

# Reasons Women Do Not Attend Screening for Cervical Cancer: A Population-Based Study in Sweden<sup>1</sup>

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**Background.** With an improved compliance with screening a larger reduction of cervical cancer incidence would be within reach. We aimed at investigating why certain women do not attend Pap smear screening and at validating the reliability of self-reported screening.

**Methods.** In 1998 in the county of Uppsala, Sweden, information was collected through telephone interviews with 430 nonattendees and 514 attendees to Pap smear screening, who were all sampled from a population-based database. The women's recall of attendance was validated against the database. The main outcome measures used were odds ratios (OR) and 95% confidence intervals (CI).

**Results.** Non-attendance was positively associated with nonuse of oral contraceptives (OR = 3.56, 95% CI 2.18–5.83), seeing different gynecologists (OR = 1.90, 95% CI 1.34–2.70), and seeing a physician very often (OR = 3.12, 95% CI 1.45–6.70) or not at all (OR = 1.78, 95% CI 1.09–2.90). Frequent condom use (OR = 1.88, 95% CI 1.02–3.47), living in rural/semirural areas (OR = 1.55, 95% CI 1.07–2.21), and not knowing the recommended screening interval (OR = 2.16, 95% CI 1.20–3.89) were all associated with nonattendance, whereas socioeconomic status was not, when tested in a multivariate model. Among the nonattendees, 57% underestimated the time lapse since last smear.

**Conclusions.** Seeing a gynecologist on a regular basis and information guiding women to have a Pap smear on their own initiative are important factors for recurrent screening. Therefore, information should be given to all women about the purpose and benefits of Pap

smear testing. Self-reports on screening should be treated with caution. © 2001 American Health Foundation and Academic Press

**Key Words:** nonattendance; Pap smear screening; cervical cancer.

## INTRODUCTION

Cervical cancer, the third most common malignancy globally among women [1], is also potentially one of the most preventable [2]. In Sweden, the introduction of Papanicolaou (Pap) smear screening about 3 decades ago resulted in removal of precursor lesions on a large scale, which reduced the national incidence of invasive cancer by about 50% [3,4]. In the mid-1990s, self-referred screening accounted for approximately 75% of all smears taken in Sweden and it appears equally effective as organized screening to detect precursors of cervical cancer [5]. However, epidemiological studies [6] and mathematical modeling [7] indicate that a much larger reduction would be within reach if compliance with the screening program was improved. Most cervical cancers occur among women who have had few or no smear tests at all [8].

Several informative studies have investigated why not all women attend to Pap smear screening. Some of them, however, base the attendance status on self-reports only [9–11] and women also tend to underestimate the time that has elapsed since they had had their last smear [12–14]. In other studies, a partial validation of self-reports was possible through access to physician's record [15] or computerized databases covering organized, but not self-referred, screening [16–18]. Results from some [9,10,19–21] but not all [11,15] earlier studies suggest that low socioeconomic status reduces compliance. Other variables that have been shown to reduce compliance to screening are being single [9,11,21], to have a low frequency of gynecological examinations for other reasons [15,22], and poor knowledge

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about the purpose of screening [16,19,23] or the recommended screening interval [15].

Our main aim was to reveal why many women choose not to regularly attend such a beneficial health program as Pap smear screening. Second, we aimed at validating the reliability of self-reported screening through taking advantage of the unique prerequisites offered by a computerized register that covers all smears taken in Uppsala County in Sweden for 30 years. This register allowed a large population-based study with reliable information on each woman's screening history.

## METHODS

### *Setting*

Screening for cervical cancer started in Sweden on a limited scale in 1961, whereas an organized program was introduced in 1967. Initially, all women ages 30–49 years and from 1998, women of 25–59 years of age were invited to attend every 3–4 years. The organized screening was run independent of self-referred screening, but since 1972 only women who had not had a Pap smear during the past 3–4 years (including smears taken in self-referred screening) were invited for screening. In the organized screening program, specially trained midwives take Pap smears free of charge. All information from the organized and self-referred screening in Uppsala County has been computerized in a Cytology Register since 1969 [5]. In this register, each woman is identified through her individually unique national registration number.

