Sexual behaviour and HPV infection in British women, by postal questionnaires and telephone interviews

Journal:	<i>Journal of Medical Virology</i>
Manuscript ID:	JMV-10-2181
Wiley - Manuscript type:	Research Article
Date Submitted by the Author:	27-Oct-2010
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Keywords:	HPV, cervical cancer, sexual behaviour, HPV acquisition, postal questionnaires, telephone interviews

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Sexual behaviour and HPV infection in British women, by postal questionnaires and telephone interviews

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This epidemiological study was conducted in the London School of Hygiene and Tropical Medicine. The study population was composed of women participating in the ARTISTIC (A Randomised Trial In Screening To Improve Cytology) trial ran in Greater Manchester.

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Shortened title: **Sexual behaviour and HPV in British women**

For Peer Review

1 **Abstract**

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3 Sexually transmitted human papillomaviruses (HPVs), most frequently HPV 16, are the primary cause of
4
5 cervical carcinogenesis. The aim of this study was to evaluate the relationship between sexual behaviour and
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7 prevalence and acquisition of HPV infection among British women attending regular screening who responded
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9 to postal questionnaires and/or telephone interviews. A total of 1880 women who had been tested for HPV in
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11 the ARTISTIC trial were randomised to three methods of data collection: group 1 (questionnaire only), group 2
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13 (questionnaire excluding sexual history, short interview) and group 3 (questionnaire, longer interview). Sexual
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15 history collected included age at first sexual intercourse, sexually transmitted diseases, lifetime (total and
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17 regular) sexual partners and partners in the last five years (total and new). Demographics, reproductive,
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19 screening and smoking history were also collected in questionnaires. The overall participation rate was 35%.
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21 There was good agreement (87.4%-95.5%) on sexual behaviour answers in questionnaires and interviews in
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23 women in group 3 and no significant differences between data obtained by questionnaire or interview. Odds
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25 ratios (OR) for both HPV prevalence and acquisition increased consistently with increasing numbers of lifetime
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27 sexual partners, regular partners and new partners in the last five years. No significant association was found for
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29 other characteristics investigated. The effect of recent partners on HPV acquisition (OR for 2+ new partners:
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31 4.4, 95%CI: 1.7-11.2) was stronger than that of earlier partners (OR for 2+ earlier partners: 2.2, 95%CI: 0.7-6.7)
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33 suggesting that most incident HPV infections are newly acquired rather than recurrent.
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40 Word count: 245

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Key words:

HPV

Cervical cancer

Sexual behaviour

HPV acquisition

Postal questionnaires

Telephone interviews

For Peer Review

Introduction

Cervical cancer is the second most common cancer among women worldwide [Parkin, 2004], and is more frequent in many socio-economically deprived populations [Almonte et al., 2008]. Human papillomaviruses (HPVs), most frequently HPV 16, are the primary cause of cervical carcinogenesis [International Agency for Research on Cancer, 1995]. Over 100 HPV types have now been described, including 13 ‘high-risk’ types that are definitely associated with cervical cancer and several more that are probably carcinogenic [International Agency for Research on Cancer, 2007]. The overall prevalence of HPV in cervical cancers worldwide is over 99%, implying the highest attributable fraction ever identified for a specific cause of a major human cancer [Walboomers et al., 1999].

HPV is one of the most common sexually transmitted infections [Bosch et al., 2008]. Most women become infected during their lives, although the majority of the infections are transient and clear within two years [Plummer et al., 2007]. HPV genital acquisition is associated with sexual behaviour patterns such as early age at first sexual intercourse, number of sexual partners and sexual behaviour of the partner; and certain co-factors (high parity, long-term use of hormonal contraceptives and cigarette smoking) help in the progression from infection to cancer [Almonte et al., 2008; Vaccarella et al., 2006; Vaccarella et al., 2008].

This study describes sexual behaviour patterns in relation to HPV prevalence and acquisition rates among British women who participated in the ARTISTIC trial (A Randomised Trial In Screening To Improve Cytology), which was conducted in Greater Manchester [Kitchener et al., 2006]. In order to compare responses and participation rates, the method of ascertaining sexual behaviour was randomised between postal questionnaire, telephone interview, and both.

