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Development and Psychometric Evaluation of the Lung Cancer Screening Health Belief Scales

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Abstract

Background—Lung cancer screening is a recent recommendation for long-term smokers. Understanding individual health beliefs about screening is a critical component in future efforts to facilitate patient-provider conversations about screening participation.

Objective—To describe the development and psychometric testing of four new scales to measure lung cancer screening health beliefs (perceived risk, perceived benefits, perceived barriers, self-efficacy).

Methods—In Phase 1, four scales were developed from extensive literature review, item modification from existing breast and colorectal cancer screening health belief scales, focus groups with long-term smokers, and evaluation/feedback from a panel of 10 content experts. In Phase 2, we conducted a survey of 497 long-term smokers to assess the final scales' reliability and validity.

Results—Phase 1: Content validity was established with the content expert panel. Phase 2: internal consistency reliability of the scales was supported with Cronbach's alphas ranging from . 88 to .92. Construct validity was established with confirmatory factor analysis and testing for differences between screeners and non-screeners in theoretically-proposed directions.

Conclusions—Initial testing supports the scales are valid and reliable. These new scales can help investigators identify long-term smokers more likely to screen for lung cancer and are useful for the development and testing of behavioral interventions regarding lung cancer screening.

Implications for Practice—Development of effective interventions to enhance shared decision-making about lung cancer screening between patients and providers must first identify factors influencing the individual's screening participation. Future efforts facilitating patient-provider conversations is better informed by understanding the perspective of the individual making the decision.

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Lung cancer is the deadliest cancer worldwide regardless of gender or ethnicity. Most lung cancer patients are diagnosed with advanced disease; individuals with Stage IV lung cancer have a five-year relative survival rate of 1%.[1] Tobacco smoking has been linked to 90% of all lung cancer cases and is the number one risk factor.[1] Long-term smokers, defined as age 55 or older who have a minimum of a 30 pack-year tobacco smoking history and currently smoke, or former smokers who quit within the past 15 years, are at greatest risk for the development of lung cancer.

Lung cancer screening with low-dose computed tomography (LDCT) in long-term smokers has been shown to decrease relative lung cancer-related mortality by 20%.[2] In response to empiric findings from the National Lung Screening Trial (N = 53,456), the United States Preventive Services Task Force (USPSTF) issued guidelines recommending annual LDCT for long-term smokers.[3] The USPSTF's Grade B recommendation reflects their conclusion that available evidence was sufficient, with high certainty, that annual LDCT will yield moderate to substantial benefits for this high-risk group. As a result, in the United States, the Centers for Medicare and Medicaid Services (CMS) approved coverage of LDCT for its high-risk members in February 2015.[4]

Lung cancer screening participation is influenced by many factors at multiple levels, including individual, provider, and health care system. It is essential to understand these factors in order to advance on shared decision-making between health care providers and their high-risk patients about lung cancer screening. Understanding individual health beliefs about screening among long-term smokers is a critical component of future efforts to facilitate patient-provider conversations about lung cancer screening participation, which is a requirement for CMS coverage.[4]

Theoretical Model

The Expanded Health Belief Model (HBM) is a commonly used framework to explain what motivates individuals to participate in health-promoting behaviors, such as cancer screening.[5-7] The Expanded HBM has been used to explain other types of cancer screening behavior such as for breast and colorectal cancers,[6,7] and is applicable in the context of lung cancer. Major constructs incorporated from the model and reflected in the development of these scales include perceived risk for lung cancer as well as perceived benefits of, perceived barriers to, and self-efficacy for lung cancer screening. Although the Expanded HBM delineates separate constructs for perceived risk and perceived severity, numerous studies have reported that perceived severity is not useful in explaining cancer screening behavior because cancer is universally perceived to be severe.[8-10] Therefore, we did not develop a measure for this HBM construct.

