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ORIGINAL ARTICLE

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# The readiness of German GPs to recommend and conduct cancer screening is associated with patient–physician gender concordance. Results of a survey

Jennifer Engler[a], Anne Dahlhaus[a,b,c] and Corina Güthlin[a]

[a]Institute of General Practice, Goethe University Frankfurt/Main, Frankfurt, Germany; [b]German Cancer Research Center (DKFZ), Heidelberg, Germany; [c]German Cancer Consortium (DKTK), Heidelberg, Germany

**KEY MESSAGES**

- Male GPs are more likely than female GPs to view GPs as responsible for recommending and conducting male-specific cancer screening.
- Men consult urologists less frequently than women consult gynaecologists, so male GPs seem to take on the role of 'doctor for men'.

**ABSTRACT**

**Background:** Cancer screening participation rates in Germany differ depending on patients' gender. International studies have found that patient–physician gender concordance fosters recommendation and conducting of cancer screening, and especially cancer screening for women.
**Objectives:** We aimed to ascertain whether gender concordance influences general practitioners' (GPs') rating of the usefulness of cancer screening, as well as their recommendations and readiness to conduct cancer screening in general practice in Germany.
**Methods:** For an exploratory cross-sectional survey, 500 randomly selected GPs from all over Germany were asked to fill in a questionnaire on cancer screening in general practice between March and June 2015. We asked them to rate the usefulness of each cancer screening examination, how frequently they recommended and conducted them and whether they viewed GPs or specialists as responsible for carrying them out. We used multiple logistic regression to analyse gender effect size by calculating odds ratios.
**Results:** Our study sample consisted of 139 GPs of which 65% were male. Male and female GPs did not differ significantly in their rating of the general usefulness of any of the specified cancer screening examinations. Male GPs were 2.9 to 6.8 times as likely to consider GPs responsible for recommending and conducting PSA testing and digital rectal examinations and were 3.7 to 7.9 times as likely to recommend and conduct these examinations on a regular basis.
**Conclusion:** Patient–physician gender concordance made it more likely that male-specific cancer screenings would be recommended and conducted, but not female-specific screenings.

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General practice/family medicine; oncology; cancer screening; gender; survey



## Introduction

Cancer screening can detect cancer in early stages and decrease mortality. However, depending on cancer type and screening method, the balance of benefits and harms is hotly debated [1].

### *Cancer screening in Europe and Germany*

The Council of Europe recommends screening for breast cancer, cervical cancer and colorectal cancer. Recent European cancer screening guidelines urge general practitioners (GPs) to provide patients with information and advise them to participate in centralized screening programmes [2–4]. They further recommend that GPs conduct Pap tests and FOBTs and explain to patients how to prepare for sigmoidoscopies and endoscopies [2,3].

In Germany, patients of a certain age are advised to undergo breast palpation to screen for breast cancer, Pap tests to screen for cervical cancer, digital-rectal examinations (DREs) for prostate cancer, FOBTs and

CONTACT Jennifer Engler engler@allgemeinmedizin.uni-frankfurt.de Goethe-Universität Frankfurt am Main, Zentrum der Gesundheitswissenschaften, Institut für Allgemeinmedizin, Theodor-Stern-Kai 7, 60590 Frankfurt am Main, Germany

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colonoscopies for colorectal cancer and full-body examinations for skin cancer. The cost of these examinations is covered by public health insurance [5]. PSA tests are not covered and must be paid for by patients.

### GPs' role in cancer screening

GPs exert a strong influence on a patient's decision whether to undergo cancer screening, and regular contact with a primary care physician is associated with higher cancer screening rates [6,7]. Recommendations by primary care physicians encourage patients to undergo cancer screening, while the absence of any recommendation is reported as a major reason not to [6,8–10].

### Gender differences in cancer screening rates and the role of patient–physician gender concordance

Men participate in cancer screening examinations less frequently than women [11]. This gender difference is even more pronounced in sex-specific screening: While 48% of eligible women have had a Pap test and breast palpation [11], and 65% a mammography [12], only 27% of eligible men have had a DRE to screen for prostate cancer [11]. Surveys have indicated that 20% to 31% of men in Germany regularly have a PSA test [8,13]. It is of note that in Germany women are strongly advised to visit their gynaecologists regularly, where screening examinations are addressed [14], whereas healthy men rarely consult a urologist [15].

