

**The association between physician trust and prostate-specific antigen screening:  
Implications for shared decision-making**

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**Abstract**

**Introduction:** Shared decision-making is widely recommended when men are considering prostate cancer screening with prostate-specific antigen (PSA). The role of patients' trust in cancer information from their physician in such decisions is unknown.

**Methods:** We identified male respondents  $\geq 18$  years of age from the Health Information National Trends Survey, a population-based survey of people living in the U.S. (2011–014). We assessed the association between degree of trust in cancer information from respondent's physician with patient-reported receipt of PSA-screening and patient-reported discussion of PSA screening with their physician.

**Results:** Among 5069 eligible respondents, 3606 (71.1%) men reported trusting cancer information from their physician "a lot," 1186 (23.4%) "somewhat," 219 (4.3%) "a little," and 58 (1.1%) "not at all." A total of 2655 (52.4%) men reported receiving PSA screening. The degree of trust an individual had in his physician for cancer information was strongly associated with his likelihood of having received PSA screening ( $p_{\text{trend}} < 0.0001$ ) (54.9% "a lot" vs. 27.6% "not at all"). These findings persisted after multivariable regression. Similarly, men who had high levels of trust in their physician were more likely to have discussed PSA screening with a strong trend across strata ( $p_{\text{trend}} < 0.0001$ ).

**Conclusions:** The level of trust an individual has in cancer information from his physician is strongly associated with his likelihood of discussing and undergoing PSA screening. As rationale, implementation of PSA screening requires shared decision-making, and the level of trust an individual has in his physician has important implications for dissemination of PSA screening guidelines.

## Introduction

Prostate cancer (PCa) screening using serum prostate specific antigen (PSA) testing remains controversial. In conflict is level 1 evidence that PSA-screening decreases PCa-specific mortality<sup>1</sup> and the significant risks of over-diagnosis, over-treatment, and treatment-related harms<sup>2</sup>. Thus, most cancer organizations recommend that the choice to undergo PSA-screening be made through shared decision making, in which there is a bi-directional sharing of information followed by consensus regarding the patient's healthcare preferences<sup>3</sup>. While such an approach offers the opportunity for care that is most aligned with a patient's values, it depends on the rapport between a patient and their physician. Across a variety of health care settings, patient and family trust in physicians has been shown to be strongly associated with adoption of shared decision-making<sup>4-6</sup>. While physicians are an important source of medical information, patients are increasingly utilizing online medical resources to inform their healthcare decisions<sup>7</sup>.

Given the importance of shared-decision making for PSA screening, we sought to assess the association between men's trust in cancer information from their physician and the likelihood of discussing and receiving PSA testing. Further, as a secondary aim, we examined the association between men's trust in cancer information from the internet and these outcomes.

## Methods

### *Data source*

We utilized the fourth edition of the Health Information National Trends Survey (HINTS), specifically cycles 1-4 (2011-2014), to identify all men included in the annual national survey. The HINTS database is part of the National Cancer Institute's (NCI) Division of Cancer Control and Population Sciences, collecting national representative data regarding the American public's use of cancer related information. The survey targets adults ( $\geq 18$  years of age) and focuses on how individuals use different communications channels to obtain vital health information. Notably, individuals are not resurveyed, thus, data from differing cycles represent unique respondents. For the purposes of this study, the four years of data were manually combined into a single dataset for analysis. We identified 5,563 men surveyed from 2011-2014. We excluded 410 for missing data regarding receipt or discussion of PSA testing and 84 for missing data regarding their trust in information about cancer from their physician. The data was deidentified by the NCI prior to being made publicly available, thus institutional review board approval was not required for this study.

