

Comparing 3 Techniques for Eliciting Patient Values for Decision Making About Prostate-Specific Antigen Screening

A Randomized Controlled Trial

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Importance: To make good decisions about prostate-specific antigen (PSA) screening, men must consider how they value the different potential outcomes.

Objective: To determine the effects of different methods of helping men consider such values.

Design and Setting: Randomized trial from October 12 to 27, 2011, in the general community.

Participants: A total of 911 men aged 50 to 70 years from the United States and Australia who had average risk. Participants were drawn from online panels from a survey research firm in each country and were randomized by the survey firm to 1 of 3 values clarification methods: a balance sheet (n=302), a rating and ranking task (n=307), or a discrete choice experiment (n=302).

Intervention: Participants underwent a values clarification task and then chose the most important attribute.

Main Outcome Measures: The main outcome was the difference among groups in the most important attribute. Secondary outcomes were differences in unlabeled test preference and intent to undergo screening with PSA.

Results: The mean age was 59.8 years; most participants were white and more than one-third had graduated from college. More than 40% reported a PSA test

within 12 months. The participants who received the rating and ranking task were more likely to report reducing the chance of death from prostate cancer as being most important (54.4%) compared with those who received the balance sheet (35.1%) or the discrete choice experiment (32.5%) ($P < .001$). Those receiving the balance sheet were more likely (43.7%) to prefer the unlabeled PSA-like option (as opposed to the “no screening”-like option) compared with those who received rating and ranking (34.2%) or the discrete choice experiment (20.2%). However, the proportion who intended to undergo PSA testing was high and did not differ between groups (balance sheet, 77.1%; rating and ranking, 76.8%; and discrete choice experiment, 73.5%; $P = .73$).

Conclusions and Relevance: Different values clarification methods produce different patterns of attribute importance and different preferences for screening when presented with an unlabeled choice. Further studies with more distal outcome measures are needed to determine the best method of values clarification, if any, for decisions such as whether to undergo screening with PSA.

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WHETHER TO UNDERGO prostate-specific antigen (PSA) screening is a difficult decision for middle-aged men. Prostate cancer is common and causes more than 28 000 deaths per year in the United States.¹ However, PSA screening at best seems to produce only a small reduction in prostate cancer mortality and has considerable downsides.² These downsides include an increase in the number of

prostate biopsies (which can be painful and have a risk of causing infection), overdiagnosis (ie, the detection of cancers that

See Invited Commentary at end of article

would never become clinically apparent or problematic), and increased treatment and treatment-related adverse effects (impotence and incontinence).³

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High-quality decision processes, including whether or not to be screened for prostate cancer, should inform patients and incorporate patient values.^{4,5} Decision aids are tools to help inform patients of their options related to preference-sensitive decisions, promote understanding of the benefits and downsides of these options, prompt consideration of one's personal values, and encourage shared decision making.⁵ Decision aids have been shown to improve patient knowledge, reduce uncertainty and decisional conflict, and promote a shared decision-making process for a range of conditions, including PSA screening.^{6,7}

Consensus recommendations for high-quality decision aid design include incorporating some method for eliciting and clarifying patient values and preferences.⁵ However, the best method for eliciting and incorporating patient values and preferences is not clear.^{8,9} Potential options for values elicitation include implicit techniques, in which patients receive information about different domains and are able to consider their potential value on their own (or with a prompt to "consider which factors are most important to you"), and several explicit techniques (eg, rating, ranking, and discrete choice methods), in which patients are asked specifically to compare the relative importance of several potentially relevant characteristics of a decision. Among decision psychologists, there remains considerable theoretical debate about the potential benefits and downsides of explicit techniques.¹⁰

Few previous studies have examined the effect of a decision aid with explicit values clarification compared with the same decision aid without explicit values clarification or compared different values clarification techniques against one another. A recent review¹¹ identified 13 comparative trials and could not reach a conclusion about the effects of values clarification because outcome measurement was inconsistent and results were mixed. One of these studies¹² examined PSA screening and found no effect of adding a time trade-off task on knowledge, decisional conflict, or testing preference. In a small, single-site trial, our group recently compared 2 different explicit techniques (discrete choice experiment [DCE] vs rating and ranking) for decision making about colorectal cancer screening and found some differences in participant-reported most important attribute but few other effects.¹³

To help better understand the effect of different values clarification methods (VCMs), we conducted a randomized trial comparing 1 implicit method (provision of a balance sheet) and 2 explicit methods (a rating and ranking task and a DCE) to determine whether they produce different effects on decision making about PSA screening.