GPs' gender may also play a role in patients' cancer screening attendance rates and GPs' recommendation and conducting of cancer screening examinations. Especially the interplay between patients' and physicians' gender and the influence of patient–physician gender concordance—that is GP and patient having the same gender—seem to foster healthcare utilization. GPs of contrasting gender are more reluctant to discuss gender-sensitive matters [16], or to perform gender-sensitive examinations [17,18]. Several studies have shown that patient–physician gender concordance results in higher screening rates for sex-specific cancers [17,19–23]. Female patients in particular, are more likely to undergo cancer screening examinations such as mammograms, Pap tests and breast palpation when their GP is female [17,18,20–22,24]. Female GPs also recommend breast cancer screening more often and systematically than their male colleagues [19]. The same study found no gender difference in the recommendation of colorectal and prostate cancer screening, but male GPs conduct DREs more often [19]. A survey among GPs found no gender differences for PSA tests [25].

Considering that differences in sex-specific screening rates between males and females in Germany are especially marked, the potential influence of the GP's gender on their view on screening examinations is particularly interesting.

We, therefore, investigated gender differences in GPs' ratings of the usefulness of cancer screening and how they felt about recommending and conducting cancer screening examinations.

## Methods

### Study design and data collection

The postal survey started in March 2015. Five hundred GPs were randomly selected based on a nationwide directory to form a convenient sample. Data collection terminated in June 2015. The ethics committee of the Frankfurt/Main university hospital provided consent but waived a formal consent process because the study design includes no biomedical research on patients.

### Measurement instrument

The survey items were based on a previous qualitative inquiry conducted among 55 GPs in Germany on the subject of oncology in general practice and the recommendations made to GPs in German oncology guidelines. GPs were asked to rate the usefulness of a selection of cancer screening examinations in general, as well as for specific age groups and risk populations, on a four-point Likert scale. GPs were also asked whether recommending and conducting such examinations was part of their practice routine (regularly, irregularly, not at all and/or only in special cases), and whether they viewed GPs or specialists as responsible for recommending and conducting each examination (Supplementary material). The survey items were piloted in a sample of 30 GPs and evaluated during cognitive telephone interviews with four GPs. The exact wording of the items presented in this article can be found in the Supplementary material, available online.

### Data analysis

Survey data were entered into IBM SPSS Statistics 20 and analysed cross-sectionally. Gender differences in socio-demographic data were evaluated using chi-square tests (dichotomous scale) or Mann–Whitney U-tests (ordinal scale). Gender differences in survey items were evaluated using chi-square tests. For this purpose, the ordinal level data were transformed into dichotomous outcomes. The alpha level was set at 5%,

**Table 1.** Coding of dependent variables for multiple logistic regression.

| | Coding | |
|---|---|---|
| Dependent variable | 1 | 0 |
| (a) Who do you see as responsible for recommending colonoscopy/FOBT/skin cancer screening/PSA testing/digital-rectal examination/mammography/breast palpation/Pap testing? | GP | Specialist |
| (b) Who do you see as responsible for conducting colonoscopy/FOBT/skin cancer screening/PSA testing/digital-rectal examination/mammography/breast palpation/Pap testing? | GP | Specialist |
| (c) To what extent do you recommend screening examinations colonoscopy/FOBT/skin cancer screening/PSA testing/digital-rectal examination/mammography/breast palpation/Pap testing in your practice? | Part of routine practice procedure | Irregularly; never and/or only in special cases |
| (d) How often do you conduct FOBT/skin cancer screening/PSA testing/digital-rectal examination/breast palpation in your practice yourself? | Regularly | Irregularly; never |

**Table 2.** Sample description by gender category (numbers do not always add up to 100% due to rounding), *P*-values relate to chi-square tests for dichotomous items (additional qualification in palliative care, psychotherapy, complementary medicine) and Mann–Whitney U-tests for ordinal data (age, work experience, location of medical practice, practice setting).

| | Female GPs | | Male GPs | | |
|---|---|---|---|---|---|
| | *n* | % | *n* | % | Sig. |
| Age (years) | | | | | |
| Total | 46 | 100 | 90 | 100 | 0.006 |
| <40 | 6 | 13 | 2 | 2 | |
| 40–49 | 11 | 24 | 21 | 23 | |
| 50–59 | 20 | 44 | 27 | 30 | |
| >59 | 9 | 20 | 40 | 44 | |
| Work experience (years) | | | | | |
| Total | 45 | 100 | 81 | 100 | 0.018 |
| ≤10 | 13 | 29 | 8 | 10 | |
| 11–20 | 13 | 29 | 29 | 36 | |
| 21–30 | 16 | 36 | 28 | 35 | |
| >30 | 3 | 7 | 16 | 20 | |
| Location of medical practice (inhabitants) | | | | | |
| Total | 49 | 100 | 90 | 100 | 0.066 |
| ≤5000 | 14 | 29 | 35 | 39 | |
| >5000–20 000 | 10 | 20 | 23 | 26 | |
| >20 000–100 000 | 12 | 25 | 19 | 21 | |
| >100 000 | 13 | 27 | 13 | 14 | |
| Practice setting | | | | | |
| Total | 49 | 100 | 90 | 100 | 0.730 |
| Single practice | 26 | 53 | 45 | 50 | |
| Group practice | 23 | 47 | 45 | 50 | |
| Additional qualification | | 49 | 100 | 90 | 100 |
| Palliative care | 7 | 14 | 22 | 24 | 0.159 |
| Psychotherapy | 9 | 18 | 13 | 14 | 0.545 |
| Complementary medicine | 18 | 37 | 29 | 32 | 0.591 |