### *Outcomes and covariates*

Our primary outcome was the patient-reported prevalence of PSA-screening. The secondary outcome was patient-reported discussion of PSA screening with their physician. The primary exposure was the degree of trust in cancer information from their physician (categorically operationalized as 'a lot', 'some', 'a little', 'not at all'). Secondly, we assessed the effect of

degree of trust in cancer information from the internet (operationalized in the same manner). Other covariates included age (18-34, 35-49, 50-64, 65-74,  $\geq 75$ ), race (white, black, Hispanic, Indian, other), marital status (married, living as married, divorced, widowed, separated, single/never married), geographical region (northeast, midwest, south, west), education level (<high school, high school, some college, Bachelor's degree, post-Bac degree), income level (<\$20,000, \$20,000-\$35,000, \$35,000-\$50,000, \$50,000-<\$75,000, >\$75,000), health insurance (yes/no), born in the USA (yes/no), self-assessment of general health (excellent, very good, good, fair, poor), smoking status (current, former, never), and Patient Health Questionnaire-4 score (PHQ-4; an assessment of psychological distress<sup>8</sup>).

### *Statistical analyses*

We used the Cochran-Armitage test to identify significant trends for each outcome, across the levels of trust. Subsequently, a multivariable logistic regression model assessed the association between trust in information from physicians and from the internet and each outcome, adjusting for the above covariates (selected *a priori*). The American Urological Association (AUA) recommends shared decision-making for men 55-69 years of age, based on benefits of PSA screening outweighing harms<sup>9</sup>. As such, a sensitivity analysis using the above models was performed only for men 55-69 years of age to assess the impact of the aforementioned exposure variable and covariates on PSA screening in this target group. Goodness of fit and multicollinearity were assessed for each model with no evidence of violations. Statistical analyses were performed using SAS 9.4 (SAS Institute, Cary, North Carolina). All tests were 2-sided, with statistical significance set at  $p < 0.05$ .

### **Results**

Among 5069 eligible respondents, 3,606 (71.1%) men reported trusting cancer information from their physician 'a lot', 1,186 (23.4%) 'some', 219 (4.3%) 'a little', and 58 (1.1%) 'not at all'. White, married men with higher levels of education and income were more likely to report a higher degree of trust in their physician (Table 1). Furthermore, patients with high levels of trust in their physician tended to have health insurance, be born in the USA, and report no psychological distress. There were 767 men (15.1%) that reported 'a lot' of trust in cancer information from the internet, 2543 (50.2%) 'some', 1044 (20.6%) 'a little', 448 (8.8%) 'not at all', and 267 (5.3%) didn't answer the question. There was weak correlation between an individual's trust in information from physicians and information from the internet (Pearson correlation coefficient = 0.078, 95% CI 0.039-0.118) (Supplementary Table 1).

Among the 5,069 eligible men, 2,655 (52.4%) men received PSA-screening. The degree of trust an individual had in cancer information from their physician was strongly associated with their likelihood of receiving PSA-screening: 54.9% of men who reported 'a lot' of trust underwent screening, 48.6% who reported 'some' trust, 38.4% who reported 'a little' trust, and 27.6% who reported 'not at all' trusting their physician (Figure 1a,  $p_{\text{trend}} < 0.0001$ ). The degree to which an individual trusted cancer information from the internet was also associated with

having received PSA-screening (Figure 1a) ( $p=0.005$ ), albeit with an insignificant trend ( $p=0.07$ ). After multivariable adjustment, these significant results persisted only for degree of trust in information from the physician (Table 2). As patients may also seek health advice from family and friends, we assessed the association between trust in these data sources and receipt of PSA-screening. We found no significant association ( $p=0.28$ ) and inclusion of this variable didn't modify the effect of trust in physician.

There were 2,472 (48.8%) men who discussed PSA screening with their physician. Men who had high levels of trust in their physician were more likely to have discussed PSA-screening (Figure 1b) ( $p<0.0001$ ) with a strong trend across strata ( $p<0.0001$ ). Results from multivariable models recapitulated these findings (Table 2).

As the American Urological Association (AUA) explicitly recommends shared decision-making for men 55-69 years of age<sup>9</sup>, we performed a pre-planned sensitivity analysis among the 1,826 men in this age bracket. There were 1,293 (70.8%) men who reported undergoing PSA-screening and 1,173 (64.2%) had discussed PSA screening with their physician. Patients that did not trust their physician at all regarding cancer information were significantly less likely to receive PSA-testing (vs 'a lot': OR 0.26, 95%CI 0.08-0.90) (Table 3). Level of trust regarding cancer information from the patient's physician did not impact discussions regarding PSA screening.

