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Uptake of cervical cancer screening in The Netherlands is mainly influenced by women's beliefs about the screening and by the inviting organization.

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ABSTRACT

Background: This study aims to examine the impact of women's characteristics (demographics, risk behaviour, and beliefs) on the uptake of cervical cancer screening, taking practice characteristics (demographic and organizational) into account. Methods: Routinely collected data of screening status were sampled from electronic medical records of 32 Dutch general practices. Additionally, a questionnaire was sent to a sample of 2224 listed women—1204 screened, 1020 unscreened. We used a step-by-step, logistic, multilevel approach to examine determinants of the screening uptake. Results: Analyses of data for 1392 women (968 screened and 424 unscreened) showed that women's beliefs about cervical screening and attendance are the best predictors of screening uptake, even when demographic and organizational aspects are taken into account. Women aged 40–50 years who felt high personal moral obligation, who had only one sexual partner ever, and who were invited and reminded by their own general practice had the greatest likelihood of screening uptake.

A non-response study was performed; the non-responders to the questionnaire (mainly unscreened) thought they had less risk of cervical cancer, were less motivated, less often intended to get future screening, and were more convinced that cervical cancer cannot be cured. Conclusion: To improve the uptake rate, we should focus on the personal moral obligation of eligible women, beliefs about the risks of cervical cancer, and available cures. Invitations and reminders within general practices enhance the uptake rate.

The reduction of morbidity and mortality due to screening for precancerous changes in the uterine cervix or cervical cancer itself by examination of a cervical smear is widely recognized.1–3 Screening programmes were started in parts of Europe and North America in the 1960s1 with variable success.

In the Netherlands, the attendance rate was 66% in 1999.4–7 Recent figures for England showed that 84% of the women aged 25–64 years had been screened at least once in the previous 5 years,8,9 so the Dutch figures are open to improvement.

Understanding factors influencing the uptake rate can provide opportunities to increase the attendance rate. A literature review showed that compliance or willingness to attend is influenced by a variety of factors.

Known risk factors for cervical cancer are inversely related to participation in screening programmes; the incidence and mortality rates of cervical cancer among unscreened women are higher.10–13 The Pap smear uptake among groups of women varies with sociodemographics. For instance, low uptake rates have been associated with women who are older or less well educated, who have a lower socioeconomic background or social health insurance, or who reside in rural locations.14–17 Women from higher social classes feel more morally obliged to attend cervical screening, while women from lower social classes are less likely than others to agree that they are at risk of cervical cancer.18 Furthermore, women may not attend because of the test itself (i.e. their negative views of the test),18,19 perceptions of vulnerability, the perceived benefits of screening, and worry about cervical cancer,13,20–22 especially if a female doctor or nurse is unavailable.13 Research on participation in mammography shows that normative beliefs of others affect screening uptake as well.

Women whose relatives encourage them to participate in a screening are more likely to attend.23,24 The relatively low uptake rate is even more problematic because women with low uptake rate less often follow the path from initial participation to provision of preventive health care than those with an objectively lower risk.16 At the practice level, uptake rates are known to vary among practices on the basis of organizational aspects and the region in which the practices are situated. Good organization enhances the uptake rate of the target group.6 Involvement of the general practice in personally inviting the target population conclusively increases the effectiveness of mass screening.6,7 Uptake rates are higher for practices in very urbanized regions.7 Usually studies concentrate on either patient or practice determinants; these determinants have not yet been co-analysed in studies that take clustering of patients within practices into account. This may have led to biased conclusions. Women's beliefs about cervical screening might, for example, be linked to organizational aspects. This study attempts to determine how sociodemographic and risk-behavioural factors, women's beliefs, and organizational factors affect uptake rates.