Most women in Sweden have, at any time, had a Pap smear. In Uppsala County in 1996, only around 2% of the women ages 25–59 years had never had a Pap smear. However, 41% of the women ages 25–29 years had not had a Pap smear within the past 3 years, and 21% of the women ages 30–54 years and 26% ages 55–59 years not within the past 5 years.

### *Subjects*

The participants in our study were sampled from a population comprising all (around 65,000) women ages 25–60 years resident in Uppsala County in December 1996. By linking the Cytology Register to a population database that includes all residents of Sweden during the years of our investigation we generated a database with individual information on *all* screening for cervical cancer in Uppsala County from 1969 through 1996, which included women with no registered smear as well. This database was further linked to the national Swedish Cancer Register that started in 1958, thus enabling us to exclude from the cohort all women with a history of *in situ* or invasive cervical cancer. Screening information was supplemented until July 1, 1998, for all women included in the study.

The women in the study cohort were categorized by the number of smears that had been taken, the age of the woman at which the last Pap smear was taken, the number of years since last smear, and the type of screening (organized or self-referred). Those women ages 30–59 years in December 1996 who had *not* had a Pap smear within the past 5 years were defined as nonattendees as were women 25–29 years of age who had *not* had a Pap smear within the past 3 years. We wanted to investigate women who were truly non-compliant to Pap smear screening and therefore chose a 5-year interval to define noncompliance. For younger women a 3-year interval was chosen, since invitations to screening do not start until 25 years of age, and a longer time interval would mean exclusion of this age group. We drew a stratified random sample of 875 nonattendees and 750 attendees in 5-year age classes. Our aim was to interview 500 nonattendees and 500 attendees to screening. Since attendance status might have changed over time, the attendance status was not finally defined until the date when a notification letter (March 25, 1998) was distributed. Nonattending women who stated that they had had a Pap smear outside Uppsala County during the relevant period were excluded from the study base. Population size at the place of residence (based on postal codes) was retained for all interviewed women.

### *Study Design and Questionnaire*

All women were first invited to participate in the study by means of a notification letter informing them about the purpose of our study. Then, between March 30 and June 19, 1998, a trained interviewer called each woman and conducted an interview following a structured, computerized questionnaire. All respondents had given their informed consent. The study was approved by the Ethical Committee at Karolinska Institutet in Stockholm, Sweden.

In this paper we focus on the following areas as predictors of compliance to screening: (i) socioeconomic and demographic factors; (ii) genital symptoms and contraceptive use; (iii) gynecological examinations; (iv) risk behavior (age at first intercourse, number of sexual partners, smoking, and condom use); (v) perceived health status and participation in other health-related activities; (vi) knowledge and received information about the Pap smear and cervical cancer. To validate the women's self-report on Pap smears the women were asked if they had ever had a Pap smear, how often, and when they had their last Pap smear (less than 1 year ago, 1–3 years ago, 4–5 years ago, 6–9 years ago, 10 or more years ago). The questions were asked for both organized and self-referred screening. The answers given in the interviews were compared with information in the Uppsala Cytology Register.

### Statistical Methods

Logistic regression was used to estimate odds ratios (OR) of being a nonattender over an attendee, with 95% confidence intervals (CI). Likelihood ratio tests were employed to test different multivariate models against each other. In all analyses we controlled for age at interview as categorized into the following age groups: 26–31, 32–41, 42–51, and 62–61 years. We also used conditional logistic regression to estimate the ORs, which yielded only marginal differences (data not shown). All variables that were statistically significant in the age-adjusted analyses (except hysterectomy) were employed to find the best fitting multivariate model. To check for multicollinearity among the independent variables we calculated correlation coefficients between all independent variables included in the multivariate analysis. To elucidate how the socioeconomic variable profession was related to other explanatory variables, we fitted a separate multivariate logistic regression model with profession as a dichotomized outcome variable.

### RESULTS

Of the selected 1,625 subjects, 1,334 (82.1%) could be reached by phone and 1,018 (76.3%) of them completed the interview. Of the interviewed 504 nonattendees, 74 (14.7%) were ineligible and subsequently excluded because they had either had a Pap smear between the notification letter and the interview or stated that they had had a recent Pap smear outside Uppsala County. This left us with 944 subjects, corresponding to a response rate of 430 nonattendees (69.0%) and 514 attendees (80.7%) of the women who were reached and eligible.