i.e., differences were interpreted as significant if *P*-values were 0.05 or below. If a significant difference was found, we used multiple logistic regression to analyse gender differences by calculating odds ratios (Table 1). Each multiple logistic regression analysis was adjusted for age, location of medical practice and additional training in complementary medicine.

## Results

### Sample

Our sample consisted of 139 GPs (65% men, 35% women). Mean age was 55 (range: 31–72). On average, male GPs were significantly older than female GPs and had more work experience. Male and female GPs did not significantly differ in terms of additional qualifications, practice location and structure (Table 2).

### Gender differences in GPs' ratings of usefulness, and how often they recommended and conducted cancer-screening examinations

Chi-square tests indicated no significant gender differences in GPs' views on the value of cancer screenings (Figure 1).

However, multiple logistic regression revealed that male GPs were 2.9 times as likely as female GPs to

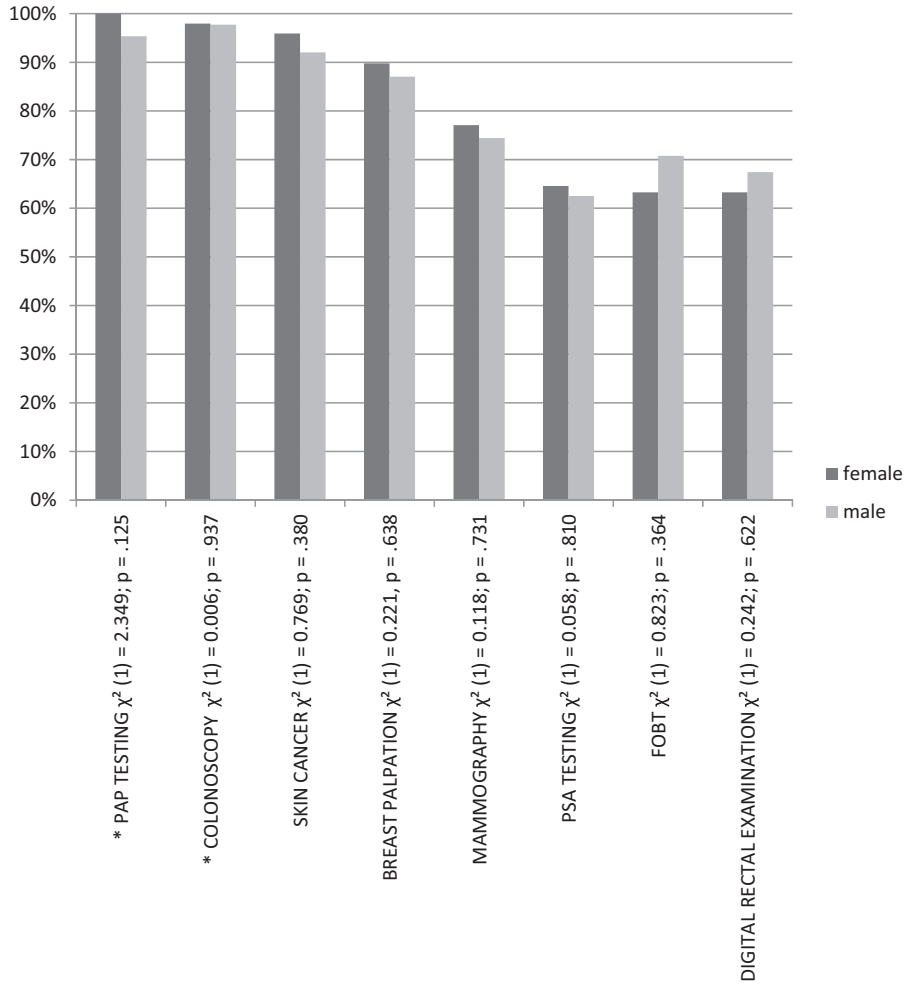


**Figure 1.** Gender differences in percentage of GPs who rate the cancer screening examination in question as useful or fairly useful, tested by applying the chi-square statistic. *More than 20% of cells in this table have expected cell counts of less than five. Chi-square results may be invalid.

consider responsibility for recommending PSA testing ($P = .014$) as falling within the domain of the GP, and 5.8 times as likely to view DREs as doing so ($P = .002$). Furthermore, male GPs were 5.2, 6.8 and 3.8 times as likely to consider the GP responsible for conducting PSA tests ($P = 0$), DREs ($P = 0$) and skin cancer screening ($P = .004$). Male GPs were only 0.3 times as likely to consider conducting breast palpation as GPs' responsibility ($P = .035$) (Table 3).

