

Lung: Short Report

Willingness for Lung Cancer Screening: Disparities Among Informed, Screening-Eligible Individuals



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ABSTRACT

BACKGROUND Lung cancer is the leading cause of cancer-related death. Although lung cancer screening has been shown to reduce mortality, only a small fraction of eligible people receive screening. This study briefly educated screening-eligible individuals about lung cancer risk, prevention, and screening recommendations. We then evaluated race and gender as predictors of willingness to be screened once participants were educated.

METHODS An online lung cancer screening learning module was created and distributed to convenience samples of screening-eligible White Americans ($n = 173$) and Black Americans ($n = 52$) between November 2022 and February 2023. Participants viewed short modules about lung cancer risks and screening. Thereafter, participants rated their willingness to consider future screening using theory of planned behavior measurement frameworks (attitudes, norms, perceived control, and intentions to screen), with higher scores indicating greater willingness. Participant demographics were recorded.

RESULTS Black Americans reported higher perceived control over obtaining screening than White Americans ($t_{223} = -3.10$; $P < .001$; $d = 1.28$). We observed no other racial differences in willingness as Black Americans and White Americans reported similar attitudes, normative beliefs, and intentions. Women also showed more positive attitudes and greater intention to be screened than men did ($t_{223} = -2.42$; $P = .02$; $d = 1.66$).

CONCLUSIONS Once informed about lung cancer risks, prevention, and screening recommendations, Black Americans may be as willing as White Americans to undergo screening, highlighting potential causal factors other than willingness for existing racial disparities in lung cancer screening uptake. Gender differences in willingness highlight a potential need for gender-targeted outreach and communication.

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Lung cancer is the leading cancer killer worldwide.¹ The National Lung Screening Trial demonstrated a 20% reduction in mortality with screening based on age and tobacco exposure.² Even with broadened eligibility criteria, however, uptake of lung cancer screening is alarmingly low. Recent analyses have shown that <6% of eligible people actually receive a computed tomography scan for lung cancer screening.³

IN SHORT

- Disparities in lung cancer screening can be mitigated through education.
- There are disparities in screening associated with gender.

Black Americans are less likely to undergo lung cancer screening than White Americans are.⁴ Simultaneously,

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men are less likely than women to undergo recommended screening. A paucity of studies have examined racial and gender differences in willingness to undergo lung cancer screening once screening-eligible individuals are properly educated on screening recommendations and characteristics. As such, our goal was to educate screening-eligible White and Black American women and men and to measure subsequent willingness to obtain screening.

PATIENTS AND METHODS

SURVEY DISTRIBUTION. Participants (age, mean [SD], 60.78 [7.42] years) were recruited through Qualtrics, an online survey platform with a large panel of diverse participants who are available for survey recruitment. White and Black American participants were eligible for the study if they had not previously been screened for lung cancer, were between 50 and 80 years of age, were either a current smoker or former smoker who quit <15 years ago, and had at least a 20 pack-year smoking history. An initial sample of 320 participants was recruited. Ninety-five participants were excluded on the basis of responses to quality control measures that considered responses to identify an automated (ie, bot) response or inattentiveness. This resulted in a final sample size of 225 screening-eligible participants (Table 1).

PROCEDURE. After completing an online consent form, participants completed a set of demographic and individual differences measure. They then viewed a series of educational modules on lung cancer, risk factors, and lung cancer screening. Specifically, participants were first provided a diagram of the lungs and types of lung cancer. They then viewed an infographic of lung cancer risk factors, followed by an overview of the screening process and guidelines. To determine attentiveness, participants answered 4 low-difficulty true-false knowledge retention questions after each module. Participants were excluded if they answered fewer than 8 of the total 12 questions correctly (mean, 10.66; SD, 1.24). Last, participants completed outcome measures to gauge willingness to be screened for lung cancer. On survey completion, participants received a small monetary compensation. The survey took approximately 42 minutes to complete (mean, 42.16 minutes; median, 35.58 minutes; range, 13.50-294.22 minutes; SD, 32.44 minutes). The single survey that was recorded at 294.22 minutes probably occurred as the survey was completed but not closed. In this instance, the survey was automatically closed after timing out. The study was approved by the institutional review board (IRB #15679).