METHODS

Study population and setting

In December 2000, a questionnaire was posted to a two-stage cluster sample of women who were eligible for the Dutch population-based screening programme in the preceding year. Box 1 describes the organization of cervical screening in The Netherlands. The sample included 1204 women known to have had a population-based Pap smear or a recent Pap smear (<12 months before invitation-time) taken and 1020 women who did not attend the invitation for the screening. Women with known medical reasons for not attending, such as a hysterectomy or pregnancy, were excluded from the sampling procedure. The women were sampled from the electronic medical records of 32 Dutch computerized general practices collaborating in a national monitoring project on cervical cancer screening within the National Information Network of General Practices (LINH). The distribution of age, sex, and type of health insurance of the patients listed in these practices correlated well with that of the Dutch population. The geographical distribution of the 32 general practices was reasonably even. Before posting the questionnaires, practice employees checked the sample list for those to be excluded because of personal reasons or foreign language problems. For confidentiality reasons, the questionnaire senders were the women's own general practitioners (GPs); the self-addressed answer envelopes were addressed to our institute. One reminder (February 2001) was used to increase the response rate. The ethics committee of the Radboud University Nijmegen approved the study proposal.

Variables, instruments, and analysis

Information was collected per practice regarding 'eligible birth cohorts for screening', 'the invitation system used (health-authority- based approach, general-practice-based approach, or a combined approach)' and 'who takes the smears (GP or practice assistant)' by questionnaire. Data on urbanicity of practice location were derived from the regular data collection within the network, as was information about listed patients' gender, age, and type of health insurance. The remaining data regarding patients eligible for a cervical smear were extracted from the computerized medical record system (CMRS) of the general practices. Data were collected at the patient level and included year of birth, cervical smear(s) taken, and known medical reasons for non-attendance.

[BOX 1]

[TABLE 1]

The questionnaire for the women included questions on educational level, behavioural risk factors, normative beliefs, personal appraisal, personal moral obligation, beliefs about efficacy of treatment for cervical abnormalities/benefits of the screening and aversiveness of the test procedure.

Multilevel logistic regression modelling extends ordinary regression analysis to the situation where the data are hierarchical, 25 so we considered it the most appropriate technique for analysing determinants at practice and patient levels in one analysis. We accounted for the clustering effect of patients who are nested within the practice and the varying number of patients among practices (unbalanced data).25,26 The dependent variable was whether the women had recently had a cervical smear taken, derived from regular data collection within the monitoring project.

A total of 15 independent variables were included in the analyses: 12 at the patient level and 3 at the practice level.

The variables were categorized as 'self-reported risk behaviour and sociodemographic factors', 'women's beliefs about the screening' or 'organizational aspects of the screening' (table 1).

Two behavioural risk factors for cervical cancer were assessed: self-reported smoking behaviour (non-smoker, current smoker, or ex-smoker), and self-reported lifelong number of sexual partners (none, one, two, or more).18 Three of the sociodemographic variables were at the women's level and one at the practice level: age has been operationalized in the cohorts underlying the age groups eligible for the invitation.

The cohorts are not linearly related to uptake, so they are included in the model as dummies. Socioeconomic status has been operationalized in type of health insurance (social or private health insurance) and education (classified as 'none or elementary school', 'secondary school', 'high school', or 'college/university'). The urbanicity of the practice location (at practice level) was classified as 'large city', 'small urban area', or 'rural area'.

The remaining items at the women's level were beliefs about cervical cancer screening and attendance. These beliefs were measured on five-point scales with statements ranging from 'strongly agree' to 'strongly disagree'. Box 2 presents the questions underlying these items. Personal appraisal and personal moral obligation were each scaled on five items with Cronbach's alpha (α) = 0.51 and α=0.82, respectively. Aversiveness of the test procedure was scaled on three items with α = 0.61. Normative beliefs of others and beliefs about efficacy of treatment for cervical abnormalities/benefits of the screening formed no scale; these items were included separately in the model.

Finally, the two items pertaining to the organization of cervical screening in general practice were 'the organization for inviting and reminding the eligible women' (healthauthority- based approach, general-practice-based approach, or a combination of both; Box 1)5 and 'who takes the smears' (the GP, the female practice assistant, or both).

The analyses were executed in three steps. First, the effect of the sociodemographics and the self-reported risk behaviour towards uptake were observed (model 1). Then the women's beliefs regarding

cervical screening and attendance were added (model 2), and finally for model 3, items regarding the screening organization were added (Box 3 and table 1).