Materials and Methods

The ARTISTIC trial

In the ARTISTIC (A Randomised Trial In Screening To Improve Cytology) trial, 24,510 women aged 20-64 who were attending for routine cervical cytology in four health authorities (Manchester, Salford & Trafford, Wigan and Stockport) in 2001-2003 were screened with liquid-based cytology (LBC) and HPV testing [Kitchener et al., 2006]. LBC samples were collected and processed using ThinPrep (Cytic). Hybrid Capture 2 (hc2, Qiagen) was used to test for high-risk HPV DNA. This nucleic acid microplate chemiluminescent detection assay detects 13 high-risk HPV types (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68). Results were read and calculated on the Digene Microplate Luminometer 2000 (DML 2000; Qiagen) using the hc2 software at the recommended relative light units (RLU) to control ratio of greater than or equal to 1.0. HPV results were reported independently of cytology.

At entry, women were randomly allocated in a 1:3 ratio to have their HPV results concealed or revealed. Cytologically normal women in the revealed arm who were HPV positive (HPV+) were recalled a year later, and those with persistent HPV were offered colposcopy. Women were invited to a second screening round between 26 and 54 months after entry into the study.

Study population

A random sample of 1880 ARTISTIC participants who attended the second screening round (26 to 54 months after entry) and who had an adequate cytology in the second round was selected. All women had a satisfactory HPV test at entry, and the majority (87%) had adequate HPV tests at the next screening round.

Data collection

These women were randomised to three methods of obtaining the sexual behaviour data: postal questionnaire only (group 1), postal questionnaire excluding sexual history and a short interview including sexual behaviour (group 2) and both postal questionnaire and longer interview containing sexual behaviour including a calendar of sexual partners (group3). All women received an invitation package containing a description of the study, a consent form and a postal questionnaire that included age, current weight and height, marital status, education,

1 smoking, reproductive history (menarche, menopause, parity and use of hormonal contraceptives), and age at
2 first smear . The questionnaire for groups 1 and 3, which was similar to that used in a previous study in the
3 Manchester area [Deacon et al., 2000], had an additional section with questions on sexual behaviour. These
4 included age at first sexual intercourse, ever having a sexual transmitted disease (STD), and numbers of regular
5 (more than 3 months) and shorter relationships with male sexual partners overall and in the previous five years.
6 The interview for groups 2 and 3 included the same sexual behaviour questions, so questionnaire and interview
7 responses could be compared for women in group 3. The interview for group 3 also included further details on
8 each relationship (age, duration and contraceptive method). Additionally, questionnaires and both short and
9 long interviews included three common questions: current weight, current height, and age at first cervical
10 screening so these variables could also be compared in questionnaires and interviews in groups 2 and 3. Short
11 interviews lasted eight minutes and long ones 16 minutes on average and were conducted by a trained research
12 nurse with expertise in conducting telephone interviews for different cancer related studies.

13 Women were informed in the invitation letter whether they would also be interviewed or would only need to
14 return the questionnaire. All women were asked to give a blood sample for future studies and signed consent for
15 their screening records to be reviewed by the investigators. Non-responders were sent a reminder letter 3-10
16 months later.

17 Ethical approval was provided by the North West Multicentre Research Ethics Committee (MREC).

18 ***Statistical Analysis***

19 To ensure the return of 200 questionnaires in each group, a minimal response rate of 32% was assumed, so
20 invitation packages were sent to 1880 women.

21 Non-response and refusal rates were based on all women who were sent a questionnaire. Further analyses were
22 restricted to women who returned both the consent form and questionnaire. Current BMI was calculated in
23 kg/m² and was categorised in four groups (<18.5, 18.5-24.9, 25-29.9, and, 30 or more kg/m²). Kappa statistics
24 were used to compare questionnaire and interview responses of women in group 2 (BMI and age at first smear)
25 and group 3 (BMI, age at first smear, and, sexual behaviour variables). Analyses of HPV status at the second

1 screening round were restricted to women who had an HPV test result both at entry and at the second screening
2 round 26 to 54 months later. Age-adjusted odds ratios (AORs) with corresponding 95% confidence intervals
3 (95%CI) for HPV prevalence at the second round (HPV detection at the second round irrespective of HPV
4 test result in the first round) and for HPV acquisition (HPV detection at round 2 in women who were HPV
5 negative in round 1) were calculated by unconditional logistic regression for single variables, and for the
6 combined effects of new partners in the last five years and earlier partners. Two-sided significance levels were
7 calculated using Fisher's exact test or chi-square tests for trend or heterogeneity. All analyses were carried out
8 using Stata 10.