The Cytology Register allowed us to compare respondents and nonrespondents (i.e., women who agreed to telephone interviews and those who did not). While the age distribution was the same for responding and nonresponding nonattendees, it differed among the attendees. We found a higher proportion of responding than of nonresponding attendees at ages 42–51 years (33% vs 24%,  $P = 0.01$ ) but no significant differences at other ages. There was a higher proportion of responding than of nonresponding nonattendees who had had their last Pap smear within 6–9 years ago (51% vs 40%,  $P = 0.002$ ) and a lower proportion of responding than of nonresponding nonattendees who had never had a Pap smear (10% vs 23%,  $P < 0.001$ ) (data not shown). The mean number of smears was similar for responding and nonresponding attendees (8.3 vs 8.2,  $P = 0.81$ ), while for responding and nonresponding nonattendees it differed somewhat (4.2 vs 3.7,  $P = 0.03$ ).

In order to validate how accurately women recalled their screening history, we compared the interview answers with information from our database. Among

those women who had had a Pap smear, 99% of the attendees and 95% of the nonattendees gave a correct answer. However, among women with not a single smear registered in the database, 21 of 42 (50%) believed that they had had one. The women's recall of the year when they had their last smear was less accurate. Among attendees, 74% gave a correct year, whereas among nonattendees only 29% ( $P < 0.001$ ). Only 14% of the attendees underestimated the time that had elapsed since the last Pap smear compared with 57% of the nonattendees ( $P < 0.001$ ) (50% stated that they had had a smear within 5 years and 29% within 3 years). In fact, as many as 53% of the nonattendees would have been incorrectly classified as attendees, had the study based attendance status on the women's self-report instead of the database, whereas only 5% of the attendees would have been incorrectly classified as nonattendees. The results were largely the same whether the women had attended organized or self-referred screening (data not shown). Irrespective of attendance status, the longer the time since last smear the smaller the proportion of women who gave a correct answer (data not shown).

### Age-Adjusted Analyses

Nonattendance increased with a decreasing density of population (Table 1). It was also positively associated with not being employed (OR = 1.53, 95% CI 1.06–2.22) or with being a blue-collar worker compared with white-collar worker (OR = 1.37, 95% CI 1.04–1.80). The factors education, marital status, and number of children were not significantly associated with the risk for nonattendance (Table 1). Having had hysterectomy was positively associated with nonattendance (OR = 2.06, 95% CI 1.19–3.59), whereas having menstrual disturbances or genital problems were negatively associated with nonattendance (OR = 0.75 and 0.56, respectively). Using contraceptives other than oral or not using any contraceptive method at all was also positively associated with being a nonattender (Table 2). Age at menopause showed no significant effect on attendance status (data not shown).

Nonattendance was more common among women who had *not* seen a gynecologist on a regular basis (OR = 4.26, 95% CI 3.14–5.78) that among those who had (data not shown). Also, women who had seen different gynecologists or only one once, or who gave symptoms or pregnancy as their most usual reason for seeing a gynecologist, were more likely to be nonattendees than were women who had always seen the same gynecologist or who gave health checkup as their most usual reason. Women who had explicitly asked for Pap smears when seeing a gynecologist were more likely to attend screening than were women who only had had smears on the gynecologist's initiative (Table 2). However, more

TABLE 1  
Socioeconomic and Demographic Risk Factors for Nonattendance to Pap Smear Screening

	Attendees		Nonattendees		Age-adjusted	
	<i>n</i>	%	<i>n</i>	%	OR	95% CI
Population size						
Metropolitan areas	207	40.4	134	31.3	1.00	(Ref.)
Cities and towns	142	27.7	118	27.6	1.36	0.97–1.89
Semirural and rural areas	164	32.0	176	41.1	1.75	1.29–2.39
<i>P</i> for trend						<i>P</i> = 0.001
Education						
9 years or less	152	29.6	132	30.8	1.00	(Ref.)
10–14 years	167	32.5	150	35.1	0.95	0.67–1.34
15 years or more	195	37.9	146	34.1	0.83	0.60–1.15
Employment status						
Employed/student	452	87.9	352	81.9	1.00	(Ref.)
Other <sup>a</sup>	62	12.1	78	18.1	1.53	1.06–2.22
Profession						
White collar	321	65.1	231	56.8	1.00	(Ref.)
Blue collar	172	34.9	176	43.2	1.37	1.04–1.80
Marital status						
Married/cohabitant	404	78.6	341	79.3	1.00	(Ref.)
Single	101	19.7	86	20.0	1.00	0.71–1.36
Widowed	9	1.8	3	0.7	0.41	0.11–1.54
Number of children						
None	90	17.5	85	19.8	1.03	0.73–1.46
1–3	389	75.7	313	73.0	1.00	(Ref.)
4 or more	35	6.8	31	7.2	1.15	0.69–1.91

