Cronbach's alpha coefficients. Construct validity was evaluated by confirmatory factor analysis.**Results:** The validity-reliability of the health belief model scale for lung cancer and its screening was assessed with the test-retest design. Correlation between the two measurements was calculated using intraclass correlation coefficient ( $p < 0.001$ ). The scale's Cronbach's alpha value was found to be 0.760. The scale consists of 5 subgroups. The Cronbach's alpha value of the trust-benefit perception subscale was 0.779, the Cronbach's alpha value of the sensitivity perception subscale was 0.833, the Cronbach's alpha value of the barrier perception subscale was 0.737, and the Cronbach's alpha value of the subscale of the perception of health motivation was 0.725.**Conclusion:** The validity and reliability of the health belief model scale for lung cancer and its screenings were conducted and it was determined that the scale was a valid and reliable scale.**Keywords:** Lung Cancer, Health Belief Model, Early Diagnosis**Introduction**

Lung cancer has various histological subtypes, and it is the most fatal cancer type worldwide. Smoking and air pollution are the two important risk factors. Other risk factors such as occupational

exposure (such as asbestos) have an important role in the development of lung cancer [1]. In 2020, it has been stated that there are new lung cancer cases of 2.206.771 in the world, and it is on the first rank among the cancer types. It is stated that 18% of all

cancer deaths in 2020 is associated with lung cancer. Lung cancer is one of the most common cancer types in some of the developed countries such as Austria and Germany. Incidence of lung cancer is 21.6% in Europe and 2.1% in Africa. Mortality rate of lung cancer is 21.4% in Europe and 2.3% in Africa. While lung cancer is seen in 14.6% per 100 thousand in women throughout the world, this rate is 31.5% per 100 thousand in men [2]. Lung cancer has the highest mortality rate among all the cancer types both in United States of America (USA) and in China. Among all cancer types, lung cancer constitutes 25% of cancer deaths in the USA and 30% in China [3]. In terms of the incidence of lung cancer, it is ranked as the second in the USA and the first in China [3,4].

Early diagnosis is critical in reducing the morbidity and mortality in lung cancer [5]. One of the two essential issues contributing to the success of lung cancer screening is the determination of high-risk individuals. Other one is the management approach regarding the screening of examination findings in order to maximize the benefits of screening and minimize its harm [6].

As in other cancer screening procedures, it is not sufficient to make an age-based selection. As the most important risk factor is tobacco smoke exposure, other strong risk factors should also be evaluated. Among these other important risk factors, history of respiratory tract diseases (COPD, emphysema, bronchitis, pneumonia, and tuberculosis), previous malignancy, history of lung cancer in the family (first-degree relative, 60 years old or younger), and asbestos exposure take place [7].

Participation in lung cancer screening is affected from various factors including the individual and the health system. It is crucial to understand these factors to advance a common decision-making process between healthcare providers and high-risk patients in lung cancer screening. Understanding the individual health beliefs about screening among long-term smokers is a critical component for the efforts to increase participation in lung cancer screening [8].

Extended Health Belief Model (HBM) is a common framework to explain the motivation factor for the individuals regarding their participation in health promotion behaviors such as cancer screening [9,10,11]. Extended HBM is used to explain other cancer screening behaviors such as breast and colorectal cancers and it can be applied in the context of lung cancer [10,11]. Thus, the aim of the present study is to conduct the validity and reliability study of the scale by adapting Champion's Health Belief Model to lung cancer regarding cancer screening.

## Materials and Methods

In the first stage, permissions for the use of scale were obtained and Champion's Health Belief Model Scale was revised to be suitable for lung cancer. Expert opinion was asked in order to determine whether or not 30 items in the assessment tool were suitable for the purpose of measurement and they represent the field to be measured. Then, a pilot application was conducted with 15 students and the scale was tested in order to determine whether or not it was understandable.

In the development of a meaningful and reliable assessment tool, it is recommended for the number of participants to be 5-10 people

for each item of the scale or to be at least five times higher than the number of items. Thus, 150 students, who were students at Gümüşhane University Faculty of Health Sciences Department of Nursing and agreed to participate in the study, were reached and the data were collected by using the test-retest method with a two-week interval between December 2019 and February 2020.

## Health Belief Model Scale for Lung Cancer and Screening

Health Belief Model Scale was developed by Victoria Champion for breast cancer [12]. Jacobs changed a few questions and the "breast cancer" term with "colon cancer" in each subscale of Champion's Health Belief Model Scale and adapted this scale for colorectal cancer [13]. Turkish validity and reliability study of the scale was conducted by Özsoy et al., in 2007 [14]. In the present study, the version of Champion's Health Belief Model Scale, which was adapted for colon cancer, was adapted to lung cancer by changing "colon cancer" term with "lung cancer" in the subscales and changing a few questions.