1 **Results**

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4 Of the 1880 women selected, 661 (34% in group 1, 37% in group 2 and 34% in group 3) agreed to participate
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6 (512 at first invitation), 182 (10%) refused and 1037 (55%) did not reply to the invitation or reminder. Among
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8 1037 non-respondents, two women died, three withdrew from the ARTISTIC trial and 163 (16%) changed
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10 address during the invitation process (information from the trial coordination office or by returned mail). There
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12 were no significant differences between randomisation groups (group 1: questionnaire; group 2: questionnaire
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14 excluding sexual history, short interview; group 3: questionnaire, longer interview) in response, refusal and
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16 non-response rates. Nine women in group 2 and 14 in group 3 returned the questionnaire but were not
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18 interviewed. Table I shows overall participation rates in this study and numbers in each group by age, allocated
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20 screening protocol (HPV result revealed or concealed), cytology at entry, and HPV status at entry and at the
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22 second screening round in the ARTISTIC trial. Participation rates ranged from 29% to 39%, being lower among
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24 women aged under 35 ($P = 0.03$) and those who had been randomised in the ARTISTIC trial to have their HPV
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26 results concealed ($P = 0.01$). Among women who responded there were no significant between-group
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28 differences for any of the screening results shown in Table I.
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35 Similarly, there were no statistically significant between-group differences for any variables not related to
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37 sexual behaviour collected in questionnaires (Supplementary Table I) , therefore these data was pooled and
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39 analyse for all women (three groups). Age at second screening round was associated with both HPV acquisition
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41 and HPV prevalence, while marital status, ever been pregnant, menopausal status and ever used hormonal
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43 contraceptives smear were associated with HPV prevalence at second round (Table II). But no associations
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45 remained significant after adjusting for age at second round (Age-adjusted odds ratios (AORs): 0.6 (95%CI:
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47 0.3-1.1) for being married or cohabiting, 0.9 (95%CI: 0.4-1.8) for ever been pregnant, 1.4 (95%CI: 0.4-4.6) for
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49 being menopausal, and 3.9 (95%CI: 0.9-17.5) for ever use of hormonal contraceptives).
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54 Table III shows responses to questions on sexual behaviour from questionnaires for groups 1 and 3, from
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56 interviews for groups 2 and 3, and for all women (questionnaire data in groups 1 and 3, interview data in group
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58 2). The only statistically significant difference was in the proportion of women reporting first intercourse at age
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20 or later, which was higher in group 2 (short interview) than in group 3 (extended interview) (29.2% v 19.1%: $P = 0.02$). The right-hand part of Table IV shows percentage agreement (exact and within one category) on questionnaire and interview responses to these questions by women in group 3. There was good agreement (87.4%-95.9% exact, 99.5%-100% within one category) for all questions. A similar analysis for BMI and age at first smear also showed good agreement between responses in questionnaires and interviews (agreement for current BMI: 92.2% in group 2 and 90.4% in group 3 and for age at first smear: 85.3% in group 2 and 81.3% in group 3, Supplementary Table II).

Table IV shows age-specific rates for HPV prevalence at the next screening round and for HPV acquisition (HPV positive at round 2 in women who were HPV negative at entry) for all women with an HPV test at the second screening round. The lower part of Table IV shows age-adjusted HPV prevalence and acquisition ORs for each sexual history question, and for a multiple regression analysis including age, number of sexual partners within the last five years, and number of earlier partners. ORs for both prevalence and acquisition increased consistently with increasing numbers of lifetime sexual partners and lifetime regular partners. For HPV acquisition the effect of new partners in the last five years (OR for 2+ new partners: 4.4, 95%CI 1.7-11.2) appeared to be stronger than that of earlier partners (OR for 2+ earlier partners: 2.2, 95%CI 0.7-6.7).

Table V tabulates the age at first sexual intercourse by number of sexual partners over life and in the last five years according to year of birth. There were marked changes in sexual behaviour between women born before 1940 and those born in 1970-1979. The percentage with more than one lifetime sexual partner increased from 50% (10/20) to 94% (125/133) (P for trend < 0.001) and the percentage reporting a sexual relationship before age 17 increased from zero (0/20) to 44% (58/133) (P for trend < 0.001). Similar cohort trends were observed for number of sexual partners in the last five years.