<sup>a</sup> Housewife, retired, on parental leave, on sick leave, on leave (off duty), unemployed, employment in a working program.

that half (60%) of the nonattendees that stated that they had been to a gynecologist during the past 3 years (37%) believed they had had a Pap smear during the same time (data not shown).

Women with two or more sexual partners during the past 5 years were less likely to be nonattendees, compared with those who had no sexual partner or only one (OR = 0.62), whereas we found no association with age at first intercourse (Table 3). Always using condom during sexual intercourse, versus never, was positively associated with nonattendance, as was smoking; indeed, the higher the number of pack years the greater the risk of nonattendance ( $P = 0.008$ ). Attendance status was not affected by the woman's perception of her own health status but by participation in other health-related activities. There was a tendency (not statistically significant) for women who had not participated in mammography to be nonattendees. Future intentions toward mammography had a stronger effect, that is, significantly more nonattendees than attendees did not plan to participate in mammography. There was also a tendency (not statistically significant) for nonattendees to see a dentist more seldom than attendees. Women who never saw a physician and those who saw one more than five times per year were both more likely to be nonattendees than those who saw one one to five times per year (Table 3).

Whereas information about the Pap smear and female cancer did not materially influence attendance, women who gave an incorrect answer about the *main* purpose of Pap smears were more likely to be nonattendees than women who gave a correct answer (Table 3). Moreover, women who did not know of the recommended screening interval, or who stated it to be less often than every third year, were also more likely to be nonattendees compared with those who gave a correct answer, as were women who did not know what the treatments of precursors to cervical cancer are. We found no significant differences between nonattendees and attendees concerning knowledge about the recommended age at the *first* or *last* smear, which type of cancer the Pap smear is used to prevent, or what are the risk factors for cervical cancer (data not shown).

Independent of attendance status, many women (34%) believed that the *main* purpose of Pap smears was to detect already developed cancer, and as a corollary, the most frequent answer to the question how precursors were treated was radiation (34%) (data not shown). Only 40% of the women believed that they would have a very big chance to be cured if a precursor to cervical cancer was detected. There also seemed to be a frequent misunderstanding about which type of cancer the Pap smear is supposed to prevent, as the most common answer was "cancer of the uterus" (45%).

TABLE 2  
Gynecological Related Risk Factors for Nonattendance to Pap Smear Screening

	Attendees		Nonattendees		Age-adjusted	
	<i>n</i>	%	<i>n</i>	%	OR	95% CI
Genital symptoms and contraceptive use						
Have had a hysterectomy						
No	489	95.3	393	91.6	1.00	(Ref.)
Yes	24	4.7	36	8.4	2.06	1.19–3.59
Menstrual disturbance, past 5 years <sup>a</sup>						
No	260	50.8	252	58.7	1.00	(Ref.)
Yes	252	49.2	177	41.3	0.75	0.58–0.97
Other genital symptoms, past 5 years <sup>b</sup>						
No	400	78.1	368	85.8	1.00	(Ref.)
Yes	112	21.9	61	14.2	0.56	0.40–0.79
Contraceptive use, past 5 years <sup>c</sup>						
Oral contraceptives	123	24.2	55	12.8	1.00	(Ref.)
Depo-Provera, Norplant, IUD, diaphragm <sup>d</sup>	143	28.1	92	21.5	2.36	1.49–3.74
Condom, spermicides, etc. <sup>e</sup>	77	15.1	96	22.4	4.72	2.88–7.74
None	166	32.6	186	43.4	5.88	3.54–9.78
Visits to a gynecologist						
Visit same/different gynecologist						
Same	290	56.9	143	34.1	1.00	(Ref.)
Different	152	29.8	177	42.1	2.40	1.78–3.23
Only once	35	6.9	41	9.8	2.35	1.43–3.86
Never been to a gynecologist	33	6.5	59	14.1	3.46	2.15–5.58
Usual reasons for visiting a gynecologist <sup>f</sup>						
Cervical smear	45	8.8	13	3.1	0.57	0.29–1.13
Health checkup	132	25.8	67	15.8	1.00	(Ref.)
Contraceptives/HRT <sup>g</sup>	159	31.1	114	26.8	1.34	0.91–1.98
Symptom, pregnancy	142	27.8	172	40.5	2.41	1.66–3.50
Never been to a gynecologist	33	6.5	59	13.9	3.34	1.97–5.68
Initiative to smear at a gynecologist's						
Only on gynecologist's initiative	189	37.7	157	40.9	1.00	(Ref.)
On own initiative	194	38.7	69	18.0	0.42	0.30–0.60
Never had a smear at a gynecologist	119	23.7	158	41.2	1.63	1.18–2.25