These differing views on who is responsible for male-specific cancer screening are reflected in the behaviour of GPs. Male GPs were 3.0 and 4.5 times as likely to recommend FOBTs ($P = .008$) and DREs ($P = 0$) on a regular base. Furthermore, they were 3.5, 4.0, 3.7 and 7.9 times as likely to conduct FOBT ($P = .005$), skin cancer screening ($P = .003$), PSA testing ($P = .001$) and DREs ($P = 0$) on a regular basis. Female gender was significantly associated with regularly recommending but not performing breast palpation (Table 4).

Female and male GPs did not differ significantly in considering a GP responsible for recommending all-gender cancer screening (i.e. colonoscopy, FOBT and skin cancer screening) and for recommending female-specific cancer screening (i.e. mammography, breast palpation and Pap testing). Furthermore, GPs did not differ in regarding a GP responsible for conducting colonoscopy, FOBT, mammography and Pap testing. No significant gender differences were found in regard to recommending colonoscopy, skin cancer screening, PSA testing, mammography and Pap testing on a regular basis and in regard to regularly conducting colonoscopy, breast palpation and Pap testing.

Regardless of gender, fewer GPs regarded screening examinations for women such as palpation of the breast, mammograms and Pap tests as falling within the domain of the GP than viewed screening examinations that are specific to males such as PSA testing

Table 3. Results of multiple logistic regression on the dependent variables (a) and (b), as well as odds ratios for female (0) versus male (1) gender, adjusted for age, location of practice and additional training in complementary medicine.

| | Female GPs | | Male GPs | | | | 95%CI for OR | |
|---|---|---|---|---|---|---|---|---|
| | *n* (total *n*) | Valid% | *n* (total *n*) | Valid % | Sig. | Odds ratio | Lower | Upper |
| (a) The GP (not a specialist) is responsible for RECOMMENDING the following cancer screening examination | | | | | | | | |
| All genders | | | | | | | | |
| Colonoscopy | 46 (48) | 96 | 80 (85) | 94 | 0.899 | 0.9 | 0.2 | 5.2 |
| FOBT | 47 (49) | 96 | 84 (85) | 99 | 0.329 | 3.5 | 0.3 | 43.8 |
| Skin cancer | 45 (47) | 96 | 80 (85) | 94 | 0.767 | .8 | 0.1 | 4.4 |
| Male-specific | | | | | | | | |
| PSA testing | 30 (49) | 61 | 68 (85) | 80 | 0.014 | 2.9 | 1.2 | 6.8 |
| Digital-rectal examination | 34 (49) | 69 | 79 (86) | 92 | 0.002 | 5.8 | 1.9 | 17.2 |
| Female-specific | | | | | | | | |
| Mammography | 15 (49) | 31 | 23 (83) | 28 | 0.708 | .9 | 0.4 | 1.9 |
| Breast palpation | 25 (49) | 51 | 31 (84) | 37 | 0.171 | .6 | 0.3 | 1.3 |
| Pap testing | 16 (49) | 33 | 18 (80) | 23 | 0.349 | 0.7 | 0.3 | 1.6 |
| (b) The GP (not a specialist) is responsible for CONDUCTING the following cancer screening examination | | | | | | | | |
| All genders | | | | | | | | |
| Colonoscopy | 2 (49) | 4 | 9 (90) | 10 | 0.944 | 1.1 | 0.2 | 6.2 |
| FOBT | 47 (48) | 98 | 86 (88) | 98 | 0.909 | .9 | 0.1 | 10.5 |
| Skin cancer | 27 (47) | 57 | 71 (87) | 82 | 0.004 | 3.8 | 1.5 | 9.4 |
| Male-specific | | | | | | | | |
| PSA testing | 20 (48) | 42 | 64 (85) | 75 | 0 | 5.2 | 2.2 | 12.0 |
| Digital-rectal examination | 25 (48) | 52 | 76 (85) | 89 | 0 | 6.8 | 2.7 | 17.3 |
| Female-specific | | | | | | | | |
| Mammography | 0 (49) | 0 | 3 (88) | 3 | [a] | [a] | [a] | [a] |
| Breast palpation | 10 (48) | 21 | 12 (85) | 14 | 0.035 | 0.3 | 0.1 | 0.9 |
| Pap testing | 1 (49) | 2 | 3 (88) | 3 | 0.682 | 0.6 | 0 | 7.9 |

*Inflated odds ratio due to cell count $n = 0$.

and DREs as doing so (Table 3). Screenings that are specific to women were less often regularly provided by GPs than those for men (Table 4).