Perceived risk is conceptually defined as an individual's belief in the likelihood that he or she will develop lung cancer [11-13] and has been shown to predict intention to screen for lung cancer.[11] Perceived benefits are defined as the belief in the efficacy of an advised course of action to reduce risk.[14] In relation to lung cancer screening, perceived benefits are the individual's beliefs about the positive outcomes associated with lung cancer screening. Perceived barriers are defined as an individual's belief about the costs (i.e., tangible and

psychological) of the advised course of action.[14] In the context of lung cancer, perceived barriers are a person's estimation of the level of challenge associated with lung cancer screening participation.[11-13] Finally, self-efficacy is defined as the confidence individuals have in their ability to take action [14] such as the confidence one has in their ability to perform all tasks related to arranging and completing lung cancer screening. The figure depicts our conceptual model linking key psychological variables and the Expanded HBM constructs to explain factors that may influence the decision to participate in lung cancer screening.

Purpose

The purpose of this paper is to describe the development and psychometric testing of four new scales to measure the following lung cancer screening health beliefs: (1) perceived risk of lung cancer; (2) perceived benefits of lung cancer screening; (3) perceived barriers to lung cancer screening; and (4) self-efficacy for lung cancer screening. To our knowledge, there are no scales to measure HBM constructs in the context of lung cancer screening. Using the framework originally established by Champion for breast cancer screening [15] and extended by Rawl for colorectal cancer screening,[16] the authors developed the lung cancer screening health belief scales. Measurement of individual health beliefs in the context of lung cancer screening will enable investigators to determine the relationships between the theoretical constructs of an established model and lung cancer screening participation in high-risk smokers. Establishing valid and reliable measures of health beliefs specific to lung cancer screening will provide greater understanding of the influence of perceptions of risk, benefits, barriers, and self-efficacy which, if found to predict lung cancer screening behavior, would be potential targets that could be modified in interventions. Many studies in other types of cancer screening demonstrate the ability of theory-based interventions to successfully increase screening rates.[5,6,17]

To examine the psychometric properties of the scales, we tested the following hypotheses: (1) each scale will demonstrate adequate content validity as evidenced by a total scale content validity index of at least .80 when evaluated by an expert panel; (2) each scale will demonstrate adequate internal consistency reliability with Cronbach's alphas of .70 or higher; (3) significant differences will be observed in mean scores on the scales between individuals who intend to be or have been screened for lung cancer and those who have not; and (4) a 4-factor (perceived risk of lung cancer, perceived benefits of, perceived barriers to, and self-efficacy for lung cancer screening) confirmatory factor analysis model will be consistent with observed data and individual lung cancer screening health belief items will demonstrate loadings at .40 or greater on the corresponding latent factors.

Methods

Phase I: Development and Content Validation

The four scales tested in this study were developed using the following methods: (1) extensive review of the literature on lung cancer screening specifically as well as other types of cancer screening in general; (2) appropriate and applicable modification of items from Champion's breast cancer screening health belief scales[15] and Rawl's colorectal cancer

screening health belief scales;[16] (3) focus groups conducted to generate qualitative data on health beliefs related to lung cancer screening; and (4) evaluation and feedback from a panel of 10 content experts. Individual items for the lung cancer screening health belief scales were initially developed by modifying the health belief scales in breast and colorectal cancer screening and by an extensive review of the literature on the four constructs specific to lung and other types of cancer screening. Focus group discussions were then conducted with four groups: two groups of long-term current and former smokers who had recently been screened for lung cancer with LDCT; and two groups of screening eligible individuals who had never been screened. Scale items were revised based on feedback received from the focus groups.