<sup>a</sup> Irregular menstruation or amenorrhea, profuse or prolonged menstruation, or climacteric symptoms.

<sup>b</sup> Brittle vulvovaginal mucous membranes, recurrent infections, or other genital symptoms.

<sup>c</sup> Multiple choice question. The categories are in hierarchical order. Women who gave more than one answer were included in the higher category.

<sup>d</sup> Depo-Provera (progesterone-only contraception injection), Norplant (progesterone-only contraception implant), IUD (intrauterine device).

<sup>e</sup> Condoms, spermicides, rhythm method, interruptus coitus.

<sup>f</sup> Multiple choice question. The categories are in hierarchical order. Women who gave more than one answer were included in the higher category.

<sup>g</sup> HRT (hormonal replacement therapy).

Some women (29%) also believed that the Pap smear protects against more than one cancer type. The most common answers to the questions about how often and for how long women are recommended to have Pap smears were "every 2nd year" and "all their life" (39% and 43%, respectively).

### Multivariate Analysis

Nine of the 20 variables associated with nonattendance in the age-adjusted analyses (2 were of borderline significance) remained statistically significant in a multivariate model (Table 4). The strongest predictors of nonattendance were contraceptive use, frequency of visits to a physician, on who's initiative the smear was

taken, and whether the woman visited the same gynecologist. Compared with women who used oral contraceptives, those who used condoms or no contraceptives at all were three to seven times more likely to be nonattendees than others (OR = 3.40, 95% CI 1.83–6.31 and OR = 6.85, 95% CI 3.70–12.68 respectively). Women who visited a physician more than five times a year (OR = 3.12, 95% CI 1.45–6.70) or never (OR = 1.78, 95% CI 1.09–2.90) were more likely to be nonattendees, as were women who used to see different gynecologists (OR = 1.90, 95% CI 1.34–2.70). Women who had had Pap smears on their own initiative (OR = 0.43, 95% CI 0.29–0.62) and those who had had genital problems (OR = 0.56, 95% CI 0.38–0.85) were less likely to be

TABLE 3  
Behavioral and Informational Risk Factors for Nonattendance to Pap Smear Screening