## Discussion

Using a large, nationally-representative survey, the level of trust an individual has in cancer information from their physician was one of the strongest predictors of discussing and receiving PSA screening. In fact, only age was a stronger predictor of receiving PSA-screening among data collected in this survey. While trust has been previously associated with shared decision making, this study provides uniquely generalizable results. Interestingly, previous work has shown that individuals with high, but not excessive, levels of trust are most likely to engage in shared decision making<sup>5</sup>. Patients with very high levels of trust may blindly defer to their physicians while those with very low levels may opt for autonomous roles<sup>5</sup>. Given that this survey is disseminated nationally across the United States, with broad inclusion criteria ( $\geq 18$  years of age), we feel that these findings are likely generalizable to most first-world, multi-cultural countries, including Canada.

It is perhaps intuitive that a man who trusts his physician is more likely to undergo PSA-screening based on the physician's recommendation. One may infer that primary care physicians are strongly recommending PSA-screening. However, it is not immediately apparent that this is true<sup>10</sup>. Alternatively, men may receive balanced information and decide to undergo testing based on a desire to avoid potential loss due to under-diagnosis, in keeping with prospect theory<sup>11</sup>. Finally, it is possible that men who trust their physician may place more trust in the healthcare system in general and thus engage in PSA-screening based on this principle.

Our study found several noteworthy findings with regards to the impact of race and socioeconomic status on the effect of receiving and/or discussing PSA screening. First, and

importantly, minority populations (i.e. Black, Hispanic, etc) were just as likely to receive or discuss PSA screening with their physician as White individuals. Historically, minorities have been less likely and perhaps less willing to undergo PSA testing<sup>12,13</sup>. Several perceived and actual barriers include, a lack of: health insurance, knowledge, a sense of urgency, and recommendation for routine screening from primary care providers<sup>14</sup>. Second, we found an effect gradient of greater odds of receiving or discussing PSA screening with increasing income and education level. These results are consistent with previous studies that suggest men with higher income and those who are more educated are more likely to undergo PSA testing<sup>15-17</sup>.

Due to the nature of the data source, there are intrinsic limitations. First, recall bias is a risk in any cross-sectional survey, though it is not clear that this would exert a differential effect. Second, although the HINTS database accounts for many factors that may influence PCa screening, other factors including family history and voiding symptoms are not captured. Third, the nature of the physician counseling involved in shared decision making is unknown. Thus, physicians may be either encouraging or discouraging PSA-screening. Fourth, the HINTS database does not have laboratory values, thus there is no way to ascertain whether a participant truly underwent PSA testing. Fifth, we were unable to compare PCa screening to other cancers or conditions (i.e. HIV) as these were not captured in the survey. Sixth, the racial demographics of participants included in the HINTS database may not accurately reflect those of the U.S. population as a whole. Finally, this study may represent reverse causality with patients having increased trust in physicians that discuss PSA-testing or explicitly offer it.

### **Conclusions**

The level of trust a man has in cancer information from their physician is strongly associated with his likelihood of discussing and undergoing PSA-screening. As rational implementation of PSA screening requires shared decision-making, the level of trust an individual has in their physician has important implications for dissemination of PSA-screening guidelines.