Content Validity—An expert panel examined content validity. The content experts evaluated each item on the four scales for relevance, clarity, comprehensiveness, and appropriateness. Relevance, the degree to which the item was believed to be relevant to the concept (i.e., perceived risk, perceived benefits, perceived barriers, and self-efficacy) was rated using a 4-point response scale: (1) item is not relevant; (2) item needs major revision to be relevant; (3) item needs minor revision to be relevant; and (4) item is relevant. Total content validity indices (CVI) were calculated for each scale. Total CVIs is a mathematical calculation for quantitatively measuring the content validity of an instrument.[18] The CVI, or proportion agreement method, is calculated using the ratings of item relevance by a panel of content experts indicating level of agreement for relevance of scale items. A minimum of five content experts is recommended to provide a sufficient level of control for chance agreement. As defined by Lynn using the 4-point response scale, a total scale CVI of .78 or higher is considered acceptable with a panel of 10 content experts.[19] Each reviewer was given a packet of information that included: (1) purpose of the study; (2) hypotheses; (3) conceptual and operational definitions; (4) survey instructions; and (5) a content validity survey for each of the four scales. The content validity survey was developed using recommendations outlined by Wynd, Schmidt and Schaefer.[20] Specific instructions for determining the relevance of each of the items comprising the four scales were given to each content expert, who then completed and returned them to the researcher electronically or by mail. In addition, item level CVIs were calculated. Items that were unanimously rated as not relevant were deleted. Total scale level CVIs (reflective of relevance) as well as average ratings for clarity, comprehensiveness, and appropriateness are presented in Table 1. Two members of the research team (XXX and XXX) independently reviewed the content experts' ratings and suggestions and made final decisions about item deletion, modification, retention, and addition through discussion to reach consensus.

Phase II: Study to Test Reliability and Construct Validity

Design—A descriptive, cross-sectional study was conducted to test the hypotheses related to internal consistency reliability and construct validity of the four newly developed scales. Internal consistency reliability was tested using Cronbach's alpha. Construct validity was tested by two methods: (1) by examining scale mean differences between two distinct groups; and (2) through confirmatory factor analysis. Because lung cancer screening is a new recommendation (guidelines issued in 2013 and Medicare coverage approved in 2015), the pool of screened individuals was expected to be small. We assessed stage of adoption for

lung cancer screening which included intention to screen for lung cancer in the next six months. “Screeners” are conceptually defined in this study as those individuals who indicated they either intended to screen for lung cancer or had recently completed lung cancer screening. Therefore, construct validity was first tested by validating proposed theoretical relationships among the constructs based on the performance of the Health Belief Model constructs in other types of cancer screening. Specifically, if the perceived risk scale was measuring the construct as theoretically specified, individuals who intended to and had screened should have higher levels of perceived risk of lung cancer than those who had not screened. Similarly, individuals classified as screeners should have higher levels of perceived benefits and self-efficacy for lung cancer screening and fewer perceived barriers to lung cancer screening than those who had not screened.

Secondly, since each scale was developed to be unidimensional, construct validity also was tested through confirmatory factor analysis. This analysis model was chosen to demonstrate that the four scales are independent of each other and to give distinct information on each construct being measured.

Sample—Participants were recruited using a variety of community-based recruitment methods. Power analysis indicated that 300 participants were needed to detect a .20 correlation between scores on each of the four scales and lung cancer screening participation. Inclusion criteria included: (1) age 55 to 77 years; (2) 30 pack-year tobacco smoking history; (3) current smoker or former smoker who had quit within the past 15 years; and (4) not diagnosed with lung cancer.

Data Collection—University Institutional Review Board approval was obtained. Data were collected via a one-time web-based survey using the REDCap (Research Electronic Data Capture) system. REDCap is a secure web-based application for building and managing online surveys and databases. For participants who agreed to participate in the study but did not wish to complete the survey online, a paper copy of the survey was mailed (n = 16) or the survey was administered via telephone (n = 3), depending upon participant preference.