The association with the dependent variable is presented using odds ratios, while controlling for the other variables in the various models, with 95% confidence intervals. The significance level was $p < 0.05$. We estimated the proportion of variance explained (R^2) by the significant variables in the three models with the McKelvey and Zavoina definition adapted to multilevel logistic regression models as described by Snijders and Bosker.26

RESULTS

Response

The mean response rate was 73.2% (n = 1628), but the loss was selective; 84.6% (n=1019) of the women who had had a smear taken responded, but only 59.7% (n=609) of those who had not responded. Box 4 shows the results of the non-response study performed. In summary, women who dropped out of the prevention programme thought they were in less danger or were more convinced that cancer was fatal.

The analyses were limited to those for whom complete questionnaires were available. Information for 1392 women (85.5% of the returned questionnaires, 95.0% of the questionnaires returned from screened, and 69.6% returned from unscreened women) was included in the logistic multilevel analyses; 968 screened women (69.5%) and 424 unscreened women (30.5%).

Most respondents with complete questionnaires (92.2%) were born in The Netherlands, and the difference in uptake between those born in The Netherlands and elsewhere was insignificant (chi-square, $p > 0.05$).

Description of the determinants of the uptake rate

Table 1 presents the items and their characteristics included in the analyses. Most practices (53.1%) invited and reminded the eligible women themselves (the general-practice-based approach). Most practices (43.8%) were situated in a large city. For most participants (45.1%), the highest educational level was secondary schooling and most participants were socially insured. The cohort of participants consisted of nonsmokers (38.3%), ex-smokers (29.2%), and current smokers (32.5%). A minority (1.8%) had never had a sexual partner, 53.7% had had one, and 44.5% had had two or more sexual partners in their lives.

The intraclass correlation coefficient (ICC) of the null model (without predictors) was 4.2; that is to say, 4.2% of the cervical cancer uptake rate can be attributed to differences among practices and ~96% can be attributed to differences among women.

The variation among practices was significant ($p < 0.05$). The practice variance in the null model was 0.14 (SE 0.06). Table 2 is an overview of the contributions of the items in the various models, the explained variance of the models and the practice variance. Women's beliefs towards cervical cancer screening and attendance are good predictors of uptake; when their beliefs were introduced into the analyses, the explained variance increased from 4.3% (model 1) to 20.1% (model 2). When the organizational aspects were also added (model 3), explained variance increased slightly to 21.4%. Overall, women's beliefs towards cervical cancer screening and attendance were better predictors of the uptake of cervical cancer screening than organizational aspects.

Because model 3 effectuated the highest percentage of explained variance, these results are described in more detail.

Especially the factors 'normative beliefs of women', 'their GP wants them to have the smear taken', and the 'personal moral obligation' are strong predictors of uptake ($p < 0.05$).

Women's personal moral obligation and the normative belief that their GP wants them to have a smear taken are significantly correlated (Pearson correlation 0.27; $p<0.01$), but the influence of these two factors on the uptake is opposite. The analyses revealed that the more strongly a woman feels a personal moral obligation, the more likely it is that she will attend the screening; and the more strongly she feels that her GP wants her to attend, the less likely it is that she will attend (when the analyses are adjusted for other items). The lifelong number of sexual partners is also a strong predictor of uptake.

The uptake for women with one sexual partner in their lives is significantly greater than that for women with none or more than one partner lifelong. The organization of invitations and reminders was also a strong predictor of the uptake rate.

Adjusted for other items in the analyses, the likelihood of screening was greater for those women listed in practices that organized the invitation and the reminders themselves. No significant relationship was found between the urbanicity of practice location and the uptake rate. The organizational factor 'who takes the smears' is not a predictor of the uptake rate.

Furthermore, the characteristics 'health insurance type' and 'educational level' yielded no significant effect on the likelihood of screening. The eligible women in the age cohorts 40, 45, and 50 years were significantly more likely to attend screening than women in the age cohorts 30, 35, 55, and 60 years. The women's personal appraisal, aversiveness of the test procedure, normative beliefs of the partner, and the beliefs about the efficacy of treatment proved to have no significant effect on the uptake rate.