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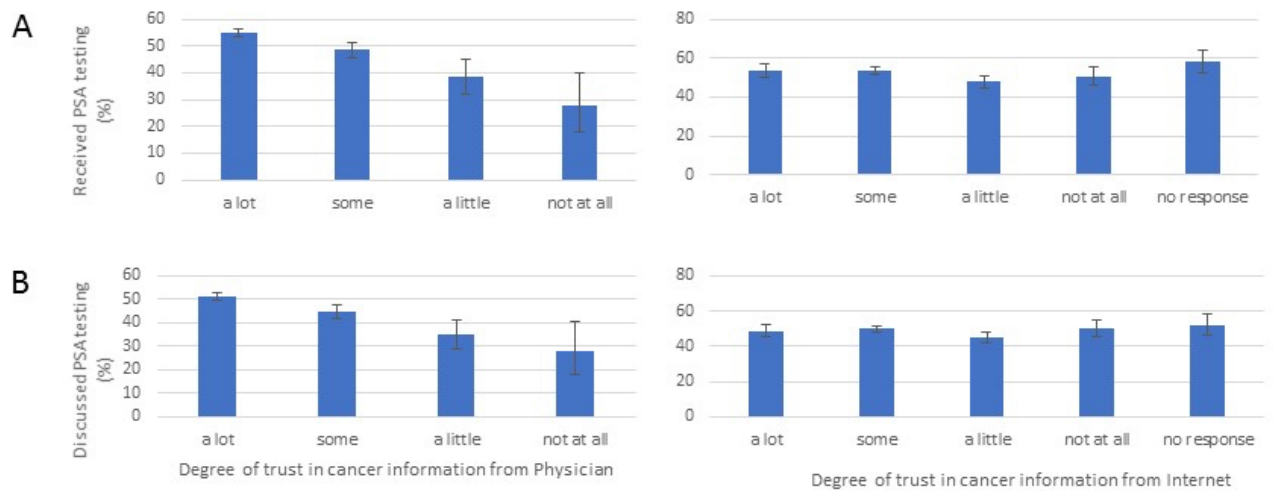
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## Figures and Tables

**Fig. 1.** Proportion of respondents reporting (A) receiving a prostate-specific antigen (PSA) test; and (B) discussing PSA screening with their physician.





Variables	Level of trust about cancer information from physician		p
	A lot	Some/a little/not at all	
Sample size	3606	1463	
Age			0.0002
18–34	440 (12.2)	131 (9.0)	
35–49	735 (20.4)	347 (23.7)	
50–64	1,274 (35.3)	524 (35.8)	
65–75	672 (18.6)	244 (16.7)	
≥75	418 (11.6)	173 (11.8)	
Unknown	67 (1.9)	44 (3.0)	
Race			<0.0001
White	2,391 (66.3)	871 (59.5)	
Black	440 (12.2)	184 (12.6)	
Hispanic	115 (3.2)	75 (5.1)	
Indian	19 (0.5)	10 (0.7)	
Other	188 (5.2)	100 (6.8)	
Unknown	453 (12.6)	223 (15.2)	
Marital status			<0.0001
Married	2,129 (59.0)	794 (54.3)	
Living as married	113 (3.1)	56 (3.8)	
Divorced	449 (12.5)	224 (15.3)	
Widowed	165 (4.6)	86 (5.9)	
Separated	77 (2.1)	44 (3.0)	
Single/never married	607 (16.8)	214 (14.6)	
Unknown	66 (1.8)	45 (3.1)	
Geographical region			0.45
Northeast	575 (16.0)	220 (15.0)	
Midwest	705 (19.6)	268 (18.3)	
South	1465 (40.6)	601 (41.1)	
West	861 (23.9)	374 (25.6)	
Education level			<0.0001
<High school	283 (7.9)	146 (10.0)	
High school	649 (18.0)	308 (21.1)	
Some college	1059 (29.4)	477 (32.6)	
Bachelor's degree	906 (25.1)	293 (20.0)	
Post-bac degree	659 (18.3)	198 (13.5)	
Unknown	50 (1.4)	41 (2.8)	
Income level			<0.0001
<\$20 000	475 (13.2)	286 (19.6)	