Table VI shows lifetime numbers of sexual partners by age, reported by women participating in a large national survey of sexual attitudes and lifestyles (NATSAL) conducted in 2000 [Johnson et al., 2001] and in women in the present study who were aged 17-45 in 2000. (Lifetime number of partners up to 2000 was estimated as the number of partners more than five years before the survey, as 89% of questionnaires/interviews were filled

1 (conducted) between 2004 and 2006). The distributions of the number of lifetime sexual partners in women
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3 aged 25 or older were similar (average number of sexual partners 7.1 in this study and 6.9 in NATSAL 2000,
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5 respectively), but below age 25 a substantially larger proportion of respondents reported five or more partners
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7 (63%) than in NATSAL (36%), presumably reflecting a tendency for women with several partners to attend for
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9 screening earlier.
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Discussion

Cervical cancer is the second most common cancer among women worldwide [Parkin, 2004], with the highest attributable fraction ever identified for a specific cause of a major human cancer [Walboomers et al., 1999]. HPV 16 and 18 are the most frequent types associated with cervical cancer and two prophylactic vaccines against these high-risk types are available and being used to vaccinate young women (mostly adolescents) in several countries. Most HPV infections are no longer detectable two years later [Plummer et al., 2007; Rodriguez et al., 2008], but it is not known whether HPV in a woman who was HPV negative at a previous test is usually newly acquired or a recurrence of a latent infection. HPV testing may soon replace cytology as the primary cervical screening test, at least in older women, and the significance of transient and persistent infections is an important aspect of the natural history of HPV infection and cervical neoplasia in relation to screening policy and clinical management. Viral latency is also relevant to the effectiveness of HPV vaccination in older women, many of whom have cleared a previous HPV infection. This study describes the sexual behaviour patterns in relation to HPV prevalence and HPV acquisition rates in a sample of British women attending regular cervical screening.

The multiple regression results suggest that most incident infections are newly acquired, as HPV acquisition was determined mainly by the number of new sexual partners in the last five years (OR for 2+: 4.4, 95%CI 1.7-11.2). The smaller and non-significant effect for earlier partners (OR for 2+: 2.2, 95%CI 0.7-6.7) is presumably due at least partly to residual confounding, as the partner of a woman who has had multiple partners is more likely to have had several partners himself. A weak association of lifetime number of sexual partners with HPV acquisition once the effect of recent partners was taken into account has been seen in a number of studies [Moscicki et al., 2001; Velicer et al., 2009]. Several studies have shown a high risk of new HPV infection in young women following a new sexual relationship [Giuliano et al., 2002; Ho et al., 1998; Moscicki et al., 2001; Nielsen et al., 2009; Oh et al., 2008; Velicer et al., 2009; Winer et al., 2006]. A study in young women in the US [Moscicki et al., 2001] reported that 55% of uninfected women aged under 22 years attending family planning clinics acquired an HPV infection within three years, the risk increasing with numbers of new partners.