## Discussion

### Main findings

Our analysis found that male GPs are more likely than female GPs to consider GPs responsible for recommending and conducting prostate cancer screenings such as DREs and PSA tests. Male GPs were also more likely to regularly recommend and conduct prostate cancer screening than female GPs. Gender did not affect GPs' rating of the usefulness of gender screening.

### Strengths and limitations

This study is the first in Germany to address gender differences in GPs' perceptions of who is responsible for recommending and conducting cancer screening examinations. No validated scale is available in the German language, so the questionnaire was developed based on qualitative interviews with German GPs and the wording of items was tested in cognitive interviews with them. As our sample is a convenience sample of the GPs that responded to a postal survey, we cannot exclude the possibility that predominantly GPs who have a specific interest in cancer screening participated. Our sample is similar to the overall population of GPs in Germany in regard to age and practice structure, while female GPs are slightly underrepresented in our sample [26].

Although the sample size allows for multiple analyses, it is nonetheless based on only 139 responses, and as such must be considered exploratory. However, this will have had no effect on the observed gender differences in our sample. As we adjusted our analyses for age, practice location and additional training in complementary medicine, these factors cannot provide an explanation for observed gender differences.

Work experience correlates with age and for this reason was not included in our logistic regression model. It cannot be ruled out that work experience was a confounding factor. As we only surveyed GPs, we were unable to include possible confounders at the patient level in our analysis such as the age of the patient, and public/private health insurance.

A further confounding variable may be whether a practice had the necessary technical equipment to conduct specific cancer screening examinations. Furthermore, it should be emphasized that some of the surveyed cancer screening recommendations (breast palpation, digital rectal-examinations for prostate cancer and skin examinations) are not supported by clear scientific evidence. Our study does not explore the reasons for not recommending or performing a specific screening examination.

Table 4. Results of multiple logistic regression on dependent variables (c) and (d), as well as odds ratios for female (0) versus male (1) gender, adjusted for age, location of practice and additional training in complementary medicine.

| | Female GPs | | Male GPs | | | | 95%CI for OR | |
|---|---|---|---|---|---|---|---|---|
| | *n* (total *n*) | Valid % | *n* (total *n*) | Valid % | Sig. | Odds ratio | Lower | Upper6 |
| (c) RECOMMENDATION of the following cancer screening examination is part of routine practice procedure. | | | | | | | | |
| All genders | | | | | | | | |
| Colonoscopy | 36 (49) | 74 | 64 (87) | 74 | 0.820 | 1.1 | 0.5 | 2.6 |
| FOBT | 24 (48) | 50 | 59 (87) | 68 | 0.008 | 3.0 | 1.3 | 6.6 |
| Skin cancer | 30 (49) | 61 | 61 (86) | 71 | 0.178 | 1.7 | 0.8 | 3.8 |
| Male-specific | | | | | | | | |
| PSA testing | 25 (49) | 51 | 51 (84) | 61 | 0.106 | 1.9 | 0.9 | 4.0 |
| Digital-rectal examination | 17 (49) | 35 | 59 (87) | 68 | 0 | 4.5 | 2.0 | 10.1 |
| Female-specific | | | | | | | | |
| Mammography | 16 (49) | 33 | 18 (83) | 22 | 0.060 | 0.4 | 0.2 | 1.0 |
| Breast palpation | 23 (49) | 47 | 16 (83) | 19 | 0.003 | 0.3 | 0.1 | 0.6 |
| Pap testing | 19 (49) | 39 | 20 (78) | 26 | 0.186 | 0.6 | 0.3 | 1.3 |
| (d) CONDUCT the following cancer screening examination regularly | | | | | | | | |
| All genders | | | | | | | | |
| Colonoscopy | 1 (49) | 2 | 1 (90) | 1 | [a] | [a] | [a] | [a] |
| FOBT | 32 (49) | 65 | 76 (90) | 84 | 0.005 | 3.5 | 1.4 | 8.4 |
| Skin cancer | 30 (49) | 61 | 75 (90) | 83 | 0.003 | 4.0 | 1.6 | 10.2 |
| Male-specific | | | | | | | | |
| PSA testing | 17 (49) | 35 | 53 (88) | 60 | 0.001 | 3.7 | 1.7 | 8.2 |
| Digital-rectal examination | 16 (49) | 33 | 70 (90) | 78 | 0 | 7.9 | 3.3 | 18.6 |
| Female-specific | | | | | | | | |
| Mammography | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Breast palpation | 8 (49) | 16 | 9 (88) | 10 | 0.194 | 0.5 | 0.1 | 1.5 |
| Pap testing | 2 (49) | 4 | 1 (88) | 1 | 0.216 | 0.2 | 0 | 2.6 |

[a]Inflated odds ratio due to low cell counts.