\$20 000–35 000	463 (12.8)	212 (14.5)	
\$35 000–50 000	484 (13.4)	173 (11.8)	
\$50 000–<75 000	624 (17.3)	229 (15.7)	
>\$75 000	1217 (33.8)	396 (27.1)	
Unknown	343 (9.5)	167 (11.4)	
Health insurance			<0.0001
Yes	2271 (75.5)	1010 (69.0)	
No	840 (23.3)	429 (29.3)	
Unknown	45 (1.3)	24 (1.6)	
Born in U.S.			<0.0001
Yes	3088 (85.6)	1180 (80.7)	
No	485 (13.5)	254 (17.4)	
Unknown	33 (0.9)	29 (2.0)	
Self-assessment of general health			<0.0001
Excellent	424 (11.8)	126 (8.6)	
Very good	1368 (37.9)	463 (31.7)	
Good	1264 (35.1)	565 (38.6)	
Fair	376 (10.4)	221 (15.1)	
Poor	100 (2.8)	53 (3.6)	
Unknown	74 (2.1)	35 (2.4)	
Smoking status			0.007
Current	554 (15.4)	275 (18.8)	
Former	1194 (33.1)	430 (29.4)	
Never	1827 (50.7)	747 (51.1)	
Unknown	31 (0.9)	11 (0.8)	
PHQ-4*			<0.0001
None	2,048 (75.4)	693 (64.7)	
Mild	414 (15.2)	215 (20.1)	
Moderate	146 (5.4)	109 (10.2)	
Severe	109 (4.0)	54 (5.0)	
Level of trust about cancer information from internet			<0.0001
A lot	625 (17.3)	142 (9.7)	
Some	1863 (51.7)	680 (46.5)	
A little	653 (18.1)	391 (26.7)	
Not at all	285 (7.9)	163 (11.1)	
Unknown	180 (5.0)	87 (6.0)	

\*Based on 3788 participants. PHQ-4: Patient Health Questionnaire-4.

<b>Table 2. Multivariable logistic regression assessing predictors for reporting receiving a PSA test and discussing PSA screening with their physician</b>				
<b>Variables</b>	<b>Receiving PSA testing</b>		<b>Discussing PSA screening</b>	
	<b>OR (95%CI)</b>	<b>p</b>	<b>OR (95%CI)</b>	<b>p</b>
Level of trust about cancer information from physician				
Marital status				
Married	Ref		Ref	
Living as married	1.08 (0.68–1.72)	0.75	1.14 (0.73–1.77)	0.57
Divorced	0.89 (0.70–1.13)	0.33	0.88 (0.70–1.11)	0.28
Widowed	0.82 (0.55–1.23)	0.34	0.88 (0.61–1.29)	0.52
Separated	0.66 (0.40–1.11)	0.11	1.01 (0.62–1.67)	0.96
Never married	0.63 (0.49–0.82)	<0.001	0.62 (0.48–0.79)	<0.001
Geographical region				
Northeast	Ref		Ref	
Midwest	0.89 (0.68–1.18)	0.42	0.91 (0.70–1.18)	0.47
South	1.14 (0.90–1.45)	0.29	1.09 (0.87–1.37)	0.45
West	0.83 (0.64–1.08)	0.16	0.85 (0.66–1.09)	0.20
Education level				
<High school	Ref		Ref	
High school	1.30 (0.93–1.82)	0.13	1.11 (0.80–1.54)	0.53
Some college	1.70 (1.22–2.35)	0.002	1.34 (0.98–1.84)	0.07
Bachelor's degree	2.30 (1.62–3.27)	<0.001	1.54 (1.10–2.16)	0.01
Post-bac degree	3.30 (2.25–4.83)	<0.001	2.07 (1.44–2.97)	<0.001
Income level				
<\$20 000	Ref		Ref	
\$20 000–35 000	1.42 (1.05–1.93)	0.02	1.36 (1.01–1.82)	0.04
\$35 000–50 000	1.45 (1.06–1.99)	0.02	1.29 (0.96–1.75)	0.09
\$50 000–75 000	1.53 (1.12–2.08)	0.007	1.39 (1.03–1.87)	0.03
>\$75 000	1.56 (1.15–2.11)	0.004	1.49 (1.11–1.99)	0.007
Health insurance				
Yes	Ref		Ref	
No	0.80 (0.65–0.98)	0.03	0.86 (0.71–1.05)	0.15
Born in U.S.				
Yes	Ref		Ref	
No	0.65 (0.49–0.85)	0.002	0.69 (0.53–0.90)	0.006
Self-assessment of general health				
Excellent	Ref		Ref	
Very good	1.12 (0.84–1.48)	0.44	1.01 (0.77–1.31)	0.97
Good	1.11 (0.84–1.48)	0.46	0.95 (0.72–1.25)	0.72
Fair	0.95 (0.67–1.35)	0.77	0.90 (0.64–1.25)	0.52
Poor	1.18 (0.69–2.02)	0.54	0.93 (0.55–1.55)	0.77