1 Data on HPV acquisition in older women are sparse, and the reason for the high HPV prevalence seen in older
2 women in many developing countries [Ferrecio et al., 2004; Herrero et al., 2000; Lazcano-Ponce et al., 2001;
3 Molano et al., 2002] is not known. Twenty-seven (10.0%) of the women aged over 45 in this study reported one
4 or more new partners in the last five years and 11.1% (3/27) of these had a new HPV infection at the second
5 round, compared with 3.7% (9/243) of those with no new partner.
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11 The results of this study are limited because it was not powered to evaluate the association between sexual
12 activity and HPV status; instead the sample size was fixed to a minimum of 200 women targeted by each
13 method of data collection assuming a minimal response rate of 30%. However, these limited data clearly
14 suggest that HPV is often recently acquired rather than persistent or recurrent even in older women.
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21 Postal questionnaires are less expensive and perhaps less intrusive than personal interviews, but they may
22 provide less reliable information on sensitive sexual behaviour data. The comparison of responses on sexual
23 behaviour showed no substantial differences between British women returning postal questionnaires and those
24 interviewed by telephone, or between questionnaire and interview responses by women who provided both.
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26 Among women aged 25 or older the distribution of sexual partners observed in this study was similar to the
27 results of Natsal 2000 [Johnson et al., 2001], which was based on a national random sample of women
28 interviewed at home (Table VI). Similarly, the patterns of sexual behaviour reported by South Korean students
29 returning a postal questionnaire [Shin et al., 2004] were similar to those obtained by a household interview in
30 The National Health and Nutrition South Korea Survey [Oh et al., 2008]. A recent study conducted in the US
31 suggests that reporting of potentially sensitive items such as very early sexual intercourse in women and late
32 first intercourse in men is increased when telephone interviews are automated rather than conducted by an
33 interviewer [Turner et al., 2009].
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51 For both scientific and practical reasons it thus appears that personal interviews, at least in this field, have no
52 advantages over more impersonal and less expensive alternatives. Postal questionnaires or automated telephone
53 interviews are easier and less expensive to administer and code consistently than personal interviews. This is an
54 important finding, as large samples will need to be surveyed to monitor future changes in sexual behaviour
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among adolescents who are now being vaccinated against HPV and will not reach the age of 25 years when cervical screening begins for more than a decade.

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1 **Acknowledgements**

2 The current study was funded by Cancer Research UK. The ARTISTIC trial was funded by the UK Health
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5 Technology Assessment Programme.
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9 The authors have no conflict of interest to disclose.
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Table I. Study participants: characteristics at entry and second round screening in the ARTISTIC trial

	Group 1		Group 2		Group 3		Participants		All women	Participation
	No.	%	No.	%	No.	%	No.	%	invited	rate (%)
Total	215	100	233	100	213	100	661	100	1880	35.2
Age at entry in the ARTISTIC Trial										
20-24	23	10.7	16	6.9	18	8.5	57	8.6	191	29.8
25-34	42	19.5	57	24.5	41	19.3	140	21.2	459	30.5
35-44	67	31.2	77	33.1	71	33.3	215	32.5	562	38.3
45-54	47	21.9	52	22.3	51	23.9	150	22.7	407	36.9
55-64	36	16.7	31	13.3	32	15.0	99	15.0	261	37.9
									<i>P</i> =	0.03 (4 df)
Allocated screening protocol in ARTISTIC Trial										
HPV Revealed	181	84.2	174	74.7	160	75.1	515	77.9	1 399	36.8
HPV Concealed	34	15.8	59	25.3	53	24.9	146	22.1	481	30.4
									<i>P</i> =	0.01 (1 df)
Cytology at entry in the ARTISTIC Trial										
Negative	185	86.1	206	88.4	181	85.0	572	86.5	1 598	35.8
Borderline/Mild	22	10.2	20	8.6	21	9.9	63	9.5	216	29.2
Moderate/worse	8	3.7	7	3.0	11	5.2	26	3.9	66	39.4
									<i>P</i> =	0.12 (2 df)
HPV testing in the ARTISTIC Trial										
At entry										
Negative	181	84.2	195	83.7	178	83.6	554	83.8	1 567	35.4
Positive	34	15.8	38	16.3	35	16.4	107	16.2	313	34.2
									<i>P</i> =	0.69 (1df)
At second round										
Negative	167	77.7	189	81.1	162	76.1	518	78.4	1 419	36.5
Positive	17	7.9	18	7.7	19	8.9	54	8.2	151	35.8
Not done	31	14.4	26	11.2	32	15.0	89	13.5	310	28.7
									<i>P</i> =	0.03 (2 df)
At entry/second round										
Neg/Neg	147	68.4	165	70.8	145	68.1	457	69.1	1 257	36.4
Neg/Pos	11	5.1	11	4.7	10	4.7	32	4.8	82	39.0
Pos/Neg	20	9.3	24	10.3	17	8.0	61	9.2	162	37.7
Pos/Pos	6	2.8	7	3.0	9	4.2	22	3.3	69	31.9
Neg/no test	23	10.7	19	8.2	23	10.8	65	9.8	228	28.5
Pos/no test	8	3.7	7	3.0	9	4.2	24	3.6	82	29.3
									<i>P</i> =	0.17 (5 df)

Group 1: Questionnaire (included sexual behaviour).

Group 2: Questionnaire (without sexual behaviour) and short interview (with sexual behaviour).