Measures—The perceived risk, perceived benefits, perceived barriers, and self-efficacy scales are comprised of 3, 6, 17, and 9 items respectively. The perceived risk, perceived benefits, and perceived barriers scales use 4-point Likert-style responses from *strongly agree* to *strongly disagree*. The self-efficacy scale uses 4-point Likert-style responses with items ranging from *very confident* to *not at all confident*. The four scales were included in a larger general survey about lung health that collected demographic information, including participant age, marital status, educational level, income, gender, smoking status, and family history of lung cancer. Additional items assessing social influence, media exposure, perceived smoking-related stigma, health care provider recommendation, knowledge about lung cancer and screening, and stage of adoption for lung cancer screening were also included.

Data Analyses—Data were entered into SAS v9.4 (SAS Institute, Cary, NC) and cleaned by examining frequencies and identifying outliers. Data were evaluated for normal

distributions and no outliers were noted. Neither the four scales, nor any individual item of the four scales, had more than 5% missing data. Each scale was summed to create a total scale score for the analyses. Data were analyzed using Cronbach's alpha, independent samples *t* tests, Pearson chi-square tests, and structural equation modeling (SEM). All analyses were conducted using $p = .05$ as the significance level. In cases where parametric assumptions were violated (e.g., data were not normally distributed), non-parametric tests were used.

Confirmatory factor analysis was performed using the Mplus software package. Scale items were specified as ordinal categorical variables with a logit link to their factors to best theoretically represent the Likert-style scale format of the surveys. Goodness of fit criteria was used to determine the fit of the data to the model. Data were analyzed for both floor and ceiling effects and outliers. Model modification indices were analyzed to determine if various scale items could be removed.

Results

Phase I: Content Validation

Content validity was evaluated by 10 doctorally prepared behavioral scientists in lung and other cancers who served as content experts and represented the disciplines of psychology (n = 4), nursing (n = 2), and public health (n = 4).

Hypothesis 1—Total scale level content validity indices (CVIs) for the four scales ranged from .88 to .92, based upon 10 experts. See Table 1 for scale level CVIs in addition to average ratings for clarity, comprehensiveness, and appropriateness.

Three items were developed for the perceived risk scale and reviewed by the 10 content experts. All three items were retained since they were all rated relevant by at least 80% (8 of the 10) experts. The scale level CVI for the perceived risk scale was .91. Six items were developed for the perceived benefits scale and reviewed by the 10 content experts. All six items were rated relevant by at least 80% of the experts and were retained. The scale level CVI for the perceived benefits scale was .88.

Eighteen items were initially developed for the perceived barriers scale and reviewed by the 10 content experts. All 18 items were rated relevant by 80% of the experts. One item was deleted from the original scale, resulting in the final 17-item Likert-style scale. Although the item "You might put off having a lung scan because you fear feeling stigmatized" had an item CVI of .83, the item was deleted because the concept of stigma was captured more clearly in two other scale items: 1) "You might put off having a lung scan because you worry about feeling like a social outcast" and 2) "You might put off having a lung scan because you worry about being blamed for having smoked." In addition, the authors were concerned that some participants might not understand the meaning of "stigmatized." The scale level CVI for the perceived barriers scale was .92.

Nine items were developed for the self-efficacy scale and reviewed by the content experts, and all were rated relevant by 80% of the experts. However, two items were revised from the

original scale to better capture what the individual may or may not be confident about: (1) "How confident are you that you can have a lung scan even if you don't know what to expect?" was revised to "How confident are you that you can have a lung scan even if you don't know what to expect about the procedure?" and (2) "How confident are you that you can have a lung scan even if you are anxious?" was revised to "How confident are you that you can have a lung scan even if you are anxious about the process?" The scale level CVI for the self-efficacy scale was .91. See Table 2 for the items comprising the final scales and their associated item-level CVIs.

Phase II: Reliability and Construct Validity

Participants (N = 497) who were eligible for lung cancer screening were fairly evenly distributed by gender and smoking status. Ages ranged from 55 to 77 years (M = 62.8, SD = 5.8), and 77.8% of the participants were non-Hispanic Caucasian. Participants were fairly well educated, with 68.5% having some college or higher. See Table 3 for participant sociodemographic characteristics.

