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a cross-sectional survey of adult men in Denmark**

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Published in:
BMJ Open

DOI:
10.1136/bmjopen-2023-076257

Publication date:
2024

Document version:
Final published version

Document license:
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Citation for pulished version (APA):

Birkeland, S., Bismark, M., Barry, M. J., & Möller, S. (2024). Associations between knowledge of health issues and health care satisfaction and propensity to complain: a cross-sectional survey of adult men in Denmark. *BMJ Open*, 14(5), Article e076257. <https://doi.org/10.1136/bmjopen-2023-076257>

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BMJ Open Associations between knowledge of health issues and health care satisfaction and propensity to complain: a cross-sectional survey of adult men in Denmark

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To cite: Birkeland S, Bismark M, Barry MJ, *et al.* Associations between knowledge of health issues and health care satisfaction and propensity to complain: a cross-sectional survey of adult men in Denmark. *BMJ Open* 2024;**14**:e076257. doi:10.1136/bmjopen-2023-076257

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<https://doi.org/10.1136/bmjopen-2023-076257>).

Received 01 June 2023
Accepted 21 April 2024



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ABSTRACT

Objectives The objective of this study was to investigate associations between knowledge of health issues and healthcare satisfaction and propensity to complain including the association between knowledge and greater patient involvement.

Design The present study is a secondary analysis of a larger cross-sectional case vignette survey.

Setting Survey conducted in adult Danish men.

Participants Participants included 6755 men aged 45–70 years.

Interventions Participants responded to a survey with scenarios illustrating prostate-specific antigen (PSA) testing and different information provision.

Primary and secondary outcome measures Using Likert scales (scored 1–5), participants rated their satisfaction with the care described and their inclination to complain and responded to a short quiz (scored 0–3) assessing their knowledge about the PSA test.

Results Satisfaction with healthcare increased with better quiz performance (Likert difference 0.13 (95% CI 0.07 to 0.20), $p < 0.001$, totally correct vs totally incorrect responders) and correspondingly, the desire to complain significantly decreased (Likert difference -0.34 (95% CI 0.40 to -0.27), $p < 0.001$). Respondents with higher education performed better (mean quiz score difference 0.59 (95% CI 0.50 to 0.67), $p < 0.001$, most educated vs least educated). Responders who received information about the PSA test generally performed better (quiz score difference 0.41 (95% CI 0.35 to 0.47), $p < 0.001$, neutral vs no information). Overestimation of PSA merits was more common than underestimation (7.9% vs 3.8%).

Conclusions Mens' knowledge of the benefits of screening varies with education, predicts satisfaction with care and the desire to complain, and may be improved through greater involvement in decision-making.

INTRODUCTION

Does a patient's healthcare knowledge influence satisfaction with care and inclination to complain? Are misconceptions of healthcare interventions related to illiteracy and less formal education? And can

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Strengths of this study include the large sample size ($n=6755$) and the ability to control for multiple sociodemographic factors.
- ⇒ Due to the focus on prostate cancer, women were not included.
- ⇒ The study was conducted in one country with uncertain generalisability; however, findings regarding knowledge deficits and overestimation of screening benefits were consistent with studies conducted in other countries.
- ⇒ While comparisons suggest that our sample was reasonably representative of the sociodemographic characteristics of adult men, the possibility of residual bias cannot be ruled out.

knowledge deficits be remediated through provision of information by clinicians? Although important for both patients and clinicians, the answer to these questions despite preconceptions currently are largely unknown. From the patient's perspective, an accurate understanding of different healthcare options is central to exercising autonomy^{1 2} and choosing among options.³ If patients lack information or hold misconceptions regarding the risks and benefits of different options, healthcare decisions may misalign with their values and preferences.^{1 4 5} From the clinician's perspective, misunderstandings of care may be more likely if the patient has inadequate or inaccurate information. In turn, these misunderstandings could increase the risk of complaints or malpractice litigation. However, there is virtually no evidence suggesting this to be the case.