Group 3: Questionnaire and long interview (both included sexual behaviour).

Table II. Characteristics of participants collected in questionnaires by HPV prevalence and HPV acquisition at second round

	HPV prevalence at second round ¹					HPV acquisition at second round ²				
	HPV neg		HPV pos		P (df)	HPV neg		HPV pos		P (df)
	No.	%	No.	%		No.	%	No.	%	
Age at second screening round										
20-24	10	62.5	6	37.5	< 0.001	4	57.1	3	42.9	< 0.001
25-34	85	80.2	21	19.8	(5)	66	85.7	11	14.3	(5)
35-44	165	93.8	11	6.3		145	96.0	6	4.0	
45-54	145	95.4	7	4.6		135	97.1	4	2.9	
55-64	98	95.2	5	4.9		93	94.9	5	5.1	
65+	15	79.0	4	21.1		14	82.4	3	17.7	
Being married/cohabiting										
Yes	396	92.3	33	7.7	0.01	359	94.5	21	5.5	0.08
No	121	85.2	21	14.8	(1)	97	89.8	11	10.2	(1)
Age when education completed										
<18	271	90.6	28	9.4	0.98	238	92.6	19	7.4	0.33
18	244	90.7	25	9.3	(1)	218	94.8	12	5.2	(1)
Menarche										
<12	81	85.3	14	14.7	0.06	71	92.2	6	7.8	0.65
12+	433	91.5	40	8.5	(1)	382	93.6	26	6.4	(1)
Ever pregnant										
Yes	425	91.8	38	8.2	0.03	382	93.9	25	6.2	0.47
No	83	84.7	15	15.3	(1)	65	91.6	6	8.5	(1)
No. alive births										
0	25	86.2	4	13.8	0.18	22	91.7	2	8.3	0.33
1-2	299	93.4	21	6.6	(2)	272	95.1	14	4.9	(2)
3+	107	89.2	13	10.8		94	91.3	9	8.7	
Menopausal status										
Menopausal	200	93.9	13	6.1	0.04	183	95.3	9	4.7	0.18
Pre-menopausal	317	88.6	41	11.5	(1)	273	92.2	23	7.8	(1)
Ever used hormonal contraceptives										
Yes	448	89.6	52	10.4	0.04	393	92.9	30	7.1	0.22
No	70	97.2	2	2.8	(1)	64	97.0	2	3.0	(1)
Age at first smear										
<20	127	87.0	19	13.0	0.14	105	91.3	10	8.7	0.38
20+	288	91.4	27	8.6	(1)	257	93.8	17	6.2	(1)
Ever smoker										
Yes	238	90.2	26	9.9	0.76	207	92.8	16	7.2	0.61
No	280	90.9	28	9.1	(1)	250	94.0	16	6.0	(1)

¹ HPV prevalence at second round: HPV detection at round 2 irrespectively of HPV test result at round 1.

² HPV acquisition at second round: HPV detection at round 2 in women HPV negative at round 1.

Table III. Agreement on reported sexual behaviour variables between groups, and between questionnaires and interviews within group 3