METHODS

OVERVIEW

We performed a randomized trial among male members of an online survey panel in the United States and Australia who had indicated a willingness to complete surveys. Participants were asked to complete a baseline questionnaire, review basic information about the PSA decision, work through their as-

Table 1. Attributes and Levels for Prostate Cancer Screening

Attribute	Screening Levels	No Screening Level
Chance of being diagnosed with prostate cancer over 10 y	40 in 1000 60 in 1000 80 in 1000	40 in 1000
Chance of dying from prostate cancer over 10 y	2 in 1000 3 in 1000 4 in 1000	4 in 1000
Chance of having a prostate biopsy as a result of screening over 10 y	0 in 1000 240 in 1000 330 in 1000	0 in 1000
Chance of becoming impotent or incontinent as a result of screening over 10 y	0 in 1000 10 in 1000 20 in 1000	0 in 1000

Balance Sheet

Please examine the following table or "balance sheet." Consider each feature below. Please select the option that you prefer the most at the bottom of the table.

Feature of Choice	No Screening	PSA Screening
Chance of being diagnosed with prostate cancer over 10 y	40 in 1000	80 in 1000
Chance of dying from prostate cancer over 10 y	4 in 1000	3 in 1000
Chance of having a prostate biopsy as a result of screening over 10 y	0	240 in 1000
Chance of becoming impotent or incontinent as a result of screening over 10 y	0	20 in 1000
My Preference	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1. The balance sheet was based on modeling studies of outcomes related to prostate-specific antigen (PSA) screening.

signed values clarification task, and then complete a posttask questionnaire.

SELECTION OF ATTRIBUTES AND LEVELS

We described PSA screening decision options in terms of 4 key attributes: effect on prostate cancer mortality risk of biopsy, risk of being diagnosed with prostate cancer, and risk of becoming impotent or incontinent as a result of treatment. The attributes and the range of levels of the attributes included were based on the existing literature, including a review of recently reported randomized trials² and the previous work of our group¹⁴⁻¹⁶ (**Table 1**).

BALANCE SHEET TASK

The balance sheet was based on modeling studies¹⁴ of PSA-related outcomes and was informed by randomized trials and observational evidence as well as by previous research in this area¹⁶ (**Figure 1**).

RATING AND RANKING TASK

The rating and ranking task asked participants to rate (on a scale of 0, meaning not important at all, to 5, very important) and

Rating Task

For this RATING exercise, please think about the 4 features of prostate cancer screening **INDIVIDUALLY**. For questions 1-4 please rate each prostate cancer screening test feature on a scale of 0 to 5, where **0 is NOT AT ALL IMPORTANT** and **5 is VERY IMPORTANT**. You may only check one box per question.

	Not at All Important						Very Important
	0	1	2	3	4	5	
1. The chance of being diagnosed with prostate cancer over 10 y.	<input type="checkbox"/>						
2. The chance of dying from prostate cancer over 10 y.	<input type="checkbox"/>						
3. The chance of having to have a prostate biopsy as a result of screening over 10 y.	<input type="checkbox"/>						
4. The chance of becoming incontinent or impotent as a result of screening over 10 y.	<input type="checkbox"/>						

Ranking Task

Now we want to know, of the 4 features of prostate cancer screening, **what are the 3 most important features to you in order of importance?** The features are shown here with letters next to them.

A. The chance of being diagnosed with prostate cancer over 10 y.
 B. The chance of dying from prostate cancer over 10 y.
 C. The chance of having a prostate biopsy as a result of screening over 10 y.
 D. The chance of becoming incontinent or impotent as a result of screening over 10 y.

Please enter the letter for your first, second, and third most important feature choices in the boxes below.

1. First most important feature:

2. Second most important feature:

3. Third most important feature:

Figure 2. The rating and ranking task asked participants to rate and then rank the 3 most important screening test attributes.

then rank the 3 most important screening test attributes from sets of the key attributes (**Figure 2**).