It was previously shown that healthcare users' satisfaction with different courses of care, described in hypothetical scenarios, increased with scenarios demonstrating greater patient involvement and

information.⁵ Correspondingly, the urge to complain about healthcare decreases.⁶ Specifically, some clinical studies have demonstrated patient involvement in terms of exposure to shared decision-making (SDM) to have higher satisfaction with the decision-making process.^{7,8} Additionally, more educated healthcare users have been shown to express a lower inclination to complain about scenarios in which there was no clear malpractice.⁹ Taken together, these findings suggest that satisfaction with care, and propensity to complain, may be influenced by healthcare users' knowledge about their health condition and treatment options.

In this study, we used hypothetical healthcare scenarios about screening for prostate cancer with the prostate-specific antigen (PSA) test to explore the association between participants' factual knowledge about a specific health issue, healthcare satisfaction and inclination to complain. Furthermore, we sought to investigate whether knowledge was associated with mode of information provision about the healthcare intervention in question. We also sought to investigate whether more educated patients were more accurate in their assessments of the benefits of a screening intervention.

METHODS

Study design

The present study is a secondary analysis of a larger cross-sectional vignette survey.¹⁰

Study setting

Survey vignettes described various approaches to care, and different outcomes, relating to PSA screening for prostate

cancer.¹⁰ PSA screening is controversial with some studies suggesting that, at a population level, the harms may outweigh the benefits.¹¹ The test sometimes misses prostate cancer, providing patients with false reassurance. At the same time, the test detects many non-threatening and clinically insignificant prostate cancers.¹² As a result, there is a high risk of overdiagnosis and unnecessary treatment with associated adverse effects like urinary incontinence and sexual dysfunction.

For the survey, the age span 45–70 years was chosen, reflecting consideration of the American Urological Association and US Preventive Services Task Force (USPSTF) and European recommendations.^{13,14} USPSTF guidelines recommend SDM when deciding about having a PSA test.¹³ In SDM, patients and healthcare providers communicate about the intervention at hand using the best available evidence while considering patients' individual preferences.¹ Clinical situation-specific 'Decision Aids' can assist with the communication of information about an intervention's risk and benefit and help identify patient preferences.¹ Despite guidelines supporting SDM, decision-making in real life reflects different approaches to patient involvement, ranging from no involvement at all through to high levels of patient involvement consistent with SDM.

We allocated participants randomly into 1 of 30 scenarios which illustrated different levels of patient involvement in the decision about having a PSA test for screening (5 scenarios: no involvement, information biased against test, neutral information, biased information in favour of test and SDM with decision aid), different decisions made (to have a PSA or not) and different patient outcomes