	Between group <i>P</i> (4 df)	Group 1 questionnaires No. (%)	Group 2 interviews No. (%)	Group 3 questionnaires No. (%)	All women No. (%)	Group 3 interviews No. (%)	Group 3: questionnaires v interviews			
							Exact agreement % kappa		± one category % kappa	
Total		215 (100)	224 (100)	213 (100)	652 (100)	199 (100)				
Age at first sexual intercourse	0.04									
<17		74 (34.6)	60 (26.9)	74 (35.1)	208 (32.1)	71 (35.7)	87.4	0.80	100	1.0
17-19		98 (45.8)	98 (44.0)	99 (46.9)	295 (45.5)	90 (45.2)				
20+		42 (19.6)	65 (29.2)	38 (18.0)	145 (22.4)	38 (19.1)				
Not answered		1	1	2	4	-				
Ever having STDs	0.41									
None		151 (75.9)	161 (81.7)	151 (77.4)	463 (71.1)	157 (80.1)	88.8	0.68		
Any specified ¹		30 (15.1)	25 (12.7)	33 (16.9)	88 (13.5)	30 (15.3)				
Other unspecified ¹		18 (9.1)	11 (5.6)	11 (5.6)	40 (15.4)	9 (4.6)				
Not answered		16	27	18	61	3				
Lifetime sexual partners	0.55									
0-1		54 (25.1)	54 (24.4)	41 (19.3)	149 (23.0)	41 (20.8)	94.4	0.91	100	1.0
2-4		71 (33.0)	70 (31.7)	68 (32.1)	209 (32.3)	63 (32.0)				
5+		90 (41.9)	97 (43.9)	103 (48.6)	290 (44.8)	93 (47.2)				
Not answered		0	3	1	4	2				
Lifetime regular sexual partners ²	0.56									
0-1		61 (29.2)	64 (28.8)	51 (25.1)	176 (27.8)	52 (26.3)	89.0	0.83	99.5	0.97
2-4		95 (45.5)	89 (40.1)	92 (45.3)	276 (43.5)	89 (45.0)				
5+		53 (25.4)	69 (31.1)	60 (29.6)	182 (28.7)	57 (28.8)				
Not answered		6	2	10	18	1				
Sexual partners in the last five years	0.74									
0-1		170 (80.6)	184 (82.5)	170 (81.3)	524 (81.5)	162 (81.8)	95.9	0.87	99.5	0.94
2-4		31 (14.7)	32 (14.4)	27 (12.9)	90 (14.0)	26 (13.1)				
5+		10 (4.7)	7 (3.1)	12 (5.7)	29 (4.5)	10 (5.1)				
Not answered		4	1	4	9	1				
New partners in the last five years	0.45									
0-1		176 (85.9)	198 (88.8)	171 (84.7)	545 (86.5)	171 (86.4)	94.7	0.79	99.5%	0.94
2-4		20 (9.8)	21 (9.4)	21 (10.4)	62 (9.8)	18 (9.1)				
5+		9 (4.4)	4 (1.8)	10 (5.0)	23 (3.7)	9 (4.6)				
Not answered		10	1	11	22	1				

¹ Specified STDs: trichomonas, genital warts, herpes, gonhorrea and chlamydia. Unspecified STDs: any other infection excluding thrush. ² Regular sexual partners defined as relationships lasting three or more months.

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Table IV. HPV prevalence at second screening round and HPV acquisition in women who were HPV negative at round 1. Age-adjusted ORs for each sexual variable, and multivariate analysis fitting age, new partners in last five years and partners over five years ago

	HPV prevalence at second round				HPV acquisition at second round (women HPV neg at entry)			
	All women	No. (%) HPV pos	Age-adjusted OR (95%CI)	Multivariate OR (95%CI)	HPVneg at entry	No. (%) HPV+	Age-adjusted OR (95%CI)	Multivariate OR (95%CI)
Age at second screening round								
20-24	15	5 (33.3)		1.4 (0.4-4.9)	7	3 (42.9)		3.2 (0.6-17.9)
25-34	104	20 (19.2)		1.0	77	11 (14.3)		1.0
35-44	174	11 (6.3)		0.4 (0.2-0.9)	150	6 (4.0)		0.4 (0.1-1.1)
45-54	151	7 (4.6)		0.3 (0.1-0.8)	138	4 (2.9)		0.3 (0.09-1.2)
55-64	103	5 (4.9)		0.4 (0.1-1.3)	98	5 (5.1)		0.8 (0.2-2.8)
65+	19	4 (21.1)		2.1 (0.6-8.1)	17	3 (17.7)		3.2 (0.6-15.4)
Age at first sexual intercourse								
≤16	175	22 (12.6)	1.0		148	14 (9.5)	1.0	
17-19	259	19 (7.3)	0.7 (0.4-1.5)		213	9 (4.2)	0.6 (0.2-1.6)	
20+	128	11 (8.6)	0.9 (0.4-2.2)		122	9 (7.4)	1.0 (0.3-2.9)	
Ever having STDs								
None	400	34 (8.5)	1.0		354	21 (5.9)	1.0	
Specified ¹	77	14 (18.2)	2.0 (1.0-4.2)		59	9 (15.3)	2.5 (1.0-6.1)	
Unspecified ¹	88	4 (4.6)	0.5 (0.2-1.6)		73	2 (2.7)	0.5 (0.1-2.2)	
Lifetime sexual partners								
0-1	141	6 (4.3)	1.0		137	4 (2.9)	1.0	
2-4	178	11 (6.2)	1.5 (0.5-4.2)		155	7 (4.5)	1.8 (0.5-6.8)	
5+	246	35 (14.2)	3.4 (1.2-9.6)		194	21 (10.8)	5.0 (1.4-18.7)	
Lifetime regular partners								
0-1	164	6 (3.7)	1.0		154	3 (2.0)	1.0	
2-4	231	22 (9.5)	2.5 (0.9-6.7)		194	12 (6.2)	3.8 (0.9-14.9)	
5+	155	22 (14.2)	3.6 (1.3-10.3)		124	15 (12.1)	8.1 (1.9-34.2)	
Sexual partners > 5 years ago								
0-1	150	8 (5.3)	1.0		143	5 (3.5)	1.0	
2-4	183	13 (7.1)	1.4 (0.5-3.6)	1.7 (0.7-4.2) ²	157	8 (5.1)	1.7 (0.5-5.8)	2.2 (0.7-6.7) ²
5+	227	31 (13.7)	2.4 (0.9-6.3)		182	19 (10.4)	3.6 (1.1-12.1)	
New partners in last 5 years								
0-1	492	33 (6.7)	1.0		435	20 (4.6)	1.0	
2-4	52	12 (23.1)	2.6 (1.1-5.9)	3.1 (1.5-6.5) ²	37	7 (18.9)	3.5 (1.2-10.1)	4.4 (1.7-11.2) ²
5+	16	7 (43.8)	6.0 (1.9-19.3)		10	5 (50.0)	12.0 (2.6-55.8)	