	Attendees		Nonattendees		Age-adjusted	
	<i>n</i>	%	<i>n</i>	%	OR	95% CI
<b>Risk behavior</b>						
Age at first intercourse						
13–16 years,	184	36.8	148	35.8	1.00	(Ref.)
17 years or older	316	63.2	266	64.3	1.11	0.84–1.48
Number of sexual partners						
0–2 <sup>a</sup>	153	31.9	138	34.7	1.00	(Ref.)
3–9	224	46.7	183	46.0	0.89	0.66–1.21
10+	103	21.5	77	19.4	0.82	0.56–1.21
Number of sexual partners, past 5 years						
0–1	416	85.8	364	89.7	1.00	(Ref.)
2+	69	14.2	42	10.3	0.62	0.41–0.95
Use of condoms, past 5 years						
Always	52	10.2	66	15.5	1.67	1.10–2.52
Sometimes	92	18.1	75	17.6	0.97	0.67–1.40
Never	364	71.7	285	66.9	1.00	(Ref.)
<i>P</i> for trend						<i>P</i> = 0.04
Smoker, past 5 years						
No	376	73.4	269	62.7	1.00	(Ref.)
Yes	136	26.6	160	37.3	1.64	1.22–2.16
Pack years, past 5 years						
0 (nonsmoker)	376	73.4	269	62.7	1.00	(Ref.)
1–10	78	15.2	79	18.4	1.38	0.97–1.96
11+	58	11.3	81	18.9	1.99	1.37–2.90
<i>P</i> for trend						<i>P</i> = 0.008
<b>Perceived health status and participation in other health-related activities</b>						
Perceived health status						
Very good	263	51.4	225	52.6	1.00	(Ref.)
Fairly good	217	42.4	182	42.5	1.02	0.78–1.34
Quite to very bad	32	6.3	21	4.9	0.81	0.45–1.46
Participated in mammography						
Yes	374	73.1	279	65.0	1.00	(Ref.)
No	138	27.0	150	35.0	1.48	0.95–2.30
Likelihood of future mammography						
Very likely	462	90.9	345	80.8	1.00	(Ref.)
Fairly likely	37	7.3	65	15.2	2.28	1.47–3.53
Not likely at all	9	1.8	17	4.0	2.50	1.10–5.70
<i>P</i> for trend						<i>P</i> < 0.001
Frequency of visits to a dentist						
Every 2nd year or more often	479	93.6	386	90.0	1.00	(Ref.)
Every 3rd year or more seldom	33	6.5	43	10.0	1.55	0.96–2.49
Frequency seeing a physician, past 5 years						
>5 times/year	16	3.1	26	6.1	2.21	1.14–4.27
1–5 times/year	224	44.0	160	37.6	1.00	(Ref.)
Less than once a year	215	42.2	171	40.1	1.11	0.83–1.48
Never	54	10.6	69	16.2	1.81	1.20–2.74
<b>Information</b>						
Received information about Pap smear						
Yes	440	86.8	376	89.1	1.00	(Ref.)
No	67	13.2	46	10.9	0.75	0.50–1.12
Read articles about female cancer						
Yes	357	69.6	279	65.2	1.00	(Ref.)
No	156	30.4	149	34.8	1.24	0.94–1.63
<b>Knowledge</b>						
Main aim of cervical smears						
Detection of precursor stages	341	66.3	255	59.4	1.00	(Ref.)
Wrong answer	166	32.3	168	39.2	1.36	1.04–1.78
Do not know	7	1.4	6	1.4	0.98	0.32–2.99
Cancer type <sup>b</sup>						
Cervical cancer	174	33.9	137	31.9	1.00	(Ref.)
Wrong answer	322	62.7	272	63.4	1.03	0.78–1.36
Do not know	18	3.5	20	4.7	1.31	0.66–2.59

TABLE 3—*Continued*

	Attendees		Nonattendees		Age-adjusted	
	<i>n</i>	%	<i>n</i>	%	OR	95% CI
Knowledge—Continued						
Recommended screening interval						
Every 3rd year	159	31.0	122	28.4	1.00	(Ref.)
More often	318	62.0	235	54.8	0.96	0.71–1.29
Less often	30	5.8	55	12.8	2.25	1.36–3.74
Do not know	6	1.2	17	4.0	3.58	1.36–9.43
Treatment of precursors						
Correct answer <sup>c</sup>	113	22.1	73	17.1	1.00	(Ref.)
Incorrect answer	343	67.1	284	66.5	1.28	0.92–1.80
Do not know	55	10.8	70	16.4	1.89	1.19–3.01

<sup>a</sup> Including 10 women who never had sexual intercourse with a man (2 attendees and 8 nonattendees).

<sup>b</sup> Multiple-choice question. An answer is defined as correct if it includes one or more correct answer and no incorrect answer.

<sup>c</sup> Biopsy and/or conization and/or laser and/or cryotherapy (freezing of the cervix).

nonattendees. Women who thought the recommended screening interval to be longer than 3 years were more than twice as likely to be nonattendees than were women who knew the recommended interval (OR = 2.16, 95% CI 1.20–3.89). Probability of nonattendance was also higher among women who always used a condom during intercourse (OR = 1.88, 95% CI 1.02–3.47), who stated it would be fairly likely that they would attend mammography screening in the future compared with very likely (OR = 2.00, 95% CI 1.19–3.38), or who lived in rural or semirural areas (OR = 1.54, 95% CI 1.07–2.21) (Table 4). Also, nonattendees were more likely to be smokers than were attendees, although the estimates were no longer statistically significant in the multivariate model (11 or more pack-years OR = 1.51 95% CI 0.97–2.36) and therefore not included (data not shown). Profession no longer contributed significantly to the model when other explanatory variables were entered, but was related to several of them (population size, contraceptive use, frequency of condom use, smoking, on who's initiative the smear was taken, frequency of visits to a physician). This was revealed in a multivariate analysis when profession was used as the outcome (data not shown).

