Title Page

Title: THE IMPACT OF MIGRATION ON THE AWARENESS OF AND ATTITUDES TOWARDS CERVICAL CANCER PREVENTION IN EASTERN EUROPEAN WOMEN IN ENGLAND

Short Title: CERVICAL SCREENING IN MIGRANT EASTERN EUROPEAN WOMEN

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Objectives

It has been hypothesised that the rise in incidence of cervical cancer in England and the fall in screening coverage might be attributable to the effect of migration of Eastern European (EE) born women. The attitudes and behaviours of migrant EE women in England towards cervical cancer prevention strategies are explored.

Methods

A mixed methods study using quantitative surveys and in-depth semi-structured qualitative interviews was conducted between April 2015-December 2016.

Results

331 surveys and 46 interviews were completed. Native English women (nEN) had greater knowledge that a smear test is a screening test for pre-cancerous cervical cells (90%vs.71% p= <0.01), whereas migrant EE (nEE) women believed that it was conducted as part of a full gynaecological examination (46%vs.21% p= <0.01) and that the screen interval was annual (18%vs.4% p= <0.01). There was distrust of the English healthcare system resulting in a proportion of nEE women returning to their country of birth for screening. Poor awareness of cervical cancer prior to migration and lack information at the time of registration with the GP in England were associated with failure to participate with screening.

Conclusions

Targeted education at the point of contact with healthcare services in England is needed to increase participation with cervical screening in nEE women.

Keywords

Cervical screening, Cervical cancer, HPV, Eastern European, Cervical cancer prevention

BACKGROUND

Cervical cancer is largely a preventable disease however, in the last decade the incidence in the UK has increased by 5% [1]. This has coincided with a gradual but steady fall in the screening coverage rates in England, particularly amongst young women, 25-29 years [2].

It has been hypothesised that the migration of women from Eastern European countries to the UK may in part be responsible for the rise in incidence of cervical cancer [3]. Across Europe the highest incidence of cervical cancer is reported in Central and Eastern European (EE) countries[4]. UK data from North West London found that migrant EE women accounted for 28.2% of all new diagnoses of cervical cancer and of these significantly more EE women had not previously been screened in the UK prior to their diagnosis as compared to UK-born women (90% versus 52.6%)[5]. In the Wessex region in England 25% (n=66) of the Eastern European women in a survey reported that they do not attend cervical screening appointments in the UK[6]. This pattern of behaviour has also been noted in other Western European countries; a study conducted in Spain found that migrant women from EE had a 62% reduced odds of having cervical screening compared to the native population[7].

The Population by Country of Birth and Nationality Report: August 2015, showed that there has been a significant increase in the migrant EE population to the UK[8]. More recent data has shown that 73% of the European Union 8, 81% of Bulgarian and 77% of Romanian citizens living in the UK, are aged between 16-49 years[9].

Whilst the cervical screening behaviours of the non-white ethnic groups have been extensively explored[10-12], there is limited data available on white ethnic minorities, such as the migrant EE population[13]. Their individual needs can go unrecognised as they are often aggregated in the general "white ethnic group" category.

The aims of this study were to determine the cervical screening behaviours of migrant EE women in England and explore their knowledge and attitudes towards the National Health Service (NHS) Cervical Screening Programme (CSP), Human Papilloma Virus (HPV) and the HPV vaccine.

METHODS

A mixed methods approach was used; data collection took place between April 2015-December 2016. Ethical approval for the study was obtained from the London Bromley research ethics committee (15/LO/0249). Eligibility for the study was defined as all women who fall within the English cervical screening age (25-65years), from two population groups; migrant EE (nEE) (from the 2004/2007 EU accession countries), the study group, and native English Caucasian (nEN), the comparison group.

Questionnaire Survey

The aim of the survey was to explore the existing screening behaviours, and identify the level of knowledge of cervical cancer, cervical screening and awareness of HPV and the HPV vaccine, in the two populations. The survey was conducted using an anonymous, paper based, self-administered tool. The survey was developed following an extensive literature review and, where possible, pre-validated questions were

used[14]. An independent transcription company translated the final version of the questionnaire into the languages of the ten EE countries (Bulgaria, Czech, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia) that were being studied. Bilingual members from The European Federation of Colposcopy verified the accuracy of the translations. The final questionnaire consisted of 33 items.

Data were collected from two settings: 1) Secondary care (colposcopy clinics from three sites in the Midlands; University Hospitals Leicester, Northampton General Hospital and University Hospitals of North Midlands), participants were presented with a study pack by the clinic receptionist and asked to complete the survey prior to their consultation. 2) Community groups, a snowballing approach[15] was utilised to identify local migrant EE community groups. Consent was implied on completion of the survey.

The surveys were pre-coded and a dataset was created using the statistics programme, Statistical Package for Social Sciences (SPSS), IL, USA, version 22. All reported p-values were assessed using two-sided tests and statistical significance was taken as a cut-off of $p < 0.05$. Each question was analysed individually to account for missing responses.

Semi-Structured Qualitative Interviews

Participants were asked to self-volunteer at the end of the survey (by leaving their contact details) to be involved in the interview stage of the study. The participants were given the choice of either partaking in face-to-face one-to-one interviews or a focus group session. Participants were interviewed until data saturation was reached. To ensure standardisation and consistency HP conducted all the interviews. An

interpreter, if required, was offered to be present for the interviews with the nEE women. The interviews were conducted either in a meeting room at the hospital or in the community at a location of their choice; the participants decided on the meeting place base on convenience. The aim of these sessions was to obtain a detailed understanding of the thought processes behind particular screening behaviours and choices. The same topic schedule was utilised for the one-to-one interviews and the focus group session.