¹ Specified STDs: trichomonas, genital warts, herpes, gonorrhea, chlamydia. Unspecified STDs: any other infection excluding thrush. ² ORs compared two or more sexual partners with less than two partners.

Table V. Lifetime and recent sexual partners by age at first sexual intercourse and year of birth

Age at first sexual intercourse	Year of birth														
	<1940			1940-49			1950-59			1960-69			1970-79		
	Lifetime sexual partners (n = 625) ¹														
	0-1	2-4	5+	0-1	2-4	5+	0-1	2-4	5+	0-1	2-4	5+	0-1	2-4	5+
≤16				5	6	4	3	18	20	2	19	54	1	9	48
17-19	1	5		18	30	5	24	23	37	11	35	43	6	16	38
20+	9	4	1	34	10	3	21	12	5	11	12	7	1	7	7
	Sexual partners in the last five years (n = 618) ¹														
	0-1	2-4	5+	0-1	2-4	5+	0-1	2-4	5+	0-1	2-4	5+	0-1	2-4	5+
≤16				14			32	7	1	58	12	5	33	18	6
17-19	6			49	2		74	7	2	79	10		39	14	7
20+	12	2		45	1		36	2		27	3		12	3	

¹ Analysis included all women born before 1980 who answered these questions irrespectively of HPV testing at second round.

Table VI. Number of sexual partners by age at year 2000 in this study and in the National Survey of Sexual Attitudes and Lifestyles 2000 ¹

Number of lifetime male sexual partners ²	This study								National Survey of Sexual Attitudes and Lifestyles			
	Age in year 2000 (n = 436)								Age in year 2000			
	17-24		25-34		35-44		All ages		16-24	25-34	35-44	All ages
	No.	%	No.	%	No.	%	No.	%	%	%	%	%
0	0	-	2	1.2	2	1.0	4	0.9	17.7	0.9	0.9	5.3
1	9	12.3	16	9.5	37	19.0	62	14.2	18.1	16.2	20.8	18.3
2	5	6.9	14	8.3	23	11.8	42	9.6	11.1	10.8	10.9	10.9
3-4	13	17.8	39	23.2	48	24.6	100	22.9	17.1	19.7	21.5	19.6
5-9	25	34.3	54	32.1	47	24.1	126	28.9	21.5	29.8	26.6	26.5
10+	21	28.8	43	25.6	38	19.5	102	23.4	14.6	22.7	19.4	19.4
Total	73	100.0	168	100.0	195	100.0	436	100.0				
Mean no. of partners	12.0		7.7		5.6		7.5		5.0	7.3	6.8	6.5

¹ Adapted from Johnson et al 2001. ² No. of lifetime sexual partners in year 2000 = No. of lifetime sexual partners – No. of new partners in the last five years.