#### DISCUSSION

The purpose of our study was to find reasons why many women choose not to regularly attend Pap smear screening and to validate the reliability of self-reported screening. Nonattendance was positively associated with nonuse of oral contraceptives, visiting different gynecologists, and visiting a physician very often or not at all and negatively associated with intent to participate in future mammography screening and to take own initiative to Pap smear. Frequent condom use, not having had genital problems, living in rural/semirural areas, and not knowing the recommended screening interval were all associated with nonattendance,

whereas socioeconomic status was not. As much as 57% of the nonattendees underestimated the time lapse since last smear.

A strength of our study is the population-based design and access to a database covering *all* cytological screening in the area during the past 30 years. This should eliminate the misclassification that arises when attendance status is based on organized screening only [17] or on self-reports. The observation that women tend to underestimate the time lapse since their last smear [12–14] is confirmed in our study. Misclassification of attendance status would attenuate any true association. Perception of attendance might also be associated with important determinants of attendance, which will introduce bias of unpredictable direction. Indeed, in one study almost all predictors of screening became insignificant when medical charts rather than self-reports were used to truly distinguish nonattendees from attendees [14]. A woman's underestimation of the time lapse could also be a reason why she does not attend. Further, women may not be able to distinguish between Pap smears and pelvic exams [14]. As a corollary, a nonattendee more seldom than an attendee takes own initiative to have a Pap smear.

One potential limitation in our study is the low response rate among nonattendees, 69%, compared with 81% among attendees, showing that nonattendees were also more likely to be nonrespondents. This problem, common in studies on screening behavior [24], is hard to overcome. However, the likely net effect of the underrepresentation of never-screened women among the nonrespondents interviewed is that we underestimate the magnitude of any differences between nonattendees and attendees. Another possible flaw in the study is the less stringent criteria used to define nonattendance among the youngest women (25–29 years). This group is too small for meaningful stratified analyses of all

TABLE 4

Best Fitting Multivariate Model<sup>a</sup> to Explain Nonattendance to Pap Smear Screening

	Multivariate modeling	
	OR	95% CI
Population size		
Metropolitan areas	1.00	(Ref.)
Cities or towns	1.40	0.95–2.06
Semirural or rural areas	1.54	1.07–2.21
Genital symptoms, past 5 years		
No	1.00	(Ref.)
Yes	0.56	0.38–0.85
Contraceptive use, past 5 years		
Oral contraceptives	1.00	(Ref.)
Depo-Provera, Norplant, IUD, diaphragm	2.69	1.56–4.64
Condom, spermicides, etc.	3.40	1.83–6.31
None	6.85	3.70–12.68
Visit same/different gynecologist		
Same	1.00	(Ref.)
Different	1.90	1.34–2.70
Only once	1.46	0.82–2.60
Never been to a gynecologist	2.35	1.23–4.48
Initiative to smear at a gynecologist's		
Only on gynecologist's initiative	1.00	(Ref.)
On own initiative	0.43	0.29–0.62
Never had a smear at a gynecologist	1.10	0.73–1.68
Use of condoms, past 5 years		
Always	1.88	1.02–3.47
Sometimes	1.22	0.75–2.00
Never	1.00	(Ref.)
Likelihood of future mammography		
Very likely	1.00	(Ref.)
Fairly likely	2.00	1.19–3.38
Not likely	1.35	0.52–3.54
Frequency of visits to a physician, past 5 years		
>5 times/year	3.12	1.45–6.70
1–5 times/year	1.00	(Ref.)
Less than once/year	1.09	0.77–1.52
Never	1.78	1.09–2.90
Recommended screening interval		
Every 3rd year	1.00	(Ref.)
More often	1.07	0.75–1.52
Less often	2.16	1.20–3.89
Do not know	2.76	0.84–8.99

Note. All estimates are controlled for age at interview.