Outpatient care in Germany is characterized by free choice of physician—meaning patients can consult a specialist without previously obtaining a referral from their GP—therefore the transferability of our results may be limited [27]. Results may well be different in healthcare systems in which GPs act as gatekeepers, especially with regard to cancer screening recommendations.

### Interpretation and relation to literature

*Patients' and GPs' preferences for gender-concordant patient-physician relationships.* Our findings may result mainly from patients' and GPs' preference for gender-concordant patient–physician relationships, especially when discussing sensitive issues such as sex-specific examinations [16,28–30]. GPs' anticipation of patient discomfort [30], as well as their own discomfort and lack of confidence when conducting gender-discordant examinations may prevent them from conducting these examinations [16]. International studies show that female GPs have predominantly female patients, and deal more often with gynaecological problems, family planning and female prevention procedures and less often with problems involving male genitalia than their male counterparts [17,18]. Our results confirm these findings.

*Patient–physician gender concordance's influence on recommendation and conducting of cancer screening.* Previous studies have reported that female patients with a gender-concordant physician are more likely to be recommended and to receive cancer screening than those with a male physician. Furthermore, female primary care physicians are more likely to conduct the examinations themselves than male physicians [17–22, 24]. However, the influence of physician gender on cancer screening for men is unclear. Two studies have found that male GPs are more likely to conduct a DRE on men [18,19], which agrees with our findings. In contrast to our results, the studies found no gender difference in the provision of PSA testing [18,25]. The question remains why patient–physician gender concordance in our study was only associated with the recommendation and conducting of male-specific cancer screening examinations, but not with female cancer screening.

*Availability and utilization of female-specific cancer screening in Germany.* One possible explanation is the high proportion of women in Germany that regularly consult a gynaecologist. In Germany, a recent survey found that 70% of women had seen a gynaecologist in the previous 12 months [15]. This has been cited as a major reason for women's higher participation rates [14]. It seems likely that most female cancer screening examinations are conducted during these consultations. Both female and male GPs may therefore consider gynaecologists responsible for female cancer screening recommendations and examinations.

Furthermore, a gynaecological examination chair is needed for Pap tests, which German GPs rarely have. In Germany, reimbursement for Pap testing and breast palpation is only available for one overall 'female cancer screening examination', which must include both examinations. As a result, female cancer screening can rarely be conducted in general practice. The impracticality of female cancer screenings in general practice and the fact that women often consult a gynaecologist are probably the reasons why the gender of the GP had little influence on female cancer screenings. However, a qualitative study among GPs in Germany shows that GPs are prepared to conduct breast palpation for female patients that do not see a gynaecologist [31]. The special status of breast palpation is reflected in our results, as this examination is predicted by GPs' female gender.

*Availability and utilization of male-specific cancer screening in Germany*. In contrast to the proportion of women that reported consulting a gynaecologist in the previous 12 months, only 17% of German men said they had seen a urologist in the period [15]. However, 77% of men had consulted a GP. Furthermore, both DREs and PSA tests can easily be conducted in general practice. The practicability of male-specific cancer screening in general practice combined with only rare urologist consultations raise the relevance of male-specific cancer screenings in general practice. Gender-concordance plays a role in recommending and conducting prostate cancer screenings on a regular basis and to consider that responsibility for recommending and conducting prostate cancer examinations lies with the GP.

Besides prostate cancer screenings, we also found that the male gender of a GP predicts whether he considers the GP responsible for regularly conducting skin cancer screenings and FOBTs. In the case of FOBTs, the reasons may be the same as mentioned above, i.e. women are given this test by their gynaecologists. However, this cannot apply to skin cancer screening as only GPs and dermatologists are reimbursed for conducting this examination. In this regard, our finding that male GPs conduct more cancer screenings than female GPs does not correspond with results that female physicians provide more preventive services [24].

### *Practice implications and future research*

Our survey data does not permit us to draw any conclusions regarding actual cancer screening participation rates, or whether rates are influenced by the gender of the GP. Female GPs may simply refer their male patients to an urologist for the purpose of screening. Male GPs may react to men's lower cancer screening rates by taking on the role of a 'doctor for men', and provide information and male cancer screening examinations on a gender-concordant basis. Future research should, therefore, focus on the four dyads (man-man, woman-woman, man-woman, woman-man) when investigating recommendations, attitudes and screening rates for specific cancer screening examinations.