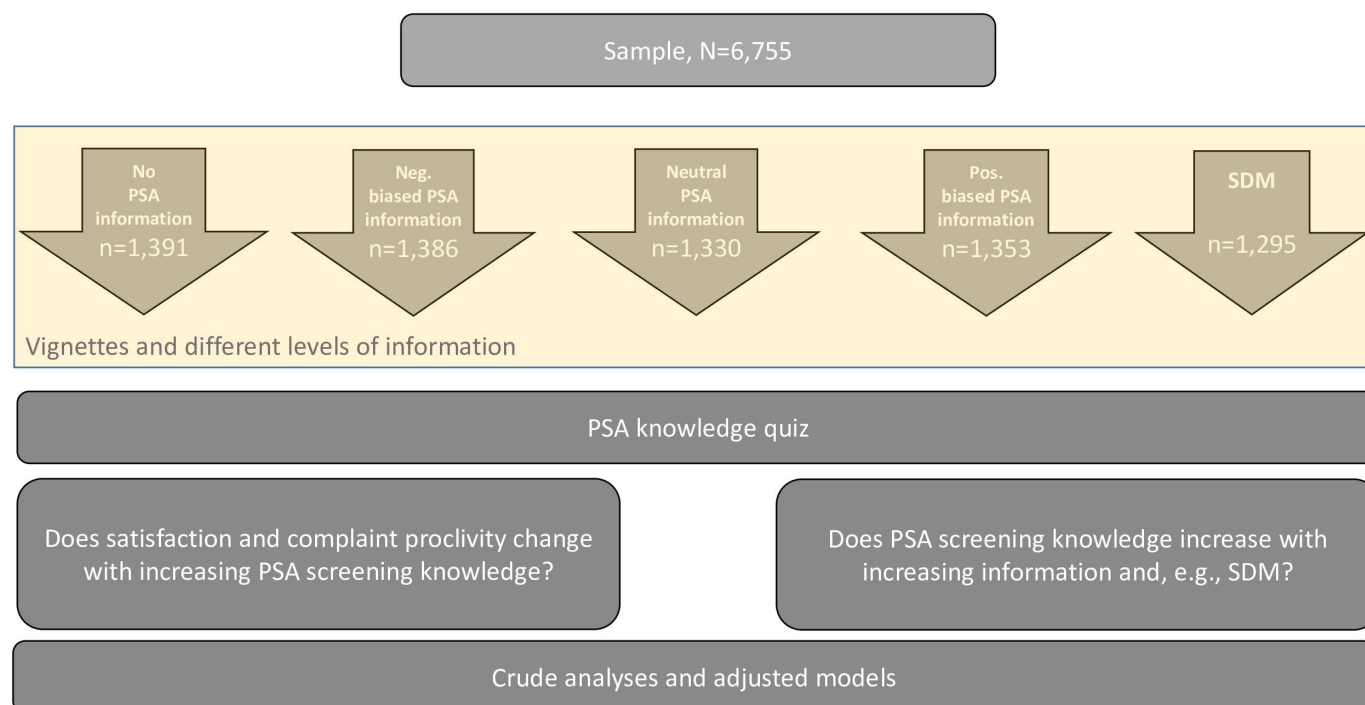


Figure 1 Flow chart illustrating inclusion of survey participants. PSA, prostate-specific antigen.

(no prostate cancer, treatable prostate cancer and eventually fatal prostate cancer) (see [figure 1](#)). Some scenarios described poor patient communication or a poor clinical outcome, but there was no indication of clinical negligence. Scenarios are described in detail elsewhere and an English version copy of the questionnaire can be found in the online supplemental material.⁶

We assessed participants' knowledge about the PSA test using a standardised 3-item quiz (from Decision Aid 'Should I have a PSA test?' originally developed by Healthwise).^{6,15} This quiz includes the following questions all with response options 'Yes', 'No', and 'I'm not sure': 'Does a high PSA test result always mean you have prostate cancer?' (right answer is 'No'); 'Can a PSA test find cancers that may never cause a problem?' (right answer is 'Yes'); and 'Is there a chance that a PSA test could save your life?' (right answer is 'Yes'). Respondents' level of knowledge was classified according to proportion of correct responses (none out of 3, 1 out of 3, 2 out of 3, and 3 out of 3). Participants were also asked about their sociodemographic characteristics including marital status, highest completed education, affiliation to the labour market, chronic illness (cardiovascular, diabetes, chronic obstructive pulmonary disease, cerebrovascular disease, cancer or other), and about their experience with the healthcare issue illustrated in the vignette ('Have you ever had your prostate gland examined?'; 'Has anyone in your family (eg, father, brother, uncle, or son) ever been treated for prostate cancer?'; 'Has anyone in your family (eg, father, brother, uncle, or son) died from prostate cancer?'). Furthermore, we drew data from the Danish municipalities' statistics database (www.noegletal.dk) about some sociodemographic characteristics of respondents' place of living. Data include statistics about municipality-level population density, tax-per-citizen, proportion of citizens with a higher education and proportion of citizens with non-Western origin.^{16,17} Furthermore, in order to study predictors for misconception of screening merits, we analysed response patterns considered indicative of an (unrealistic) positive attitude towards PSA testing ('yes', 'no', 'yes' pattern in the quiz; see above) and patterns considered indicative of an (unrealistic) negative attitude (responses 'no', 'yes', 'no').

Sampling and recruitment

We estimated the sample required to detect a medium-size change in the main study's major outcome measure (likelihood of a complaint). Power calculations showed that 100 participants per group were needed to obtain 0.90 power to detect a 0.45 Likert score difference (roughly half way from, eg, 'complaint unlikely' to 'complaint somewhat likely') with a hypothesised SD of 1, an α level of 0.05 and a bidirectional, two-sample homoscedastic t-test.^{18,19} We included an additional 300 participants in each of the 30 groups to compensate for non-responders (based on an expected response rate of 25% in online surveys of this kind with only one reminder).^{20,21} We thereby planned to survey a total of 12 000 potential

participants.³ To address the risk of skewed response rates among groups, we obtained permission to launch up to 3 waves of 12 000 invitations. The flow of participants through the study is illustrated in [figure 1](#). The first wave of invitations to 12 000 potential participants in the target group of men aged 45–70 years randomly drawn from the Danish National health registries was delivered through the Danish authorities' digital mail box 24 January 2019 with 1 reminder after 14 days. The second wave was launched 7 March 2019 with a reminder following 14 days. For various reasons (eg, citizens having no digital mailbox), some invitations could not be delivered. Resultantly, 22 288 participants were successfully invited with 6755 participants completing the web-based REDCap survey (response rate of 30%).^{22,23}