Thus, women aged 40–50 years with high personal moral obligation and one sexual partner lifelong who are invited/ reminded to have a smear taken by their own general practice are most likely to do so. (A lower estimation of the normative belief that their GP wants them to have a smear taken had no negative effect on their uptake rate).

DISCUSSION

We examined determinants of uptake rate for cervical cancer screening, particularly the practice-related and patient-related factors. As far as we know, this is the first study that combines determinants on both types of factors in one analysis. The results show that women's beliefs concerning cervical cancer screening and attendance are strong predictors of uptake. Women aged 40–50 years with great personal moral obligation, who have had one sexual partner lifelong, and who are invited and reminded to be screened by their own general practice are most likely to do so. Overall, the women's beliefs are better predictors of the uptake of cervical cancer screening than organizational aspects.

When the beliefs are introduced in the analyses; the explained variance of the model was >20%.

[BOX 2]

[BOX 3]

[BOX 4]

The uptake rates of women in ethnic minorities are known to be lower. Unfortunately, we do not know their reasons for attending or not attending because the questionnaire was in Dutch. Most respondents were born in The Netherlands, and there was no significant difference in uptake rate between them and the women born elsewhere.

[TABLE 2]

Because the response rate was selective, we performed a nonresponse study. About 40% of the initial non-response group on the questionnaire could not be reached or refused to answer during this non-response study, but the general practice employees appeared to have approached many in error; some had had a hysterectomy and others had been removed from the practice register. The non-response study shows that selective response to the questionnaire is an important barrier for studies on determinants of uptake of cervical cancer screening. The non-response study shows the different beliefs about the screening itself and the greater risk of cervical cancer, which was already known from earlier research.16 The initial non-responders thought that they had less risk of cervical cancer, they felt less encouraged by relatives, they had less intention to undergo screening in future, and they were more of the opinion that cervical cancer is incurable.

Because non-responders are at greater risk of cervical cancer, they need to be reached somehow, perhaps by special health promotion and education programmes. The education should focus on risk communication, particularly the risks of getting cervical cancer and the aspects of its curability.

An issue common to all screening programmes is the known effect of information about risk and disease status, especially on women who would not suffer any adverse effects of no screening.

27 Perhaps, the large non-response in this study confounded the results of beliefs about efficacy of treatment and benefits of screening, making the effect on the uptake insignificant.

A general-practice-based approach of inviting the women was known to have a positive effect on uptake rates. Our study shows that this effect remains when patient characteristics are taken into account. Only ~ 55% of the practices has a general-practice-based approach for cervical screening, so there is room for improvement. Surprisingly, when all items in the analysis are taken into account, the women's assessment that their GPs want them to be screened has a negative effect on their uptake. Perhaps the effect expected is not visible because of the positive effect of the general-practice-based approach. We should also mention that the women's normative belief that their GPs want them to be screened was high overall [mean 3.7, standard deviation (SD) 1.1, table 1]. Is the selective response to the questionnaire the greatest barrier for the results? Middle-aged women (40, 45, and 50 years of age) were significantly more likely to attend the cervical-cancer-screening programme than other eligible women (30,35, 55, and 60 years of age). It is obvious that special attention should be paid to the youngest women because they are just starting the screening process. However, studies show that the populationbased screening is effective for women aged 30–60 years, so special attention to the older women (55 and 60 years of age) is also justified. Especially promotion of screening in elderly women who have never been screened should remain an important goal.28 In The Netherlands, the screening is free of charge, and this may be why insurance type and education level yield no significant effect on the likelihood of screening.

The results showed that the screening attendance of women with one sexual partner lifelong is significantly greater than that of women with none or more than one partner lifelong.

We did not study this result in more detail, but, obviously, a balanced relationship is exerting influence on the attendance of the screening programme.

In conclusion, the data showed that cervical screening rates are likely to be influenced by women's beliefs about cervical cancer screening and attendance, and the organization of invitation and reminders in general practice. To enhance screening uptake, special attention should be given to the youngest women (30 and 35 years of age) and the oldest women (55 and 60 years of age). Special education should focus on the risks of getting cervical cancer and the aspects of curability of this cancer to encourage women to participate in screening.