SCREENING WILLINGNESS. Guided by the theory of planned behavior (TPB),⁵ screening willingness was

measured through attitudes toward screening (eg, "Obtaining lung cancer screening is good for me"), normative beliefs about screening (eg, "Most people who are important to me think I should obtain lung cancer screening"), perceived behavioral control over obtaining screening (eg, "I am confident that I can obtain lung cancer screening if I wanted to"), and intentions to obtain screening (eg, "I intend to obtain lung cancer screening"). Each TPB construct was measured by 3 items on a 7-point response scale ranging from 1 (strongly disagree) to 7 (strongly agree). The TPB is one of the most widely accepted theories on behavior. Items were adapted from prior applications of TPB constructs to cancer screening. Four separate TPB variables were calculated by averaging the respective items for each construct.

RESULTS

RACE DIFFERENCES IN WILLINGNESS TO SCREEN. Descriptive statistics, internal consistency coefficients, and bivariate correlations for TPB variables by race and gender are presented in Table 2. Results for race differences in screening willingness are demonstrated in Figure 1. Black Americans (mean [SD], 6.26 [0.95]) reported more perceived behavioral control regarding ability to receive screening than White Americans did (5.64 [1.35]; $t_{223} = -3.10$; $P < .001$; $d = 1.28$). There were no significant race differences for attitudes ($t_{223} = 0.25$; $P = .80$), normative beliefs ($t_{223} = -1.94$; $P = .05$), and intentions to screen ($t_{223} = -1.84$; $P = .07$).

GENDER DIFFERENCES IN WILLINGNESS TO SCREEN. Results for gender differences are demonstrated in Figure 2. Female respondents reported significantly more positive attitudes toward screening (6.38 [0.95]) than male respondents did (6.06 [1.31]; $t_{223} = -2.09$; $P = .04$; $d = 1.08$). Female respondents also had greater intention to screen (5.58 [1.54]) than male respondents (5.01 [1.89]; $t_{223} = -2.42$; $P = .02$; $d = 1.66$). There were no significant gender differences for perceived behavioral control ($t_{223} = -0.47$; $P = .64$) and normative beliefs ($t_{223} = -0.97$; $P = .33$).

COMMENT

Black Americans are much less likely to obtain lung cancer screening. Previous studies have detailed these disparities.⁶ A major and novel finding in our study was that Black Americans had greater perceived behavioral control than White Americans and were as willing to obtain screening as White Americans across all other measures once educated about the risks and benefits of screening. In general, Black Americans tend to be