In previous studies, we reported analyses of the respondents' representativeness of our target population comparing respondents to non-respondents using Danish and international data and found our sample to be reasonably representative of men aged 45–70 years in regard to sociodemographic characteristics, however with response rates being statistically significantly higher in older men, in rural area and in areas with a lower tax base.²²

Data analyses

Assuming they had received the healthcare described in vignette scenarios, participants rated their satisfaction using a Likert scale ranking from 1 (very dissatisfied) to 5 (very satisfied) and their wish to complain ranked from 1 (very unlikely) to 5 (very likely). Items used for rating satisfaction were modified from previously validated instruments: The Patient Satisfaction Questionnaire²⁴ and the Consumer Complaint Intentions and Behavior questionnaire.^{25,26} Regarding the wish to complain, danish healthcare users can, at no cost, lodge a complaint through two medicolegal paths: one that may lead to monetary compensation through a patient injury compensation organisation, and the other to non-monetary forms of disciplinary accountability through a state medical board. The latter may issue a reprimand and in some instances initiate criminal prosecution and withdrawal of the licence to practice. Patients can choose one, or both, depending on the remedy sought. Participants therefore responded to two items: 'How likely is it that you would claim compensation?' and 'How likely is it that you would complain about the doctor's care?'. We calculated a simple average between the two items to provide an overall patient complaint likelihood measure.

Comparisons were conducted between groups with linear regression on the absolute score scales (1–5 for satisfaction/complaints and 0–3 for knowledge) and CIs, and p values were computed by bootstrapping with 1000 repetitions thereby compensating for residual non-normality. We conducted crude analyses only adjusted for the 30 vignette groups and age group and also tested a model adjusted for education, employment and chronic

**Table 1** Associations between knowledge and satisfaction with healthcare and complaint likelihood*

Outcome	Knowledge quiz	Crude coefficient (95% CI)†	P value	Adjusted coefficient (95% CI)	P value
Satisfaction	All answers incorrect	0 (Reference)		0 (Reference)	
	One correct answer	0.05 (−0.02 to 0.13)	0.170	0.06 (−0.02 to 0.13)	0.136
	Two correct answers	0.06 (−0.01 to 0.12)	0.075	0.08 (0.01 to 0.14)	0.021
	All answers correct	0.12 (0.06 to 0.18)	<0.001	0.14 (0.08 to 0.20)	<0.001
Complaint combined ‡	All answers incorrect	0 (Reference)		0 (Reference)	
	One correct answer	−0.08 (−0.17 to −0.00)	0.048	−0.07 (−0.15 to 0.01)	0.083
	Two correct answers	−0.26 (−0.33 to −0.19)	<0.001	−0.22 (−0.29 to −0.15)	<0.001
	All answers correct	−0.40 (−0.47 to −0.33)	<0.001	−0.34 (−0.41 to −0.27)	<0.001
Disciplinary complaint	All answers incorrect	0 (Reference)		0 (Reference)	
	One correct answer	−0.07 (−0.16 to 0.01)	0.094	−0.06 (−0.15 to 0.02)	0.131
	Two correct answers	−0.26 (−0.32 to −0.19)	<0.001	−0.23 (−0.29 to −0.16)	<0.001
	All answers correct	−0.40 (−0.46 to −0.33)	<0.001	−0.34 (−0.41 to −0.28)	<0.001
Compensation claim	All answers incorrect	0 (Reference)		0 (Reference)	
	One correct answer	−0.10 (−0.19 to −0.00)	0.045	−0.08 (−0.17 to 0.01)	0.086
	Two correct answers	−0.26 (−0.34 to −0.18)	<0.001	−0.22 (−0.29 to −0.14)	<0.001
	All answers correct	−0.41 (−0.49 to −0.33)	<0.001	−0.34 (−0.41 to −0.26)	<0.001

*Fully adjusted model (adjusted for everything in the table as well as 30 randomisation groups; see analyses of individual quiz items in online supplemental table 1).