Overall, our results reflect the patient-centeredness of GPs and the comprehensive role they play in healthcare. GPs appear to be consulted when no other resources are available or are not commonly used (such as urologists). As GPs are frequently consulted with regard to cancer screening, this role should be acknowledged and supported. This could be achieved by reimbursing GPs for providing advice on cancer screening. In Germany, this is currently only the case for colonoscopies.

## Conclusion

GPs' gender did not affect their rating of the usefulness of any cancer screening examination. However, patient–physician gender concordance made it more likely that male-specific cancer screenings would be recommended and conducted, but not female-specific screenings. GPs appear to be consulted when no other resources are available, or are not commonly used (such as urologists).

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## Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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## ORCiD

Jennifer Engler http://orcid.org/0000-0002-6030-1513

## References

[1] Prasad V, Lenzer J, Newman DH. Why cancer screening has never been shown to "save lives"—and what we can do about it. BMJ. 2016:h6080. doi: 10.1136/bmj.h6080.

[2] European Commission, Directorate-General for Health and Consumers, World Health Organisation, CHAFEA—Consumers, Health and Food Executive Agency, Karsa L von, Segnan N, et al. European guidelines for quality assurance in colorectal cancer screening and diagnosis. First ed. Luxembourg: European Commission, Publications Office of the European Union; 2010 [cited 2016 Jul 23]. Available from: http://bookshop.europa.eu/en/european-guidelines-for-quality-assurance-in-colorectal-cancer-screening-and-diagnosis-pbND3210390/.

[3] European Commission, Directorate-General for Health and Food Safety, Arbyn M, Antilla A, Jordan J. European guidelines for quality assurance in cervical cancer screening. Second ed. Luxembourg: Publications Office of the European Union; 2008 [cited 2016 Jul 23]. Available from: http://bookshop.europa.eu/de/european-guidelines-for-quality-assurance-in-cervical-cancer-screening-pbND7007117/.

[4] European Commission, Directorate-General for Health and Food Safety, Perry N, Broeders M, de Wolf C, et al. European guidelines for quality assurance in breast cancer screening and diagnosis. Fourth ed. supplements. Luxembourg: Publications Office of the European Union; 2013 [cited 2016 Jul 23]. Available from: http://bookshop.europa.eu/de/european-guidelines-for-quality-assurance-in-breast-cancer-screening-and-diagnosis-pbND0213386/.

[5] Gemeinsamer Bundesausschuss. Krebsfrüherkennungsrichtlinie [Guideline on the early detection of cancer]. 2015 [cited 2016 Jul 25]. Available from: https://www.g-ba.de/downloads/62-492-1205/KFE-RL_2015-10-15_iK-2016-07-01.pdf.

[6] Schueler KM, Chu PW, Smith-Bindman R. Factors associated with mammography utilization: A systematic quantitative review of the literature. J Womens Health (Larchmt). 2008;17:1477–1498.

[7] Bergmann E, Kalcklösch M, Tiemann F. Inanspruchnahme des Gesundheitswesens. Erste Ergebnisse des telefonischen Gesundheitssurveys 2003 [Healthcare utilization. Initial results of the telephone health survey 2003]. Bundesgesundhbl. Gesundheitsforsch. Gesundheitsschutz. 2005;48:1365–1373. German.

[8] Sieverding M, Matterne U, Ciccarello L, et al. Prostatakarzinomfrüherkennung in Deutschland. Untersuchung einer repräsentativen Bevölkerungsstichprobe [Early detection of prostate cancer in Germany. A study of a representative random sample of the population]. Urologe A. 2008;47:1233–1238.

[9] Finney Rutten LJ, Nelson DE, Meissner HI. Examination of population-wide trends in barriers to cancer screening from a diffusion of innovation perspective (1987–2000). Prev Med. 2004;38:258–268.

[10] Bromley EG, May FP, Federer L, et al. Explaining persistent under-use of colonoscopic cancer screening in African Americans: A systematic review. Prev Med. 2015;71:40–48.

[11] Zentralinstitut für die kassenärztliche Versorgung. Teilnahme an gesetzlichen Früherkennungsuntersuchungen und an Beratungen zur Prävention des Darmkrebs (in Prozent der anspruchsberechtigten Altersgruppe) im Jahr 2011—Deutschland [Participation in cancer screening examinations and in counselling on colorectal cancer screening (percentage of the eligible age group) in 2011 – Germany]. 2012 [cited 2016 Jul 25]. Available from: http://www.zi.de/cms/fileadmin/images/content/PDFs_alle/Beteiligungsraten_2011_Deutschland_erw.pdf.

[12] Malek D, Kääb-Sanyal V. Zusammenfassung der Ergebnisse des Mammographie-Screening-Programms in Deutschland [Summary of the results of the mammography screening programme in Germany] 2014 [cited 2016 Jul 25]. Available from: http://fachservice.mammo-programm.de/download/Evaluationsbericht_2011_Zusammenfassung_der_Ergebnisse.pdf.