TABLE 1 Demographic Characteristics of the Patients				
Variable	Overall	Black American	White American	P Value
No.	225	52	173	
Gender				.19
Male	32.9 (74/225)	40.4 (21/52)	30.6 (53/173)	
Female	67.1 (151/225)	59.6 (31/52)	69.4 (120/173)	
Age, y	60.8 (7.4)	59.6 (6.3)	60.9 (7.6)	.71
Employment				.76
Employed full-time	30.2 (68/225)	30.8 (16/52)	30.1 (52/173)	
Employed part-time	3.6 (8/225)	1.9 (1/52)	4.0 (7/173)	
Self-employed	7.1 (16/225)	3.8 (2/52)	8.1 (14/173)	
Retired	57.8 (130/225)	61.5 (32/52)	56.6 (98/173)	
Student	1.3 (3/225)	1.9 (1/52)	1.2 (2/173)	
Education level				.56
High school/GED or less	46.2 (104/225)	42.3 (22/52)	47.4 (82/173)	
Some college	29.3 (66/225)	34.6 (18/52)	27.7 (48/173)	
College degree	17.3 (39/225)	9.6 (5/52)	19.7 (34/173)	
Professional/advanced degree	7.1 (16/225)	13.5 (7/52)	5.2 (9/173)	
Income				.66
≤\$14,999	11.6 (26/225)	15.4 (8/52)	10/4 (18/173)	
\$15,000-\$24,999	20.0 (45/225)	19.2 (10/52)	20.2 (35/173)	
\$25,000-\$34,999	20.4 (46/225)	15.4 (8/52)	22.0 (38/173)	
\$35,000-\$49,999	14.7 (33/225)	15.4 (8/52)	14.5 (25/173)	
\$50,000-\$74,999	16.4 (37/225)	23.1 (12/52)	14.5 (25/173)	
\$75,000-\$99,999	11.6 (26/225)	7.7 (4/52)	12.7 (22/173)	
≥\$100,000	5.3 (12/225)	3.8 (2/52)	5.8 (10/173)	
Height, inches	65.4 (3.4)	66.2 (3.2)	65.3 (3.3)	.38
Weight, pounds	168.7 (48.1)	172.8 (54.7)	175.4 (44.9)	.10
Body mass index, kg/m ²	28.4 (7.2)	29.4 (8.2)	28.2 (7.4)	.50
Health				.10
Excellent	2.7 (6/225)	1.9 (1/52)	2.9 (5/173)	
Very good	19.6 (44/225)	13.5 (7/52)	21.4 (37/173)	
Good	44.4 (100/225)	44.2 (23/52)	44.5 (77/173)	
Fair	27.6 (62/225)	30.8 (16/52)	26.6 (46/173)	
Poor	5.8 (13/225)	9.6 (5/52)	4.6 (8/173)	
Current smoker	70.7 (159/225)	80.8 (42/52)	67.6 (117/173)	.07
Insurance				.78
No insurance	7.6 (17/225)	3.8 (2/52)	8.7 (15/173)	
Medicare	36.9 (83/225)	36.5 (19/52)	37.0 (64/173)	
Medicaid	18.7 (42/225)	17.3 (9/52)	19.1 (33/173)	
Private insurance through employer	21.3 (48/225)	23.1 (12/52)	20.8 (36/173)	
Private insurance through family member	4.4 (10/225)	3.8 (2/52)	4.6 (8/173)	
Private insurance through other source	5.8 (13/225)	9.6 (5/52)	4.6 (7/173)	
Some combination of the above	5.3 (12/225)	5.8 (3/52)	5.2 (9/173)	
Last physician's visit				.21
<1 week ago	11.6 (26/225)	15.4 (8/52)	10.4 (18/173)	
Between 1 week and 1 month ago	24.4 (55/225)	21.2 (11/52)	25.4 (44/173)	
Between 1 month and 6 months ago	31.6 (71/225)	36.5 (19/52)	30.1 (52/173)	
Between 6 months and 1 year ago	13.3 (30/225)	9.6 (5/52)	14.5 (25/173)	
>1 year ago	15.6 (35/225)	9.6 (5/52)	17.3 (30/173)	
Cannot remember	3.6 (8/225)	7.7 (4/52)	2.3 (4/173)	

Categorical variables are presented as percentage (n/N). Continuous variables are presented as mean (SD).

more hesitant than White Americans to obtain health care screenings because of mistrust in health care systems and professionals due to a history of medical research abuse, such as the Tuskegee Syphilis Study,⁷ and personal experiences of racism within health care.