DISCRETE CHOICE EXPERIMENT TASK

In DCEs (also known as choice-based conjoint analysis), respondents are asked to choose between hypothetical alternatives defined by a set of attributes.¹⁷⁻²⁰ The method is based on the idea that goods and services, including health care services, can be described in terms of a number of separate attributes or factors. The levels of attributes are varied systematically in a series of questions. Respondents choose the option that they prefer for each question. People are assumed to choose the option that is most preferred or that has the highest value or utility. From these choices, a mathematical function is estimated that describes numerically the value that respondents attach to different choice options. Our study followed the International Society for Pharmacoeconomics and Outcomes Research Guidelines for Good Research Practices for conjoint analysis in health.²⁰

For the DCE, we used Ngene (<http://www.choice-metrics.com>) to generate a statistically efficient choice design that minimized sample size.^{21,22} Our design required all participants in the DCE group to evaluate a set of 16 choice scenarios. A sample choice task is shown in **Figure 3**. Each task included an active screening option and a fixed “no screening” option.

PRETESTING

We used online panels maintained by an international research firm, Survey Sampling International, to recruit 60 men

Comparison 6

Feature	Which option do you prefer?	
	Option 1	Option 2
Chance of being diagnosed with prostate cancer over 10 y.	60 in 1000	40 in 1000
Chance of dying from prostate cancer over 10 y.	3 in 1000	4 in 1000
Chance of having a prostate biopsy as a result of screening over 10 y.	240 in 1000	0 in 1000
Chance of becoming impotent or incontinent as a result of screening over 10 y.	10 in 1000	0 in 1000
	Prefer option 1 <input type="checkbox"/>	Prefer option 2 <input type="checkbox"/>

Figure 3. A sample choice task. Each task included an active screening option and a fixed “no screening” option.

(30 in the United States and 30 in Australia) to pretest the surveys. Pilot data indicated that respondents were able to complete the values clarification tasks without difficulty. On the basis of information garnered from the pretest, we modified the survey language slightly and removed the “I prefer neither option” response. Parameter estimates from analysis of the discrete choice pilot data were used to inform the final efficient design of the discrete choice task for the main study.

PARTICIPANT ELIGIBILITY AND RECRUITMENT

We used the Survey Sampling International online panels to recruit a target of 900 men (450 in the United States and 450 in Australia). Participants had average risk (no personal or family history of prostate cancer) and were originally targeted to be 50 to 75 years old; however, because Survey Sampling International has few potential participants older than 70 years, the sample was instead drawn from men 50 to 70 years old. Testing history was assessed but not used to determine eligibility. Those with visual limitations or inability to understand English were excluded.

STUDY FLOW

The entire study was performed online. After eligibility was determined and consent obtained, participants received basic information about prostate cancer and PSA screening (eFigure [<http://www.jamainternalmed.com>]), completed basic demographic questions, and were then randomized by Survey Sampling International on a 1:1:1 basis, stratified by country, to an implicit VCM (a balance sheet of key test attributes), a rating and ranking task, or a DCE. Upon task completion, participants then answered the posttask questionnaire.

STUDY OUTCOMES

Our main outcome of interest was the participant-reported most important attribute (“Which ONE feature of prostate cancer screening is most important to you?” with responses chosen from the chance of being diagnosed, the chance of dying in the next 10 years, the chance of requiring a biopsy from screening, and the chance of becoming impotent or incontinent from treatment). We chose this outcome to determine whether the VCM itself influenced how participants valued key features of the decision. Key secondary outcomes included testing preference, based on a question that included 2 unlabeled options described in terms of the key decision attributes and designed

to mimic screening or no screening options (**Figure 4**)—we call this “unlabeled test preference”; the values clarity subscale of the Decisional Conflict Scale, which ranges from 0 to 100 with lower scores suggesting better clarity; and a single question about intent to be screened with PSA, based on a Likert scale (from strongly disagree to strongly agree, with agree and strongly agree considered positive intent to be screened and as their labeled preference). In addition, we report certain VCM task-specific outcomes.

STATISTICAL ANALYSIS

We performed initial descriptive analyses with means and proportions. We used χ^2 tests and analysis of variance for bivariate analyses across the 3 groups. Because of baseline demographic differences among the groups, we then performed multivariate analyses using logistic regression and adjusting for potential confounders, including age, race, educational level, income, and prior PSA testing. We also examined whether there was effect modification based on prior PSA screening or country. Because we identified no important effect modification, we present nonstratified results here. A separate article will examine differences in study outcomes for US vs Australian participants. We used a mixed multinomial logit (also known as a random parameters logit) model with a panel specification^{23,24} to assess differences in preference structure between respondents from the United States and Australia within the DCE arm (see the eAppendix for details).