†Crude only adjusted for 30 vignette groups and age group. Adjusted model adjusted for education, work, chronic disease and experience with prostate cancer as well. Positive coefficient means higher satisfaction resp. complaint proclivity.

‡Combination of respondent statements regarding the likelihood that respondent would file a complaint with the disciplinary board resp. claim compensation (see text)

disease. A p value of 0.05 was considered statistically significant.

Patient and public involvement

The survey was developed with public and patient involvement.¹⁰ We recruited a larger group of men representing the survey's target population helping develop case vignette versions and questionnaire items by providing feedback on structure, comprehension, response patterns and time required to complete the survey. Afterwards, we engaged a smaller panel of patients with prostate cancer experience assisting development through a separate review-and-feedback process.¹⁰

RESULTS

The average age of respondents was 59.1 years (SD 7.3 years). Most respondents were employed (66%) and married (79%). In 13% of respondents, primary school was the highest education reached, 5% had completed high school, 31% had a vocational education and 52% had received a higher education. Fewer than two-fifths of respondents (38.9%, n=2627) answered all three quiz questions correctly while 28.8% (n=1946) answered 2 questions correctly, 13.6% (n=920) 1 question and 18.7% (n=1262) none of the questions. **Table 1** shows the association between knowledge about the PSA test and satisfaction and complaint likelihood, respectively.

As shown in **table 1**, with higher knowledge about the PSA test, respondents' satisfaction with healthcare increased and correspondingly, the propensity to complain decreased. Respondents with personal experience with prostate cancer displayed higher knowledge (mean knowledge score increase=0.21 (on the 0–3 knowledge scale), 95 % CI 0.16 to 0.25, <0.001; not shown in table). We also found a significant association between respondents' evaluation of the information provision in the vignette and their knowledge (increase in mean evaluation of information=0.17, 95 % CI 0.11 to 0.23, <0.001; when comparing responders with totally incorrect and totally correct responses, not shown in table).

Table 2 shows the association between respondents' knowledge according to the quiz and respondents' mode of involvement and level of education, respectively.

As shown in **table 2**, participants who were offered vignettes with information about the PSA test performed substantially better in the knowledge quiz than those receiving no information (roughly one more correct response per participant on average), with those receiving standard information with or without the doctor's recommendation (the three middle groups) doing slightly better than respondents subjected to SDM with decision support. Age, municipality-level data on population density, taxable income per citizen, proportion of citizens aged 25–64 years with higher education and proportion

Table 2 Associations between the level of involvement, respectively, respondents' level of education and respondents' knowledge according to three-item quiz

Respondent characteristic		Mean difference in correct answer on 3-item PSA knowledge quiz (95% CI)*	P value
Mode of patient involvement	No involvement	0 (Reference)	
	Negative-biased involvement	1.28 (1.20 to 1.35)	<0.001
	Neutral involvement	1.29 (1.21 to 1.37)	<0.001
	Positive-biased involvement	1.32 (1.24 to 1.39)	<0.001
	Shared decision-making	1.09 (1.01 to 1.17)	<0.001
Highest level of education reached -Overall analysis	Primary school	0 (Reference)	
	High school	0.44 (0.31 to 0.56)	<0.001
	Vocational	0.25 (0.17 to 0.34)	<0.001
	Up to 3 years higher education	0.47 (0.37 to 0.57)	<0.001
	3 to 4 years higher education	0.52 (0.44 to 0.60)	<0.001
	More than 4 years higher education	0.59 (0.50 to 0.67)	<0.001
Highest level of education reached -Analysis in vignette groups with no PSA test information (~ background respondent knowledge)	Primary school	0 (Reference)	
	High school	0.48 (0.18 to 0.78)	0.002
	Vocational	0.15 (-0.02 to 0.32)	0.090
	Up to 3 years higher education	0.32 (0.10 to 0.54)	0.005
	3 to 4 years higher education	0.38 (0.19 to 0.56)	<0.001
	More than 4 years higher education	0.50 (0.31 to 0.69)	<0.001

*Adjusted for PSA decision, vignette outcome and age. PSA, prostate-specific antigen.

of non-western immigrants were not statistically significantly associated with respondents' quiz performance (not shown in table).