Smoking status				
Current	Ref		Ref	
Former	1.48 (1.15–1.90)	0.002	1.27 (1.00–1.62)	0.054
Never	1.32 (1.04–1.67)	0.02	1.36 (1.08–1.71)	0.009
PHQ-4				
None	Ref		Ref	
Mild	0.96 (0.77–1.20)	0.74	0.86 (0.70–1.06)	0.16
Moderate	1.05 (0.75–1.46)	0.79	0.90 (0.65–1.23)	0.50
Severe	0.79 (0.52–1.20)	0.26	0.71 (0.47–1.08)	0.11

CI: confidence interval; OR: odds ratio; PSA: prostate-specific antigen; PHQ-4: Patient Health Questionnaire-4.

<b>Table 3. Multivariate logistic regression models assessing PSA screening practices among men 55–69 years of age*</b>			
<b>Variables</b>	<b>OR</b>	<b>95% CI</b>	<b>p</b>
<b>Model 1 – Receipt of PSA test</b>			
Level of trust about cancer information from physician			
A lot	Ref	Ref	
Some	0.77	0.57–1.04	0.09
A little	0.58	0.31–1.09	0.09
Not at all	0.26	0.08–0.90	0.03
Level of trust about cancer information from internet			
A lot	Ref	Ref	
Some	1.23	0.86–1.76	0.26
A little	0.95	0.62–1.44	0.80
Not at all	0.61	0.36–1.05	0.07
Marital status			
Married	Ref	Ref	
Divorced	0.68	0.48–0.97	0.03
Single/never married	0.56	0.37–0.85	0.007
Education level			
<High school	Ref	Ref	
Bachelor's degree	1.87	1.07–3.28	0.03
Post-bac degree	3.42	1.80–6.49	0.0002
Income level			
<\$20 000	Ref	Ref	
\$50 000–<75 000	1.85	1.12–3.05	0.02
Born in U.S.			
Yes	Ref	Ref	

No	0.57	0.36–0.92	0.02
Smoking status			
Current	Ref	Ref	
Former	1.89	1.31–2.73	0.0006
Never	1.59	1.11–2.27	0.01
<b>Model 2 – Discussed PSA screening</b>			
Level of trust about cancer information from physician			
A lot	Ref	Ref	
Some	0.76	0.58–1.01	0.06
A little	0.56	0.31–1.04	0.07
Not at all	0.44	0.14–1.36	0.15
Level of trust about cancer information from internet			
A lot	Ref	Ref	
Some	1.07	0.77–1.48	0.69
A little	0.98	0.67–1.45	0.93
Not at all	0.65	0.39–1.08	0.10
Education level			
<High school	Ref	Ref	
Post-bac degree	2.47	1.39–4.42	0.002
Income level			
<\$20 000	Ref	Ref	
\$50 000-<75 000	1.97	1.23–3.14	0.005

\*All models adjusted for race, marital status, geographical region, education level, income level, health insurance, born in the USA, self-assessment of general health, smoking status, PHQ-4, level of trust about cancer information from the internet, level of trust about cancer information from physician. CI: confidence interval; OR: odds ratio; PSA: prostate-specific antigen; Ref: reference.

**Supplementary Table 1. Correlation between an individual's expressed trust in cancer information from their physician and from the internet (n=5069). A significant, but weak association was observed (Pearson correlation coefficient=0.078, 95% CI 0.039–0.118)**

Degree of trust in cancer information from the internet	Degree of trust in cancer information from physician			
	A lot	Some	A little	Not at all
A lot	625	111	23	8
Some	1863	606	67	7
A little	653	304	81	6
Not at all	285	117	29	17
Unknown	180	48	19	20

CI: confidence interval.