ETHICAL CONSIDERATIONS

This study was approved by the University of North Carolina at Chapel Hill Institutional Review Board.

RESULTS

We screened 2336 individuals from October 12 to 27, 2011. Of these, 1300 were ineligible or declined participation and 1036 were randomized. Of these 1036, there were 911 (87.9%) who completed the full survey (**Figure 5**). The mean time to complete the survey was 8 minutes 46 seconds (range, 1:16–39:32 [minutes:seconds]) and differed between groups (balance sheet, 6:58; rating/ranking, 7:57; DCE, 11:24; $P < .001$). Participant characteristics are shown in **Table 2**. We noted potentially important differences across randomization groups in the proportion of white participants and the proportion reporting PSA testing within the past 12 months.

MAIN OUTCOMES

The 3 different VCMs produced differences in the participant-reported most important attribute from the single posttask questionnaire: those who received the rating and ranking task were more likely (54.4%) to report reducing the chance of death from prostate cancer as being most important compared with either the balance sheet (35.1%) or DCE (32.5%) groups (**Table 3**). Adjustment for potential confounders, including age, race, educational level, income, and prior PSA testing, did not affect the findings.

In terms of unlabeled test preference, those receiving the balance sheet were more likely (43.7%) to prefer the

1. Read the descriptions of 2 different prostate cancer screening options below.

Option 1:	Option 2:
<ul style="list-style-type: none"> • 40 out of 1000 men will be diagnosed with prostate cancer over 10 y • 4 out of 1000 men will die of prostate cancer over 10 y • There is no chance of having a biopsy as a result of screening over 10 y • There is no chance of developing impotence or incontinence from screening over 10 y 	<ul style="list-style-type: none"> • 80 out of 1000 men will be diagnosed with prostate cancer over 10 y • 3 out of 1000 men will die of prostate cancer over 10 y • 240 out of 1000 men will need a biopsy as a result of screening over 10 y • 20 out of 1000 men will develop impotence or incontinence from screening over 10 y

2. Which option above do you prefer?

I prefer option 1

I prefer option 2

Figure 4. Unlabeled test preference question.

PSA-like option (as opposed to the no screening option) compared with those who received rating and ranking (34.2%) or the DCE (20.2%) ($P < .001$). Again, findings were similar after adjustment for potential confounders. Those choosing the screening option were somewhat more likely (47.0%) to select mortality reduction as most important than those choosing the no screening option (37.7%); conversely, those choosing no screening were more likely (22.3%) to select the chance of developing impotence or incontinence as most important compared with those choosing screening (10.1%).

However, the proportion of participants who agreed or strongly agreed that they intended to have PSA testing when labeled as such was high and did not differ between groups (balance sheet, 77.1%; rating and ranking, 76.8%; and DCE, 73.5%; $P = .73$). The mean values clarity score was low (suggesting a high degree of clarity) and did not differ importantly between groups despite the difference being statistically significant (balance sheet, 22.5; rating and ranking, 19.0; and DCE, 20.3; $P = .03$).

METHOD-SPECIFIC OUTCOMES

Among the 302 participants randomized to the balance sheet, 65.6% chose the labeled PSA testing option. Agreement between test preference from the balance sheet and the unlabeled test preference question was low (eTable 1).

For the rating and ranking group ($n = 307$), the chance of being diagnosed with prostate cancer and the chance of dying of prostate cancer were each rated slightly higher in importance (3.8 for each) compared with the chance of needing a biopsy (3.5) or the chance of developing impotence or incontinence from screening (3.6). Just over half (52.8%) of the 302 participants in this group ranked the chance of dying of prostate cancer as most important. Agreement between the ranking task and the single question about the most important attribute from the posttask questionnaire was modest: 71 of 307 participants (23%) chose different attributes as being most important on the single question compared with their ranking (eTable 2).