KEY POINTS

-Taking practice characteristics into account, the impact of women's characteristics and beliefs on uptake of cervical screening were studied.

- Women's personal moral obligation had the biggest impact on the uptake rate.

-The uptake rate increases with age, but decreases when women reach their mid-50s.

- Involving the practice in inviting the women is good clinical practice in terms of cervical cancer screening.

- A non-response study, mainly of unscreened women, showed that they believed they were in less danger and that the cancer was fatal.

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BOX AND TABLE

Box 1 Population-based cervical cancer screening in The Netherlands

In The Netherlands, in 1996, a national cervical-cancer-screening programme was started.[4] The target population includes women from 30 to 60 years of age, and the screening interval is 5 years. The population-based smears (initial and follow-up) are taken in a general practice setting by the GPs or their practice assistants. Programme smears are free of charge and there are fees for GPs taking the smears. Three main systems for inviting and reminding the women are in operation, each with a different invitation and reminder approach. They are a health-authority-based approach, a general-practice-based approach, and a combination approach in which the authority invites the women and the general practitioner reminds them if necessary.[5] Furthermore, to support the organization, computer software is available to GPs so they can search the electronic medical record system to identify the target population, invite the eligible women, and easily do the clerical work for the smears.

In 2000, ~65% of the Dutch population was compulsory insured via the National Health Service (NHS). The compulsory insurance was based on income, the barrier for the compulsory insurances in 2000 was earning less than about €31 500,- per year.

Table 1 Sociodemographics and risk behaviour (A), women's beliefs towards cervical screening and attendance (B), and organizational aspects (C) of the study population as used in the multilevel analyses (Level (patient or practice), number and percentages are given)

Characteristics	Level	
A. Sociodemographics and risk behaviour		*n* (%)
Sociodemographics		
Age in years of the eligible cohorts	Patient	
30		226 (16.2)
35		227 (16.3)
40		282 (20.3)
45		216 (15.5)
50		170 (12.2)
55		139 (10.0)
60		132 (9.5)
Health insurance	Patient	
Social		953 (68.5)
Private		439 (31.5)
Education level	Patient	
None or elementary school		116 (8.3)
Secondary school		628 (45.1)
High school		369 (26.5)
College/university		279 (20.0)
Urbanicity of practice location	Practice	
Large city (>1500 addresses per km^2)		14 (43.8)
Small urban area (500–1500 addresses per km^2)		9 (28.1)
Rural area (<500 addresses per km^2)		9 (28.1)
Risk behaviour (self-reported)		
Smoking behaviour	Patient	
Non-smoker		533 (38.3)
Current smoker		453 (32.5)
Ex-smoker		406 (29.2)
Lifelong number of sexual partners	Patient	
One		747 (53.7)
None		25 (1.8)
Two or more		620 (44.5)
B. Women's beliefs toward cervical cancer screening and attendance		Mean (SD)
Personal appraisal (scale of five items)	Patient	15.1 (2.7)
Aversiveness of test procedure (scale of three items)	Patient	10.1 (2.5)
Normative beliefs of others: GP	Patient	3.7 (1.1)
Normative beliefs of others: partner	Patient	3.9 (1.1)
Personal moral obligation (scale of five items)	Patient	21.4 (3.2)
Beliefs about efficacy of treatment/benefits of screening: survival probability	Patient	3.4 (0.7)
Beliefs about efficacy of treatment/benefits of screening: curability	Patient	3.9 (0.8)
C. Organizational aspects of the screening		*n* (%)
Organization of invitations and reminders	Practice	
Health-authority-based approach		9 (28.1)

Table 1 (*Continued*)

Characteristics	Level	
Combination approach		6 (18.8)
General-practice-based approach		17 (53.1)
Who takes the smear	Practice	
The general practitioner		14 (43.8)
The female practice assistant		15 (46.9)
Both		3 (9.4)

Box 2 Questions underlying the items to assess women's beliefs toward cervical cancer screening and attendance (measured on five-point scales with statements ranging from 'strongly agree' to 'strongly disagree')

The women's *personal appraisal* was assessed with five questions:

1. I am at risk of cervical cancer.
2. I am at less risk of cervical cancer than other women.
3. I think women in my family have or have had cervical cancer.
4. My chances of getting cervical cancer are very small
5. I am very afraid of getting cervical cancer.