<sup>a</sup> This analysis was based on 479 attendees and 373 nonattendees. Missing answers were mainly due to the question about initiative to smear (12 attendees and 46 nonattendees).

possible predictors of nonattendance. However, the differences between nonattendees and attendees tended to be smaller in this age group (data not shown).

It is crucial to determine if nonattendees and attendees differ in risk factors for cervical cancer, such as socioeconomic status and risk behavior. Socioeconomic status is, in fact, one of the most investigated determinants of screening attendance [9–11,19]. It has been argued that women with low socioeconomic status, who have a higher risk for cervical cancer [25], also are overrepresented among nonattendees [9,10,19,20]. Our

results, however, indicate that socioeconomic status does not have an effect on attendance status after controlling for other variables. In Sweden, traditional economic barriers for utilizing health care have been removed, although one recent study showed that there still exist differences in health care utilization among women depending on disposable income [26]. If socioeconomic status is related to economic barriers for utilizing health care, it may affect our results. However, studies in other settings, with other conditions, have reached similar results [11,15]. The association between socioeconomic status and attendance might rather be explained by other more specific characteristics [15], as indicated when we analyzed profession as a dependent variable. One demographic factor, population size, retained its effect after controlling for other variables. This agrees with earlier findings [11,15]. Longer distances to the maternity wards or less access to a gynecologist are possible reasons why semirural and rural women may be more reluctant to participate to screening.

We, as others [18,21], did not find any evidence that high-risk sexual behavior was more common among nonattendees. In fact, nonattendees were more likely than attendees to protect themselves from contracting sexually transmitted diseases, by always using condoms during intercourse. This protective behavior may, in itself, lead to less need to seek medical care.

Nevertheless, we found that nonattendees and attendees differed in intent to participate in future mammography and frequency of visits to a physician. This indicates that nonattendees to Pap smear screening are not as keen to participate in other health-related activities, as are attendees. They also less often take the Pap smear on their own initiative. Our results are in accordance with other studies in which most women have had Pap smears as part of a gynecological examination [15]. Women who do not have gynecological examinations for any other reason may not conceive the Pap smear, in itself, as reason enough to visit a gynecologist or a midwife. However, it has been shown [27] that women who visit a gynecologist regularly to get a prescription for oral contraceptives may also continue to have Pap smears when they get older. To visit the same gynecologist is of importance too. This may be the effect of a better doctor–patient relation and the fact that it must be easier for gynecologists to keep track of the screening history of regular patients.

Like previous studies [15], more nonattendees than attendees believed that the smear test should be taken with longer intervals than recommended. This misconception would entail that even women positive to Pap smears might be examined too infrequently. In general, the knowledge about the Pap smear and cervical cancer was poor. According to other studies many women believe that the main purpose of the Pap smear is to detect existing cervical cancer [15,23] or that it is used to



prevent other types of cancer [16]. Our results agree with these findings. Obviously, information about the purpose of the smear test needs to be improved. Women who do not understand the benefits of Pap smear screening may not participate due to anticipated anxiety and may see little value of testing [15,17,23].

This study was conducted within one Swedish county. Since women were randomly selected within the nonattendee and attendee groups there should be no problem in generalizing these results to the county of Uppsala (taking into consideration the differential nonresponse between the two groups). Can our results be generalized to the rest of the country or even to settings outside Sweden? The mix of organized and self-referred screening differs over the country, but we found no major impact of type of screening on our results. Given that women do not differ geographically in their behavior we believe our results can be generalized to the whole country. They may also be important in other settings, given the objective definition of attendance and the coverage of all screening within a defined area. In fact, much of our results were in accordance with studies performed in other settings.

We conclude that socioeconomic status and sexual risk behavior had no impact on attendance status after controlling for other variables. More important are factors related to gynecological visits and women's own activity in order to have the Pap smear. The regularity of visits to a gynecologist or a physician who conducts gynecological examinations, and the knowledge that may guide women to have Pap smears on their own initiative, are important factors for recurrent screening. Improving information about Pap smear screening and its benefits is one way to increase women's consciousness. Since most women, at some point, will have a gynecological examination, good opportunities do exist for distributing information, both face to face and on paper. In organized screening, the written invitations are an obvious additional opportunity.

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