For the 302 participants randomized to the DCE, the mean part-worth utilities are shown in eTable 3. All attributes performed in the direction expected: more value was

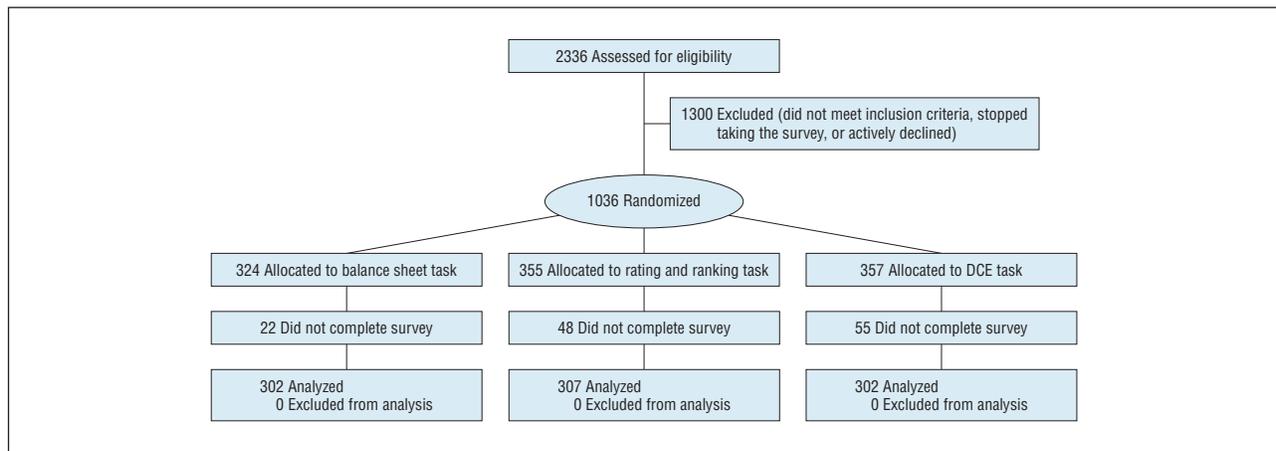


Figure 5. Study flowchart. DCE indicates discrete choice experiment.

Table 2. Characteristics of Participants Overall and by Group^a

Variable	Overall (N = 911)	Balance Sheet (n = 302)	Rating and Ranking (n = 307)	DCE (n = 302)	P Value
Age, mean (SD), y	59.8 (5.6)	59.8 (5.6)	59.9 (5.7)	59.6 (5.5)	.77
Country					
United States	50.1	49.7	50.8	49.7	.95
Australia	49.9	50.3	49.2	50.3	
White race	88.0	90.4	91.9	81.8	<.001
Educational level					
Less than high school graduate	7.3	8.3	6.8	6.6	.82
High school graduate or some college	56.3	56.9	58.3	53.7	
College graduate	36.4	34.8	34.9	39.7	
Annual income, \$					
<30 000	24.0	21.9	27.4	24.0	.95
30 000-59 999	30.4	33.8	28.3	29.1	
≥60 000	45.6	44.3	44.3	46.9	
Employment					
Employed	36.4	37.4	36.8	35.1	.58
Retired	39.3	39.4	38.8	39.7	
Other	24.3	23.2	24.4	25.2	
PSA testing					
Within past year	42.0	47.0	39.7	39.4	.06
>1 y ago	20.9	19.9	21.5	21.2	
Never/do not know	37.1	33.1	38.8	39.4	

Abbreviations: DCE, discrete choice experiment; PSA, prostate-specific antigen.

^aData are given as percentages unless otherwise indicated.

attached to a lower chance of dying of prostate cancer, a lower risk of being diagnosed, and a lower chance of impotence or incontinence compared with higher levels. There were no significant differences in utility based on the chance of needing a biopsy. The attribute most likely to be chosen as the most important one on the basis of the DCE-derived importance scores was the chance of dying of prostate cancer (chosen by 53.5% of participants).

COMMENT

Different VCMs produced different patterns of attribute importance and different preferences for PSA testing when participants were presented with unlabeled testing options designed to correspond to the PSA test and the option of not being screened. Those receiving the rating and

ranking task were more likely to select a reduction in prostate cancer mortality as being most important compared with those assigned to the balance sheet or DCE; those receiving the balance sheet were more likely to select the unlabeled option that corresponded with the PSA test than were those assigned to rating and ranking or the DCE. Those assigned to the DCE were somewhat less likely to select a reduction of mortality as being most important and were least likely to select the PSA-like option on the unlabeled preference question. These findings are consistent with the theory that DCE encourages people to more fully consider all attributes and not to rely on simple heuristics.²⁵

However, there was high intent to be screened and no difference between groups when asked directly with a labeled question. Among those in the balance sheet group, there were moderately large differences in the proportion

Table 3. Proportion of Respondents Designating Specific Attributes as Most Important (Single Question) by Values Clarification Task^a

Attribute	%		
	Balance Sheet (n = 302)	Rating and Ranking (n = 307)	DCE (n = 302)
Chance of being diagnosed with prostate cancer	35.8	22.5	31.3
Chance of dying of prostate cancer	35.1	54.4	32.5
Chance of requiring a biopsy as a result of screening	10.9	8.8	13.9
Chance of developing impotence or incontinence as a result of screening	18.2	14.3	22.5

Abbreviation: DCE, discrete choice experiment.