The five questions for assessing *personal moral obligation* were:

1. I participate in the cervical-cancer-screening programme because I want to be reassured that I don't have it.
2. I think I should have the test for cervical cancer.
3. I think that preventive tests are important.
4. When I get an invitation for a physical examination, I always make use of it.
5. If I get an invitation for cervical cancer screening in the future, I will certainly attend.

Three questions were used to assess the *aversiveness* of the test procedure:

1. I feel embarrassed.
2. I find it painful.
3. Having a smear taken is not a problem.

Two questions were used to assess the expectation of the *normative* beliefs of others:

1. I believe that my partner thinks I should be screened.
2. I believe that my GP thinks I should be screened.

Perceived efficacy of treatment for cervical abnormalities/or benefits of the screening was assessed with two questions:

1. I think most women (>75%) diagnosed with cervical cancer die because of it.
2. In the early stages, changes detected by a smear are curable.

Box 3 Factors pertaining to women and practices (sociodemographics and risk behaviour), women's beliefs towards cervical cancer screening and attendance and organizational aspects of the screening as introduced in the various models of the multilevel analysis

Analysis

The multilevel analyses comprise four phases.

Model 1: The effects of the factors pertaining to women and practices are observed (A).

Model 2: Women's beliefs concerning cervical cancer screening and attendance are introduced and observed in combination with the sociodemographics and risk behaviour (A + B)

Model 3: Sociodemographics, risk behaviour, beliefs concerning cervical cancer screening and attendance and organizational items are all included in the analysis (A + B + C)

A. Factors pertaining to women and practicesa.

a. Sociodemographics:

- Urbanicity of practice location
- Women's age groups
- Women's health insurance
- Women's educational levelb.

b. Risk behaviour:

- Women's self-reported smoking behaviour
- Women's lifelong number of sexual partners (self-reported)

B. Women's beliefs toward cervical cancer screening and attendance

- Personal appraisal
- Aversiveness of the test procedure
- Normative beliefs of others: GP
- Normative beliefs of others: partner
- Personal moral obligation
- Beliefs about efficacy of treatment/benefits of screening: survival probability
- Beliefs about efficacy of treatment/benefits of screening: curability

C. Organizational aspects of the screening (general practice)

- Organization of invitations and reminders
- Who takes the smears?

Box 4 Results of the non-response study

Because the response to the questionnaire was selective, a non-response study was performed. A random sample of women ($n = 189$) who had not responded were phoned by the practice assistants and asked to answer a short version of the questionnaire. Fifteen percent of them again refused to answer, 25% was not reached despite numerous attempts, and 14% appeared to have been approached in error since they had had a hysterectomy or their names had been removed from the practice register. About 2% of the non-responders did not speak Dutch well enough to understand and answer the questions. Of the initial non-responders, 44% ($n = 83$) was willing or able to answer the questions, 49.4% were known to have had a population-based smear taken and 50.6% did not have a smear taken. The answers given by the initial respondents and those from the non-response study were compared. The initial non-responders thought that they had less risk of cervical cancer, they felt less encouraged by relatives, they had less intention to have a Pap smear taken in future, and they more often thought that cervical cancer was incurable.