Our findings illustrate that education about lung cancer screening may be an effective strategy for encouraging screening among Black Americans. Our research also shows that practical and brief educational materials are sufficient to encourage lung cancer

TABLE 2 Racial and Gender Differences in Willingness to Undergo Lung Cancer Screening

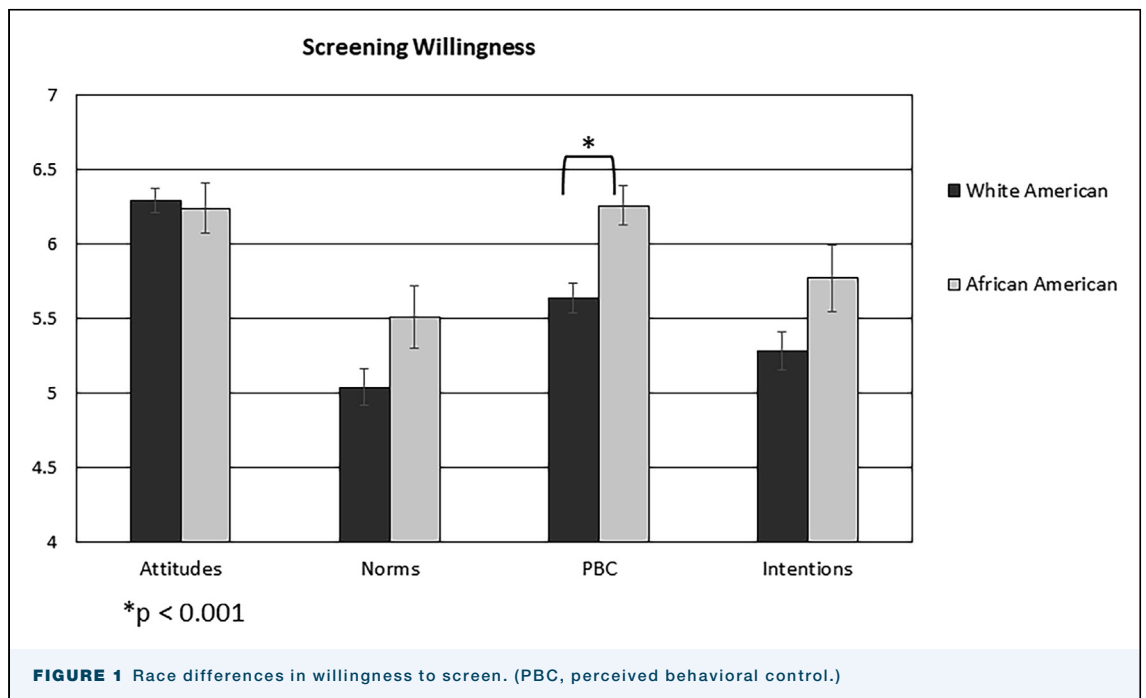
Means, SDs, Internal Consistency Coefficients, and Bivariate Associations						
Variable	Mean	SD	1	2	3	4
Black Americans (n = 52)						
Attitudes	6.24	1.24	.83			
Normative beliefs	5.51	1.48	.53**	.83		
Perceived control	6.26	0.95	.57**	.37*	.72	
Intentions	5.77	1.59	.70**	.72**	.45**	.95
White Americans (n = 173)						
Attitudes	6.29	1.04	.77			
Normative beliefs	5.04	1.54	.42**	.83		
Perceived control	5.64	1.35	.35**	.30**	.79	
Intentions	5.28	1.69	.50**	.75**	.36**	.98
Female (n = 151)						
Attitudes	6.38	0.95	.71			
Normative beliefs	5.22	1.53	.39**	.83		
Perceived control	5.81	1.32	.31**	.26*	.77	
Intentions	5.58	1.54	.50**	.73**	.38**	.94
Male (n = 74)						
Attitudes	6.06	1.31	.85			
Normative beliefs	5.00	1.53	.53**	.85		
Perceived control	5.73	1.26	.50**	.47**	.79	
Intentions	5.01	1.89	.57**	.78**	.41**	.97