Health Belief Model Scale for lung cancer and its screening consists of a total of 30 questions. The scale has 5 subscales as trust-benefit perception, sensitivity perception, barrier perception, health motivation perception, and motivation perception. It is a tool scored from 1 point to 5 points. In the scale, "strongly disagree" is rated as one point, "disagree" as 2 points, "undecided" as 3 points, "agree" 4 points, and "strongly disagree" 5 points. Min-max scores of the scale are 10-50 points for trust-benefit perception, 5 - 25 points for sensitivity perception, 4-20 points for barrier perception, 6-30 points for health motivation perception, and 5- 25 points for severity perception. Higher scores signify that sensitivity and caring increase and benefits for benefit perception and barriers for barrier perception are perceived as high.

## Reliability

The test-retest method was used to assess the scale's stability over time. In this study, students were re-evaluated two week later. The correlation between the two measurements was calculated using the intraclass correlation coefficient (ICC). Internal consistency reliability was evaluated with Cronbach's alpha coefficients.

## Validity

The Kaiser -Meyer-Olkin was used to measure the sampling adequacy and sphericity was analyzed with Bartlett's test. Health Belief Model Scale for Lung Cancer and Screening construct validity was determined with confirmatory factor analysis and exploratory factor analysis was used to examine dimensionality. Varimax rotation was used to identify the major sources of variance.

## Ethical considerations

Ethics committee approval was obtained from Gümüşhane University Scientific Research and Publication Ethics Committee in order to conduct the study.

## Results

### Sample characteristics

In the study, 150 students were included and 55.3% of them were 4th grade students, 28.7% were 2nd grade students, 18.7% were 3rd grade students, and 1.3% were 1st grade students.

## Reliability

The correlation between the two measurements was calculated using the intraclass correlation coefficient (ICC). The test-retest reliability showed almost perfect agreement, with an ICC of 0.759 ( $p < 0.001$ ) for the total score of the Health Belief Model Scale for Lung Cancer and its Screening. The internal consistency of the Health Belief Model Scale for Lung Cancer and its Screening was good (Cronbach's alpha = 0.76).

The scale consists of 5 subscales. Cronbach's alpha value of trust-benefit perception subscale was found as 0.79, Cronbach's alpha value of sensitivity perception as 0.83, Cronbach's alpha value of barrier perception subscale as 0.73, Cronbach's alpha value of health motivation perception as 0.70, and Cronbach's alpha value of severity perception subscale as 0.72 (Table 1).

**Table 1: Factor loadings of the scale and subscale.**

	Cronbach alpha value
Health Belief Model Scale for Lung Cancer and Screening	0,760
Trust-Benefit Perception	0,795
Susceptibility Perception	0,833
Perception of Obstacle	0,737
Health Motivation Perception	0,700
Perception of Seriousness	0,725

## Validity

For the final shape of the scale in terms of content validity, 5 people who were experts in their fields such as nurse and nurse academicians were determined and consulted. In accordance with their suggestions, the scale was put into final version by making necessary revisions.

The construct validity of the tool was tested using factor analysis. The Kaiser–Meyer–Olkin measure was 0.781, and the Bartlett's test provided a value of  $p < 0.001$ . These results were highly significant and indicated that the data were suitable for factor analysis. Table 2 shows item score-scale score correlations of the candidate scale. The factor load of the questions was checked. Table 3 shows the questions with the factor load.

**Insert Table 2: Item score-scale score correlations of the candidate scale.**

Scale Items	Item score-Scale score Correlation	Cronbach's alpha after item removal	Final status of the item
Item 1	0.027	0.765	Remained
Item 2	0.111	0.759	Remained
Item 3	0.162	0.759	Remained
Item 4	0.172	0.757	Remained
Item 5	0.191	0.757	Remained
Item 6	0.265	0.754	Remained
Item 7	0.152	0.758	Remained
Item 8	0.083	0.763	Remained
Item 9	0.123	0.760	Remained
Item 10	0.057	0.763	Remained
Item 11	0.304	0.751	Remained
Item 12	0.522	0.740	Remained
Item 13	0.482	0.741	Remained
Item 14	0.547	0.736	Remained
Item 15	0.548	0.738	Remained
Item 16	0.402	0.745	Remained
Item 17	0.501	0.739	Remained
Item 18	0.465	0.742	Remained
Item 19	0.395	0.746	Remained

Item 20	0.361	0.748	Remained
Item 21	0.281	0.753	Remained
Item 22	0.000	0.766	Remained
Item 23	0.157	0.760	Remained
Item 24	0.144	0.760	Remained
Item 25	0.325	0.750	Remained
Item 26	0.250	0.755	Remained
Item 27	0.280	0.753	Remained
Item 28	0.114	0.763	Remained
Item 29	0.285	0.752	Remained
Item 30	0.274	0.753	Remained