^aPearson $\chi^2 = 39.99$ ($P < .001$).

selecting PSA screening when it was presented as a labeled vs an unlabeled choice. The mean values clarity subscale was low across all 3 groups, suggesting that most users were clear about their values after completing their task.

These findings have several implications. First, they suggest that the VCM chosen affects how participants report their values (in terms of the most important attribute) in this sample of online panel members making hypothetical choices. The DCE may have led to more deliberation and hence less monolithic results for attribute importance; conversely, the rating and ranking may have focused respondents more on the most “accessible” attribute: mortality reduction. The present study cannot determine which technique is “better” or a more accurate reflection of each man’s true values; additional larger studies should be performed that examine men making actual screening decisions, account for other factors affecting decisions, and include longitudinal follow-up to allow measurement of more distal outcomes, such as appropriate test use (test was received by those who prefer it and not received by those who choose against it), decision satisfaction, and decisional regret.

Second, this study shows the potentially large effect of labeling on decision making. The proportion of men in the balance sheet arm who chose labeled PSA testing on the balance sheet (65.6%) was higher than the proportion choosing the unlabeled but otherwise identical PSA-like option immediately afterward (43.7%). Labeling may affect preferences by different mechanisms: it can allow decision makers to value important aspects of the decision that are not reflected in the attributes we used to describe the tests—this could be a desirable effect. However, labeling may also allow decision makers to simply choose the familiar option, which can help resolve cognitive dissonance but may not reflect one’s underlying values.²⁶ More studies, including qualitative work, are needed to discern the causes of this labeling effect.

Our study adds to the limited body of research examining the effects of explicit VCMs vs no values clarification, implicit methods, or other explicit methods.¹¹ Other studies have found inconsistent effects of values clarification, including 1 study in PSA screening.¹²

The US Preventive Services Task Force recently revised its PSA screening recommendation for middle-aged men, changing to a “D” recommendation (against routine screening).²⁷ Although it is clear that PSA screening has important downsides, the possibility of a rare benefit in terms of prostate cancer mortality reduction and the preference patterns noted in our survey may warrant a shared decision-making process.

More studies, conducted in a range of different conditions and using a range of different methods, are required to better determine the best approach (if any) to values clarification. Decision aids with explicit clarification techniques should be compared with decision aids with no or only implicit values clarification to best understand their effects on decision-making processes and actual decisions. Because decision aids can be difficult to implement, especially for common decisions such as PSA screening, decision aid developers should include VCMs only if they improve the decision-making process in some meaningful way.

Our study, although helpful in building the evidence base in this area, has a few key limitations that must be considered. First, we used a hypothetical scenario; whether the effects we observed would differ in men making the screening decision is unknown. To mitigate this concern, we enrolled only men of screening age and asked them to answer as if they were deciding. Second, we cannot directly determine, on an individual level, whether a good decision-making process was followed or whether a good decision was made; larger studies with more distal outcomes are required. Third, we did not conduct our trial within a full PSA screening decision aid; however, the information that we provided to participants contained the key elements for a decision aid (definition of the decision, pros and cons of the options, and encouragement to consider one’s values).⁵ Future studies should compare different VCMs embedded within a full decision aid. Fourth, participants in this study were drawn from an online panel and may not be completely representative of the population of US and Australian men in this age group. Fifth, randomization produced some differences in baseline characteristics between VCM groups. We adjusted for these differences and did not see effects on our results. Finally, we did not measure whether our participants were informed and engaged when they provided their answers.

In conclusion, different VCMs affected how men valued different aspects of the decision to undergo PSA screening and also influenced unlabeled test choice. The intent to be screened with PSA was higher than the preference for PSA when assessed via an unlabeled question, suggesting a strong effect of the label itself. Further studies with more distal outcome measures are needed to determine the best method of values clarification, if any, for decisions such as whether to undergo screening with PSA.

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