Hypothesis 2—Internal consistency was estimated using Cronbach's alpha and found to be .88 for the 3-item perceived risk scale, .80 for the 6-item perceived benefits scale, .89 for the 17-item perceived barriers scale, and .92 for the 9-item self-efficacy scale, exceeding the established acceptable criteria of .70 for internal consistency reliability.

Hypothesis 3—There were no significant differences between screeners and non-screeners for total perceived risk scores (6.55 vs. 6.51; p=.84). However, significant differences were observed between groups for total perceived benefits, total self-efficacy, and total perceived barriers scores in the hypothesized theoretical directions. Screeners had significantly higher total perceived benefits (18.07 vs. 16.68; p=.0016) and self-efficacy scores (30.38 vs. 28.55; p=.0012) and lower total perceived barriers (33.05 vs. 35.03; p=.0387) scores (see Table 4).

Hypothesis 4—A 4-factor confirmatory factor analysis (CFA) representing the theoretical model (perceived risk, perceived benefits, perceived barriers, and self-efficacy) was performed. Fit statistics showed the data fitting the 4-factor model well with a Standardized Root Mean Square Residual (SRMR) value of .074. SRMR is the standardized difference between the observed correlation and the predicted correlation; a value of < .08 is considered good fit.[21] The CFA had a Root Mean Square Error of Approximation (RMSEA) of .087 showing moderate fit. The RMSEA is related to the residual of the model, with values ranging from 0 to 1, with smaller numbers indicating a better fit. An RMSEA of .06 or less is considered good fit.[21] However, inter-factor correlations were all low (< .20), giving further strength to the hypothesis that the four factors (i.e., scales) are distinct. Model modification indices suggestions were followed, but model fit did not improve when the few paths with a high index were excluded; scale items were only excluded and not switched between factors. As additional confirmatory evidence, each of the scales was also fit well by a separate single-factor CFA model.

Discussion

This paper details the development and psychometric testing of the Lung Cancer Screening Health Belief Scales. Expanded HBM constructs have predicted participation in other types of cancer screening (e.g., breast and colorectal cancer screening), and valid and reliable measures of HBM constructs in breast and colorectal cancer screening have subsequently informed tailored interventions that increased screening uptake in those cancers. Lung cancer screening is a recent recommendation. However, for lung cancer screening to be effective, individual decision-making and participation are necessary. Therefore, we must understand factors that may influence screening including the individuals' perspectives and their beliefs about lung cancer screening. Theoretically-based scales are needed and the psychometric testing of the Lung Cancer Screening Health Belief Scales provides evidence that HBM constructs can be validly and reliably measured in the context of lung cancer screening participation.

Previous research has shown that health beliefs about cancer and cancer screening are important predictors of screening behavior. The results of this psychometric study support previous findings that perceived benefits, perceived barriers, and self-efficacy are associated with screening behavior in the same theoretically proposed directions in lung cancer as in colorectal and breast cancer. To our knowledge health beliefs have not been examined in the context of actual screening behavior, but have been examined in the context of intention to screen for lung cancer. Jonnalagadda et al. reported that increased self-efficacy was associated with intention to screen whereas specific barriers such as concerns about radiation effects and discomfort of the screening procedure were associated with decreased intention to screen.[22] Although some studies have shown perceived risk to be predictive of cancer screening behavior,[23-25] other studies have shown no association between the two variables.[26-28] Individuals eligible for lung cancer screening are long-term smokers, and smokers are a unique population different from those targeted for other types of cancer screening. Smokers experience stigma, battle an addiction to nicotine, and perceive blame from others related to the perceived self-infliction of tobacco-related diseases secondary to lifestyle choices. It is possible that other important variables such as perceived stigma, medical mistrust, cancer fatalism, fear and worry may be uniquely relevant in lung cancer screening and may mediate the relationship between perceived risk and lung cancer screening participation.