Participants with lower levels of education generally performed less well on the knowledge quiz than those with higher education (adjusted for the 30 vignette groups and age; table 2). Most vignettes included some information about the PSA test. When analyses were restricted to participants who received *no* PSA test information in their vignette, it appeared that some of the better quiz performance among higher educated participants resulted from better absorption of information presented in their case vignette. However, even among participants receiving no PSA test information, those with higher education performed better (0.50 quiz score increase, 95% CI 0.31 to 0.69, $p < 0.001$).

When analysing respondents' assessment of the information provision itself, we found a statistically significantly better evaluation of information provision in groups receiving information (eg, 0.41 Likert increase with neutral information compared with no information, 95% CI 0.35 to 0.47, $p < 0.001$; not shown in table). The most educated were the most critical regarding information provision in scenarios illustrating no patient information (0.24 Likert decrease in assessment of information provision in the most educated compared with the least educated, 95% CI -0.40 to -0.08; $p = 0.004$).

In subanalyses of predictors for misconceptions of screening merits, 7.9% ($n = 531$) of respondents displayed

a response pattern suggesting an overestimation of the merits of the PSA test and only 3.8% ($n = 253$) of respondents displayed a response pattern suggesting an underestimation. As shown in table 3, the tendency to overestimate PSA test merits increased in respondents with less education with a clear gradient across the different levels of education.

It also appears from table 3 that respondents' prior experience with prostate disease did not seem to influence the proclivity for overestimating the merits of the PSA test.

DISCUSSION

In a large national survey, which used case vignettes to explore decision-making around PSA testing, we found that respondents who performed better on a knowledge quiz reported higher satisfaction with care and less inclination to complain. Better quiz performance was associated with higher education, personal experience of prostate cancer and especially provision of information as part of the decision-making process. Respondents were more likely to overestimate, rather than underestimate, the merits of PSA screening and this tendency increased with less education.

We recently demonstrated the higher educated are less inclined to initiate malpractice complaints²⁷ even though previous medicolegal research has indicated citizens with higher education to be over-represented in complaint

**Table 3** Associations between sociodemographic characteristics and overestimation of PSA test benefits

Respondent characteristics		OR for overestimation (95% CI)	P value
Overall			
Marital status	Living together	1 (Reference)	
	Partner, not living together	1.13 (0.75 to 1.70)	0.568
	Single	1.18 (0.93 to 1.50)	0.183
Education	Primary school	1 (Reference)	
	High school	0.61 (0.38 to 0.97)	0.037
	Vocational	0.72 (0.55 to 0.93)	0.013
	Up to 3 years higher education	0.63 (0.45 to 0.88)	0.007
	3–4 years higher education	0.49 (0.36 to 0.67)	<0.001
	More than 4 years higher education	0.48 (0.34 to 0.67)	<0.001
	Affiliation with labour market	Student	0.95 (0.11 to 7.90)
	Unemployed	1.19 (0.73 to 1.95)	0.477
	Working	0.86 (0.65 to 1.13)	0.276
	Retired	1 (Reference)	
Chronic disease	No	1 (Reference)	
	Yes	1.07 (0.88 to 1.29)	0.497
Experience of prostate cancer	No	1 (Reference)	
	Yes	0.93 (0.76 to 1.13)	0.439
Municipality-level measures			
Population density (citizens/km ²)	First (lowest) quartile		
	Second quartile	1.19 (0.88 to 1.61)	0.256
	Third quartile	1.45 (0.99 to 2.12)	0.055
	Fourth (highest) quartile	1.41 (0.85 to 2.36)	0.185
Taxable income per citizen	First (lowest) quartile	1 (Reference)	
	Second quartile	0.88 (0.66 to 1.18)	0.402
	Third quartile	0.78 (0.56 to 1.08)	0.138
	Fourth (highest) quartile	0.74 (0.51 to 1.07)	0.108
Proportion citizens aged 25–64 years with higher education	First (lowest) quartile	1 (Reference)	
	Second quartile	0.89 (0.68 to 1.18)	0.434
	Third quartile	0.68 (0.48 to 0.95)	0.023
	Fourth (highest) quartile	0.84 (0.57 to 1.23)	0.362
Proportion of non-western immigrants	First (lowest) quartile	1 (Reference)	
	Second quartile	0.89 (0.68 to 1.16)	0.384
	Third quartile	0.91 (0.65 to 1.27)	0.575
	Fourth (highest) quartile	1.13 (0.80 to 1.60)	0.489