**Table 3: Factor loadings of the scale**

Subscale	Scale Items*	Factor Loading
Trust-Benefit Perception	1. I want to detect my health problems early.	0.565
	2. Maintaining my health is extremely important to me.	0.689
	3. I am confident to have regular check-ups, if necessary, for early diagnosis of lung cancer.	0.567
	4. Regular control for the early diagnosis of lung cancer gives the opportunity to catch cancer in the early period.	0.593
	5. I search for new information to be healthy.	0.621
	6. If I have lung cancer, I can maintain regular check-ups.	0.584
	7. Being healthy is very important to me.	0.649
	8. I can notice normal and abnormal changes in my breathing, cough, sputum.	0.468
	9. If I have regular check-ups for early diagnosis of lung cancer, my chances of dying from lung cancer decrease.	0.699
	10. If I have regular check-ups, I will detect lung cancer early.	0.724
Susceptibility Perception	11. In the future, I will most likely have lung cancer.	0.714
	12. I feel like I will have lung cancer in the future.	0.816
	15. My probability of getting lung cancer is higher than anyone else.	0.809
	16. If I have lung cancer, my relationships with my wife will deteriorate.	0.491
	18. There is a high probability that I will get lung cancer within the next 10 years.	0.683
Perception of Obstacle	17. I don't feel comfortable talking about lung cancer.	0.568
	19. Having regular checkups for early diagnosis of lung cancer makes me worried about lung cancer.	0.529
	20. Regular check-ups for early diagnosis of lung cancer take a lot of time.	0.645
	21. It is not pleasant to have regular check-ups for early diagnosis of lung cancer.	0.528
Health Motivation Perception	13. I know smoking is harmful.	0.752
	14. I do not smoke or have stopped using it.	0.815
	22. I eat a balanced diet.	0.594
	23. I exercise (sports) at least three times a week.	0.620
	24. Even if I am not sick, I have regular check-ups.	0.646
	25. Regular check-ups for early diagnosis of lung cancer are very expensive.	0.378

Perception of Seriousness	26. The thought of having lung cancer scares me.	0.661
	27. I would feel good if I had regular check-up for early diagnosis of lung cancer.	0.663
	28. My heart beats faster when I think I might have lung cancer.	0.734
	29. If I get lung cancer, my whole life will change.	0.625
	30. If I have lung cancer, I cannot live more than 5 years.	0.640

\* The scale, whose original language is Turkish, has been translated from Turkish to English by three different translators, and the translations have been combined

## Discussion

Health belief model uses several components in order to understand the source of motivation of the individual against preventive behaviors and how to take the steps in order to have the health screenings done for early diagnosis and to take the diseases under control [15]. In a study, it was determined that severity, benefit, sensitivity, and barrier perceptions were the main components of health belief model [16].

Victorya developed the Health Belief Model Scale for breast cancer screenings in 1984 by taking the Champion's Health Belief Model as a basis and revised it in 1993, 1997, and 1999 [12,17,18,19]. In the development study of the scale in 1984, Cronbach's alpha reliability coefficients of the scale were specified to be between 0.60 and 0.78 and test-retest correlations ranged between 0.47 and 0.86 [17]. In the study conducted in 1993, it was stated that Cronbach's alpha reliability coefficients varied between 0.80 and 0.93 and test-retest correlations ranged between 0.45 and 0.70 [18]. In a study conducted in 1997, it was determined that Cronbach's alpha reliability coefficients ranged between 0.65 and 0.90 and test-retest correlations ranged between 0.40 and 0.68 [19].

In a study conducting the Turkish validity and reliability of Champion's Health Belief Model Scale for Breast Cancer Screenings in Turkey, it was found that the Cronbach's Alpha values of its subscales ranged between 0.69 and 0.81 [20]. In another study conducting the Turkish validity and reliability of Champion's Health Belief Model Scale, Cronbach's Alpha values of the subscales were found to be between 0.58 and 0.89 [21].

In the study conducted by Pinar et al., on the Turkish adaptation of Champion's Health Belief Model Scale for testicular cancer screening, it was found that Cronbach's Alpha values of the subscales ranged between 0.64 and 0.92 [22].

In the study conducted by Özsoy et al. for the Turkish validity and reliability of Champion's Health Belief Model that is adapted for colorectal cancer, they determined that Cronbach's Alpha values of the subscales ranged between 0.54 and 0.88 [14].

Health Belief Model Scale for Lung Cancer and its Screening consists of 30 items and its Cronbach's alpha value was found as 0.760. The scale consists of 5 subscales. Cronbach's alpha values were found to be 0.79 for trust-benefit perception subscale, 0.83 for sensitivity perception subscale, 0.73 for barrier perception subscale, 0.70 for health motivation perception subscale, and 0.72 for severity perception subscale. When these results are considered, it was observed that the result found was similar to the scales developed with the health belief model.

## Conclusion

The validity and reliability of the Health Belief Model Scale for lung cancer and its screening were conducted and it has been found that the scale is valid and reliable. Health Belief Model Scale for Lung Cancer and its Screening consists of a total of 30 items. Min-max values of the scale are 10-50 points for trust-benefit perception, 5-25 points for sensitivity perception, 4-20 points for barrier perception, 6-30 points for health motivation perception, and 5-25 points for severity perception.

**Conflict of Interest:** The authors declared that they have no conflict interests.

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