Development of the Lung Cancer Screening Health Belief Scales adds to the current state of the science by providing psychometrically valid and reliable, theoretically grounded measures of individual health beliefs in lung cancer screening. These scales can be used in future research to assess these individual level factors that may influence lung cancer screening participation and provide a means of identifying potentially modifiable targets on which to intervene.

Limitations

Although the Lung Cancer Screening Health Belief Scales show promising results, several limitations must be acknowledged. First, though multiple recruitment methods were

employed, more than 50% of the surveys were collected online which may have introduced the bias of lack of sample diversity. Specifically, beliefs related to lung cancer screening may be different for those recruited online compared to the general population of long-term smokers. In addition, the study is limited by the availability of individuals who have completed lung cancer screening, likely related to the recent official recommendation of lung cancer screening by organizations such as the American Cancer Society and U.S. Preventive Services Task Force. As lung cancer screening becomes more widely implemented, it will be important to continue to test relationships between these Expanded HBM constructs and lung cancer screening behavior as the numbers of people who have been screened for lung cancer grow.

Conclusions

The present study provides an initial assessment of the reliability and validity of four new scales developed to measure HBM constructs in the context of lung cancer screening. This paper expands the limited body of knowledge on individual health beliefs specific to lung cancer screening by not only psychometrically testing the HBM constructs in the context of lung cancer screening, but also providing support that individuals who have an increased level of perceived benefit and self-efficacy and decreased perceived barriers to lung cancer screening are more likely to screen for lung cancer. Future research is needed on all HBM constructs in the context of lung cancer screening including examination of other key variables that may be important. Specifically, research examining the potential mediation effect of variables such as perceived stigma, medical mistrust, cancer fatalism, fear and worry on health beliefs about lung cancer screening is critical. Identification of long-term current and former smokers who are more likely to screen for lung cancer will be useful for investigators interested in developing and testing interventions addressing health beliefs regarding lung cancer screening. Ultimately, interventions tailored to the individual at risk for the development of lung cancer will benefit from designs that take individual health beliefs into consideration.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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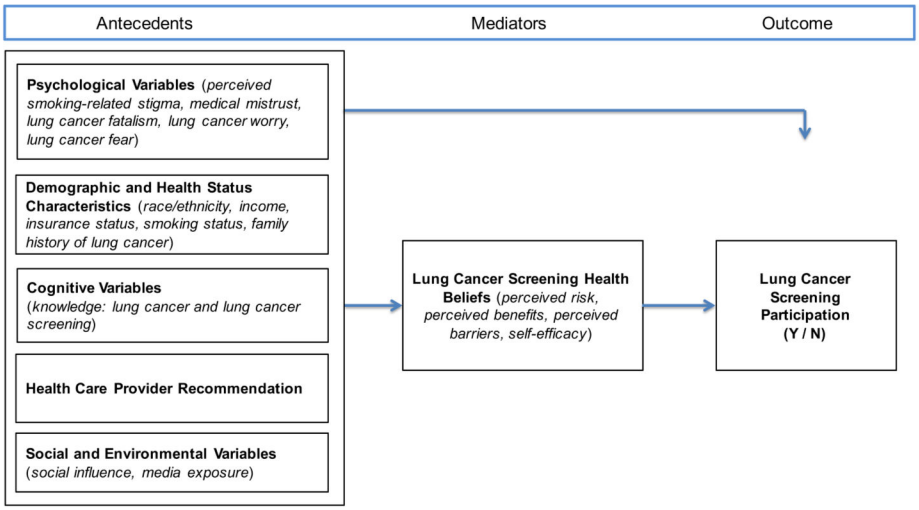

Figure.

Conceptual Model for Lung Cancer Screening Participation Copyright (2016) Dr. Lisa Carter-Harris. Reprinted with Permission.