[13] Starker A, Saß A. Participation in cancer screening programmes. Results of the German health interview and examination survey for adults (DEGS1). Bundesgesundhbl Gesundheitsforsch Gesundheitsschutz. 2013;56:858–867. [Cited 2016 Sep 9]. English version available from: http://edoc.rki.de/oa/articles/reGtNNyWhvpc/PDF/27T4csOov0aM.pdf.

[14] Starker A, Bertz J, Saß A. Inanspruchnahme von Krebsfrüherkennungsuntersuchungen [Participation in Cancer Screening Examinations]. In: Robert Koch-Institut, editor. Daten und Fakten. Ergebnisse der Studie "Gesundheit in Deutschland aktuell 2010". Beiträge zur Gesundheitsberichterstattung des Bundes [Data and facts. Results of the study "Health in Germany 2010". Contributions to the Health Report of the Federal State]. Berlin: 2012. p. 27–38 [cited 2016 Jul 21]. Available from: https://www.rki.de/DE/Content/Gesundheitsmonitoring/Gesundheitsberichterstattung/GBEDownloadsB/Geda2010/kapitel_krebsfrueherkennung.pdf?__blob=publicationFile.

[15] Rattay P, Butschalowsky H, Rommel A, et al. Utilization of outpatient and inpatient health services in Germany. Results of the German health interview and examination survey for adults (DEGS1). Bundesgesundhbl Gesundheitsforsch Gesundheitsschutz. 2013; 56:832–844 [cited 2016 Sep 9]. English version available from: http://edoc.rki.de/oa/articles/reWsjeZR5HISQ/PDF/21nRhaJo8ha7o.pdf.

[16] Lurie N, Margolis K, McGovern PG, et al. Physician self-report of comfort and skill in providing preventive care to patients of the opposite sex. Arch Fam Med. 1998;7:134–137.

[17] Franks P, Bertakis KD. Physician gender, patient gender, and primary care. J Womens Health (Larchmt). 2003;12:73–80.

[18] Fang MC, McCarthy EP, Singer DE. Are patients more likely to see physicians of the same sex? Recent national trends in primary care medicine. Am J Med. 2004;117:575–581.

[19] Eisinger F, Pivot X, Coscas Y, et al. Impact of general practitioners' sex and age on systematic recommendation for cancer screening. Eur J Cancer Prev. 2011;20:39–41.

[20] Ince-Cushman D, Correa JA, Shuldiner J, et al. Association of primary care physician sex with cervical

cancer and mammography screening. Can Fam Physician. 2013;59:e11–18.
[21] Lofters AK, Ng R, Lobb R. Primary care physician characteristics associated with cancer screening: A retrospective cohort study in Ontario, Canada. Cancer Med. 2015;4:212–223.
[22] Lurie N, Slater J, McGovern P, et al. Preventive care for women. Does the sex of the physician matter? N Engl J Med. 1993;329:478–482.
[23] Stormo AR, Cooper CP, Hawkins NA, et al. Physician characteristics and beliefs associated with use of pelvic examinations in asymptomatic women. Prev Med. 2012;54:415–421.
[24] Henderson JT, Weisman CS. Physician gender effects on preventive screening and counseling: An analysis of male and female patients' health care experiences. Med Care. 2001;39:1281–1292.
[25] Voss JD, Schectman JM. Prostate cancer screening practices and beliefs. J Gen Intern Med. 2001;16: 831–837.
[26] Bundesärztekammer. Ärztestatistik 2014. Diagramme und Tabellen [Physician statistics 2014. Graphs and tables] [cited 2016 Jul 20]. Available from: http://www.bundesaerztekammer.de/fileadmin/user_upload/downloads/pdf-Ordner/Statistik2014/Stat14AbbTab.pdf.
[27] Busse R, Blümel M. Germany: Health system review. Health Syst Transit. 2014;16:1–296.
[28] Fennema K, Meyer DL, Owen N. Sex of physician: patients' preferences and stereotypes. J Fam Pract. 1990;30:441–446.
[29] Heaton CJ, Marquez JT. Patient preferences for physician gender in the male genital/rectal exam. Fam Pract Res J. 1990;10:105–115.
[30] Hinchliff S, Gott M, Galena E. GPs' perceptions of the gender-related barriers to discussing sexual health in consultations: A qualitative study. Eur J Gen Pract. 2004;10:56–60.
[31] Dahlhaus A, Behrend J, Herrler C, et al. Abwägungssache: der hausärztliche Umgang mit gesetzlich empfohlenen Krebsfrüherkennungsuntersuchungen [Weighing up interests: The family practitioner and officially endorsed cancer screening tests]. Z Allg Med. 2013; 89:267–271.