PSA, prostate-specific antigen.

statistics.^{28–30} Additionally, when studying interactions between educational background and patient involvement in regard to respondents' wish to complain about healthcare, we found the 'preventive' effect of greater patient involvement on the wish to complain to be smaller in respondents with lower education²⁷ perhaps indicating the challenges with ensuring suitable means of involvement in healthcare users with varied educational backgrounds.³¹

Healthcare users may not necessarily be able to accurately assess how well informed they are and sometimes may overestimate their actual understanding of the decision in question.³² In this regard, our study suggests that the most educated are most critical of receiving no information. Hladkovicz *et al* among others hypothesised that, in addition to contributing to a poor healthcare experience, inadequate information and knowledge may lead to medicolegal complaints. In their evaluation of a

preoperative personalised risk communication tool, they found that a patient-facing, personalised risk communication app improved knowledge of personalised risk and also increased satisfaction for adults before elective inpatient surgery.³³ To our knowledge, our web survey is the first study to empirically investigate the association between healthcare users' knowledge and their proclivity to complain. We found that better informed respondents were more satisfied with care and less inclined to complain. These findings support previous results suggesting a beneficial effect of patient involvement on healthcare user satisfaction.^{5 6}

Fewer than two-fifths of men correctly answered all three questions in the knowledge quiz about PSA screening. This is consistent with previous research showing only 'moderate knowledge' about PSA screening among men in community samples.^{34–36} We identified a positive correlation between healthcare users' actual knowledge according to the quiz and their evaluation of the quality of information provided. In other words, knowledge and satisfaction with information provision seem related. Moreover, in agreement with our study findings, Watson *et al* previously found a decision aid considerably increased men's knowledge of the benefits and risks of the PSA test.³⁷ Watson *et al* used a much more nuanced 12-item measure of knowledge covering aspects deemed central to the decision about having a PSA test and found the median score in the control group was 3.0 (range 0–12) while the median score in the group who received the decision aid was 9.0 ($p < 0.0001$).

Regarding misconceptions of PSA screening merits, we found that respondents were more likely to over—rather than underestimate—the benefits of the PSA test. This finding held true for respondents with and without personal experience with prostate cancer. Gigerenzer *et al* previously found citizens in nine European countries systematically overestimated the benefits of PSA screening.³⁸ Similar findings have been reported by Smith and Birtwhistle,³⁹ Howard *et al*,⁴⁰ Morlando *et al*³⁵ and Morrison *et al*.³⁶ Our study adds nuance by showing that healthcare users with lower levels of education are more likely to overestimate the merits of population-based screening. This finding is consistent with previous research indicating that those with greater knowledge are more likely to lean away from screening.³ In the latter study, a decision aid was found to reduce men's interest in PSA screening. On the whole, providing patients with accurate and relevant information about medical procedures may help to align patient expectations with facts and thereby improve satisfaction and prevent misunderstandings.

Limitations

Our study has many limitations. First, due to the focus on prostate cancer, women were not included.

In addition, even if similarly low response rates are not uncommon for web-based surveys,⁴¹ our survey yielded a response rate of no more than 30%. This could partially

reflect the fact that surveys targeting more general topics (in this case: 'patient involvement') in the general population (in this case: adult men) usually yield substantially lower response rates than does, for example, a survey focusing on prostate cancer itself conducted only among patients diagnosed with prostate cancer.⁴² The question can be raised as to the representativeness of responders. As mentioned in the Methods section, we conducted analyses comparing responders to non-responders using national statistics data and those analyses suggested that our sample was reasonably representative of the sociodemographic characteristics of adult men.²² Still, the possibility of residual bias cannot be ruled out and therefore must be borne in mind when interpreting study findings.

Furthermore, any conclusions that assume a causal relationship between the phenomena under study should be made with caution bearing in mind the limitations of cross-sectional, observational data. Moreover, our study was conducted in one country with uncertain generalisability to other countries. However, findings regarding knowledge deficits and overestimation of screening benefits were consistent with studies conducted in other countries.