Table 1

Total Scale Level Content Validity Indices for Lung Cancer Screening Health Belief Scales (based upon 10 content experts)

Scale	Total Content Validity Index (Relevance)	Clarity Mean Scores	Comprehensiveness Mean Scores	Appropriateness Mean Scores
Perceived Risk of Lung Cancer Scale	.91	.91	.93	.88
Perceived Benefits of Lung Cancer Screening Scale	.88	.87	.95	.92
Perceived Barriers to Lung Cancer Screening Scale	.92	.86	.95	.90
Self-Efficacy for Lung Cancer Screening Scale	.91	.89	.95	.83

Table 2

Lung Cancer Screening Health Belief Scales and Item-level Content Validity Indices

Perceived Risk of Lung Cancer Scale (LCSHB-PRisk)	**Item-level Content Validity Index**
1. It is likely that I will get lung cancer sometime in my lifetime.	.98
2. It is likely that I will get lung cancer in the next ten years.	.88
3. It is likely that I will get lung cancer in the next five years.	.83
Perceived Benefits of Lung Cancer Screening Scale (LCSHB-PBen)	
1. Having a lung scan will help find lung cancer early.	.95
2. Having a lung scan will lower my chances of dying from lung cancer.	.93
3. Having a lung scan will help me not worry as much about lung cancer	.93
4. Having a lung scan will help me plan for the future.	.83
5. Having a lung scan will help my family not worry as much.	.85
6. Having a lung scan will give me peace of mind.	.93
Perceived Barriers to Lung Cancer Screening Scale (LCSHB-PBarr)	
1. I might put off having a lung scan because I worry about finding something wrong.	.98
2. I might put off having a lung scan because I don't have the time.	.98
3. I might put off having a lung scan because I don't have a regular healthcare provider.	1.00
4. I might put off having a lung scan because no one in my family had lung cancer.	.83
5. I might put off having a lung scan because the cost would be a problem.	.98
6. I might put off having a lung scan because I don't have any lung problems or symptoms.	1.00
7. I might put off having a lung scan because transportation would be a problem.	.95
8. I might put off having a lung scan because I am afraid the lung scan will damage my lungs.	.95
9. I might put off having a lung scan because I have had a bad experience with a hospital or healthcare provider.	.88
10. I might put off having a lung scan because I don't know enough about the test.	1.00
11. I might put off having a lung scan because I think I am too old to benefit from screening for lung cancer.	.93
12. I might put off having a lung scan because I am a smoker.	.70
13. I might put off having a lung scan because I would rather **not** know if I have any lung problems.	.98
14. I might put off having a lung scan because I worry about feeling like a social outcast for smoking.	.88
15. I might put off having a lung scan because I worry about being blamed for having smoked.	.98
16. I might put off having a lung scan because it is not worth the effort.	.93
17. I might put off having a lung scan because I do not trust the healthcare system.	.83
Self-Efficacy for Lung Cancer Screening Scale (LCSHB-SE)	
1. How confident are you that you can make an appointment to have a lung scan?	.93
2. How confident are you that you can find the time to have a lung scan?	1.00

Perceived Risk of Lung Cancer Scale (LCSHB-PRisk)	**Item-level Content Validity Index**
3. How confident are you that you can find transportation to get to and from the clinic/hospital to have a lung scan?	1.00
4. How confident are you that you can get enough information about having a lung scan?	.98
5. How confident are you that you can cover the cost of a lung scan, if needed?	.83
6. How confident are you that you can get a lung scan even if you are worried about the results?	.95
7. How confident are 6you that you can have a lung scan even if you don't know what to expect about the procedure?	.90
8. How confident are you that you can even if you are anxious **about the process**?	.80
9. How confident are you that you can even if you are anxious **about the results**?	.85