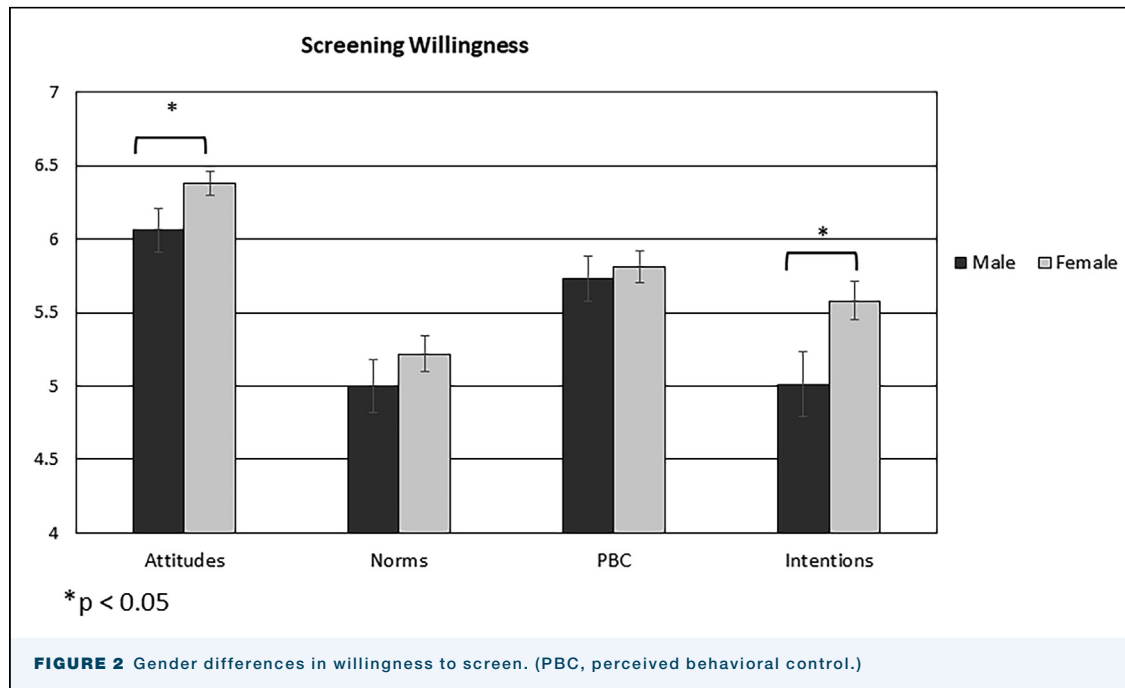
*P < .05; **P < .001. Cronbach α for multi-item measures reported on diagonal.

Another main finding of our study was that women had a significantly more positive attitude about lung cancer screening and a greater intention than men to obtain a screening scan. Women may be counseled more frequently about screening options as women are more likely to visit their primary care physician regularly.⁸ In addition, women tend to begin screening for solid organ tumors (eg, cervical) at earlier ages than men and may have an increased comfort level with cancer screening in general. Future outreach efforts should consider gender-targeted messaging to increase overall screening rates.

There were some limitations to this study. First, there was a smaller sample of Black Americans than White Americans in the study, largely because of difficulty in recruiting screening-eligible Black Americans. Future research should implement targeted recruitment strategies to increase the percentage of Black Americans in similar studies. Second, our study included only Black Americans and White Americans. Future studies should also examine other racial minorities with screening disparities, such as Hispanic or Latino populations, as part of broader efforts within the medical community to address racial cancer disparities.⁹ In addition, there were not enough respondents to compare White American men with Black American men or White American women with Black American women. Finally, survey respondents may have been more motivated than the general population, given the length of the survey; but the panel available for recruitment was large and diverse, reducing this potential bias.

screening. Although our overall survey took an average of 42 minutes to complete, the educational portion of the survey was uncomplicated and took <5 minutes to read.





The medical community has struggled to increase rates of lung cancer screening among eligible individuals. To compound this problem, underrepresented individuals are significantly less likely to be screened than non-minorities. It appears that Black Americans may be as willing or more willing to obtain lung cancer screening once educated about its benefits. Future strategies should

focus on community engagement and education to reduce racial disparities in lung cancer screening.

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DISCLOSURES

The authors have no conflicts of interest to disclose.

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