Table 2 The relationship between practice and patient characteristics with the dependent variable *'a cervical smear was taken'* [Odds ratios (ORs) with accompanying 95% confidence interval (95% CI) are presented]

	Model 1	Model 2	Model 3
R^2 (%)	4.3	20.1	21.4
Practice variance (SE)	0.14 (0.06)	0.15 (0.07)	0.09 (0.06)
	OR (95 CI)	OR (95 CI)	OR (95 CI)
Sociodemographic characteristics			
Age in years of the eligible cohorts[a]			
30	1.00	1.00	1.00
35	1.34 (0.83–2.17)	1.30 (0.77–2.19)	1.31 (0.78–2.22)
40	1.60 (0.99–2.58)	1.83 (1.08–3.10)*	1.83 (1.08–3.11)*
45	1.66 (1.04–2.64)*	1.90 (1.14–3.17)*	1.95 (1.16–3.26)*
50	1.58 (0.97–2.55)	1.67 (0.98–2.83)	1.71 (1.01–2.92)*
55	1.36 (0.83–2.24)	1.37 (0.80–2.35)	1.36 (0.79–2.35)
60	1.21 (0.72–2.03)	1.34 (0.76–2.35)	1.38 (0.78–2.43)
Health insurance[a]			
Social	1.00	1.00	1.00
Private	0.71 (0.55–0.91)*	0.79 (0.60–1.04)	0.77 (0.58–1.02)
Educational level[a]			
None or elementary school	1.00	1.00	1.00
Secondary school	0.86 (0.55–1.34)	0.83 (0.52–1.34)	0.82 (0.51–1.32)
High school	1.05 (0.65–1.70)	1.00 (0.59–1.68)	0.98 (0.58–1.66)
College/university	1.01 (0.61–1.68)	1.20 (0.69–2.08)	1.16 (0.67–2.03)
Urbanicity of practice location[b]			
Large city	1.00	1.00	1.00
Small urban area	1.27 (0.82–1.96)	1.31 (0.82–2.08)	1.28 (0.81–2.01)
Rural area	1.14 (0.74–1.74)	1.16 (0.73–1.82)	1.15 (0.75–1.75)
Risk behaviour			
Smoking behaviour[a]			
Non-smoker	1.00	1.00	1.00
Current smoker	1.17 (0.86–1.58)	1.12 (0.81–1.56)	1.12 (0.81–1.55)
Ex-smoker	0.84 (0.63–1.13)	0.79 (0.57–1.08)	0.78 (0.57–1.08)
Lifelong number of sexual partners[a]			
One	1.00	1.00	1.00
None	0.16 (0.07-0.38)*	0.29 (0.11-0.75)*	0.30 (0.12-0.78)*
Two or more	0.71 (0.55-0.93)*	0.65 (0.49-0.86)*	0.63 (0.48-0.84)*
Women's beliefs toward cervical screening and attendance			
Personal appraisal[a]	n.i.m.	0.93 (0.81–1.06)	0.92 (0.80–1.06)
Aversiveness of test procedure[a]	n.i.m.	1.12 (0.98–1.28)	1.12 (0.98–1.28)
Normative beliefs of others: GP[a]	n.i.m.	0.80 (0.68–0.95)*	0.81 (0.69–0.95)*
Normative beliefs of others: partner[a]	n.i.m.	1.00 (0.85–1.18)	0.99 (0.84–1.17)
Personal moral obligation*	n.i.m.	2.36 (2.00–2.78)*	2.36 (2.00–2.78)*
Beliefs about efficacy of treatment/benefits of screening: survival probability[a]	n.i.m.	0.97 (0.85–1.11)	0.97 (0.85–1.11)
Beliefs about efficacy of treatment/benefits of screening: curability[a]	n.i.m.	0.88 (0.77–1.02)	0.89 (0.77–1.02)

Table 2 (*Continued*)

	Model 1	Model 2	Model 3
R^2 (%)	4.3	20.1	21.4
Practice variance (SE)	0.14 (0.06)	0.15 (0.07)	0.09 (0.06)
	OR (95 CI)	OR (95 CI)	OR (95 CI)
Organizational aspects of the screening (practice)			
Organization of invitations and reminders[b]			
Health-authority-based approach	n.i.m.	n.i.m.	1.00
Combination approach			1.53 (0.90–2.58)*
General-practice-based approach			1.73 (1.15–2.60)*
Who takes the smears[b]			
The general practitioner	n.i.m.	n.i.m.	1.00
The female practice assistant			0.93 (0.64–1.35)
Both			0.71 (0.37–1.38)

n.i.m = Not in model, *significance $p < 0.05$
a: Level in analysis: women
b: Level in analysis: practice