Table 3

Participant Sociodemographic Characteristics

	Overall (n=497) $\bar{X}$ **(SD)** **Median (Range)**	**Screened/Intend to Screen (n=146)** $\bar{X}$ **(SD)** **Median (Range)**	**Unscreened (n=351)** $\bar{X}$ **(SD)** **Median (Range)**	***p*-value**
Age	62.76 (5.80); 62 (55-77)	62.66 (5.15); 62.5 (55-77)	62.81 (6.06); 62 (55-76)	.8050
Pack Years	50.49 (23.61); 44 (1-150)	52.07 (27.08); 43.5 (9-150)	49.83 (21.99); 44 (1 – 148)	.3781
Total Perceived Smoking-related Stigma	14.10 (3.28); 15 (0-20)	13.31 (4.15); 14 (0-18)	14.32 (2.98); 15 (6-20)	.2276
	n (%)			
Education				
Less than High School	20 (4.0)	3 (2.1)	17 (4.8)	.0061*
High School Graduate	136 (27.4)	34 (23.5)	102 (29.1)	
Some College	208 (41.9)	54 (37.2)	154 (43.9)	
College Graduate or Higher	132 (26.6)	54 (37.2)	78 (22.2)	
Race				
Caucasian	385 (77.8)	112 (76.7)	273 (78.2)	.6328
African-American	103 (20.8)	31 (21.2)	72 (20.6)	
Asian	1 (0.2)	1 (0.7)	0	
American-Indian	3 (0.6)	1 (0.7)	2 (0.6)	
Other Pacific Islander	2 (0.4)	1 (0.7)	1 (0.3)	
Multiracial	1 (0.2)	0	1 (0.3)	
Hispanic	24 (4.8)	4 (2.7)	20 (5.7)	.2491
Gender (Male)	191 (38.5)	64 (43.8)	127 (36.3)	.2147
Income				
Less than $25,000 per year	156 (31.6)	36 (24.8)	120 (34.5)	.0185*
$25,000 to $50,000 per year	227 (46.0)	66 (45.5)	161 (46.3)	
Greater than $50,000 per year	110 (22.3)	43 (29.7)	67 (19.3)	
Insurance				
Government Sponsored	284 (57.3)	81 (55.9)	203 (57.8)	.9223
Private Health Insurance	192 (38.7)	58 (40.0)	134 (38.2)	
Uninsured	20 (4.0)	6 (4.1)	14 (4.0)	
Smoking Status (yes)	239 (48.6)	67 (46.5)	172 (49.4)	.6203

Values are mean (standard deviation); median (minimum-maximum) for continuous variables and frequency (percent) for categorical variables. P-values are from Student's t-test for continuous variables and Fisher's Exact Test for categorical variables.

Table 4

Scale Means Examining Differences Between Participants Who Intend to and Have Screened for Lung Cancer and Unscreened Participants

	Scale Range	Overall (n=496) $\bar{X}$ (SD); Median (Range)	Screened/Intend to Screen (n=146) $\bar{X}$ (SD); Median (Range)	Nonscreened (n=350) $\bar{X}$ (SD); Median (Range)	*p*-value
Total Perceived Risk	3-12	6.52 (2.26); 6 (2-12)	6.55 (2.47); 6 (2-12)	6.51 (2.17); 6 (2-12)	.8428
Total Perceived Benefits	6-24	17.09 (4.48); 18 (2-24)	18.07 (4.14); 18 (3-24)	16.68 (4.55); 18 (2-24)	.0016*
Total Perceived Barriers	17-68	34.44 (9.08); 35 (7-65)	33.05 (10.07); 34 (14-65)	35.03 (8.58); 36 (7-55)	.0387*
Total Self-Efficacy	9-36	29.10 (6.25); 30 (1-36)	30.38 (5.29); 32 (8-36)	28.55 (6.55); 29 (1-36)	.0012*

Values are mean (standard deviation); median (range); p-values are from Wilcoxon non-parametric test.

(There are five participants without “stage” data so they have been excluded from all analyses.)