In addition, knowledge was measured using a simple three-question quiz covering the most basic knowledge conveyed in our study's 'neutral' and 'biased' information subgroups, rather than more complex assessments used by other authors that could have better detected knowledge deficits. For example, Watson *et al* in an investigation focusing on men's knowledge and attitude towards PSA testing used a 12-item measure related to 6 domains of knowledge including the PSA test's efficacy and accuracy, prostate cancer's natural history and epidemiology, the prostate biopsy, PSA screening controversies and the efficacy of treatments for prostate cancer.³⁷ In their study, men's attitude was separately measured using a 22-item scale. Because in our study, the measurement of participants' knowledge and attitude towards the PSA test was only part of a larger survey, we found it feasible to apply the more simple measure commonly used in clinical practice (from a decision aid). Specifically, regarding healthcare users' attitude towards the PSA test, there are various more comprehensive ways of measuring this.⁴³ As this study was part of a larger survey, we needed to balance the inclusion of feasible measurement tools with keeping a reasonable survey length.

There are many standardised tools and questionnaires to measure satisfaction with receiving medical procedures or medical screening and likewise, medical satisfaction encompasses various domains. In terms of decision-making, it encompasses satisfaction with the delivery of information, autonomy, correctness, reliability of information and other domains that could have been also measured. Again, however, we needed to balance measurement tools with a reasonable amount of items in the survey. We therefore chose a simple measure of healthcare satisfaction modified from previously validated instruments. Moreover, participants rated their



satisfaction using a Likert scale, ranking from 1 (very dissatisfied) to 5 (very satisfied). There is some controversy about the optimum number of response categories when using Likert scales.⁴⁴ We selected a 5-point Likert scale as this by some authors is believed to improve response quality, and to be less confusing along with reducing respondents' frustration thereby increasing the response rate.⁴⁵

Finally, we only assessed knowledge at one point in time immediately after the presentation of case vignettes. Hence, we do not know whether knowledge improvements persisted over time.

CONCLUSION

Findings of this study using a hypothetical survey set-up suggest that healthcare users' knowledge of health issues varies with education, predicts satisfaction with care, and may be improved through greater involvement in decision-making. These findings have three important implications for clinical practice. First, men with higher levels of education had better baseline knowledge of health issues related to PSA screening and a better ability to retain information provided, suggesting that those with lower levels of education may need more tailored patient education and confirmation of their understanding. Second, respondents were more likely to overestimate, rather than underestimate, the benefits of PSA screening with this tendency being more pronounced with less education. This finding supports the need for effective strategies to accurately communicate the risks and benefits of screening to patients facing the decision across different levels of education. Third, better knowledge about PSA testing, as assessed by quiz performance, was associated with greater satisfaction with the course of healthcare described in vignettes and reduced proclivity to complain. This finding suggests that difficulty comprehending and using medical information may contribute to dissatisfaction with healthcare and the intention to complain. Therefore, tailored patient education may be a fruitful way to improve patient satisfaction and reduce complaints; knowledgeable patients are more satisfied patients.

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Acknowledgements We would like to thank survey participants for their invaluable contributions to the study.

Contributors SB collected, analysed and interpreted data and was a major contributor in writing the article. SM assisted in analysing the data. MJB, MB and SM assisted in interpreting the data and writing the article. All authors read, commented and approved the final article. SB is the author acting as guarantor.

Funding The project was funded by a grant of €40 000 from the Danish Health Insurance Foundation and €5700 from the Lilly & Herbert Hansen's foundation. The funding bodies have had no influence on the design of the study. The funding bodies have had no influence on collection, analysis and interpretation of data or on writing of the manuscript.

Disclaimer MJB is a member of the United States Preventive Services Task Force (USPSTF). This article does not necessarily represent the views and policies of the USPSTF.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval According to Danish law, survey research is exempted from Ethics Committee approval requirements. Please see record n. 19-06-2018-10-35 issued by the Research Ethics Committee, Region of Southern Denmark. The study was conducted in accordance with EU General Data Protection Regulation 2016/679 and Directive 95/46/EC. Please see record n. FSEID-00003692 issued by the Danish Health Data Agency, and record n. 18/31191 issued by the Danish Data Protection Agency, exempted this study. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

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