The interviews were audio recorded and transcribed verbatim. Inductive framework analysis was used, with the aid of NVivo software to analyse the data. Two reviewers (HP, SS) reviewed the initial two transcripts independently and agreed on an extensive list of codes. HP reviewed the remaining transcripts to which the codes were applied[16].

RESULTS

Questionnaire Data

In total 331 questionnaires (249 from nEN and 82 from nEE) were completed out of the 400 that were distributed to the three participating sites and in the community setting, resulting in a response rate of 83%. The socio-demographic characteristics of the participants are described in Table 1.

Cervical screening behaviours and knowledge

Knowledge of the English cervical screening programme was lower in the nEE group, with 71% aware that a smear test was a screening test for pre-cancerous cervical cells,

compared to 90% in the nEN group, p= <0.01 (Table 2). A significantly greater proportion of nEE women believed that a smear test was part of a full gynaecological examination (46% versus 21%, p= <0.01) and that the screen interval was one yearly (18% versus 4%, p= <0.01).

Just over half (55%[n=40]) the nEE women reported to have smears in England only, the remainder either had all their smears in their country of birth or had smears in both their country of birth and England (Table 3).

HPV and HPV vaccine knowledge

Overall only 68% (221/324) of the women stated that they had previously heard of the HPV virus. nEN women were more likely to have heard of HPV than nEE women (73%[n=179) vs. 53%[n=42], p=<0.01). Detailed breakdown of specific HPV knowledge is presented in Supplementary Data 1.

Multivariate analysis using linear regression for the whole cohort showed that none of the socio-demographic factors were significant for knowledge of the purpose of cervical smears. Higher educational attainment remained significant for all three HPV knowledge categories (general, testing and vaccine). Lower age persisted to show a significant association with HPV vaccine knowledge (Table 4)

Interview Data

A total of 40 one-to-one semi-structured interviews were conducted, 20 were with women from the nEN group and 20 from the nEE group. In addition, one focus group consisting of six women from Czech and Slovakian backgrounds was conducted. The

analyses of the interviews and the focus group have been conducted together owing to the fact that there was only one focus group and the same interview schedule was utilised for both. Details of the participant characteristics are demonstrated in Table 5.

There were 14 theme categories and 45 codes in total (Supplementary data 2). A summary of the key themes and findings are described below. Details in the parentheses following the quotes represent the participant's identification number and recruitment setting (PC= Community, PH=Colposcopy clinic, FG= Focus group), age (in years) and ethnicity. Additional supporting quotes are provided in supplementary data 3.

Perceptions of the healthcare system and healthcare providers in England versus their country of origin

There was a delay in registration with the General Practitioner (GP) on migration, reasons for this delay included that they were not "unwell" or because they were able to self-medicate. Furthermore, they held largely negative views about the GP's in England, they felt that their concerns were not taken seriously and that often their symptoms would be dismissed. In comparison in their countries of birth, they had direct access to specialist care and found it frustrating that in England the GP acted as a gatekeeper. Several of the nEE women reported that *"it's much easier to book a ticket and go back to one of those countries, pay privately, and at least they do something."* (PH1,35,Lithuanian)

Knowledge and understanding of cervical screening, cervical cancer and HPV

Knowledge of cervical cancer was poor in both groups; many participants believed that cervical cancer was hereditary and some were aware that it could be asymptomatic. The nEE women used this fact to justify the need for more frequent smear tests and having a specialist review.

"Also, cervical cancer, there aren't really many symptoms, so it's hard to realise, find out unless you go to the doctor that you have cervical cancer. So, it's peace of mind if you go once a year that some specialist looked at you, rather than go every three years." (FG, Czech/Slovak)

In the nEE group many women admitted that they were not aware of the exact purpose or availability of cervical screening prior to migration. They believed that it was *"To check if everything is okay or not*." (PH6,26,Polish), *"..that they are looking for most probably sexually transmitted diseases or something ..."* (PH14,36,Lithuanian) .

EE women also commented that when they did register with the GP in England they were not given information on cervical screening.

"... when I moved here I didn't have any information about it and even in GP practice they didn't, like in the walk-in clinic they didn't even suggest me anything like that, so it's like there isn't any information and there isn't any education about it either." (PC1,34,Latvian)

Cervical screening behaviours

nEE women overall had commenced cervical screening from the age of 18 years as part of an annual gynaecological review, compared to the nEN women who started between the ages of 20-25years. EE-born women had mainly had their initial smear in their country of birth and the subsequent ones in England and/or in their country of birth or had not participated with any screening in either country.

It emerged that, on the whole, the EE-born women had a heightened desire to protect themselves, which resulted in them having more frequent smears in their country of birth. It was felt that over three years it was possible to develop cancer without necessarily being aware of it or having any specific symptoms. This fear related back to their deficient knowledge of cervical cancer development, with many of them not aware if it was a rapidly progressing disease or not. Some of the women believed that it was due to cost implications that more frequent smears were not routinely performed. Although this was not true for all participants, EE-born women used the smear in their home country as a "double check" mechanism, as they trusted their own doctors more.

"I know it's going to sound a little bit harsh but I trust more, like, Polish ... if I've done the test here and if I've done it in Poland at least I double check if you know what I mean." (PC14,29,Polish)

Motivators

The main motivators for participation with cervical screening were shared amongst the two groups of women and included the fear of getting cancer and the desire to preserve good health, having adequate knowledge to appreciate the benefit of

screening in the prevention of cervical cancer, and lastly some women believed that it was part of a sexual health check. The latter belief was more prevalent in the nEE group, who largely believed that cervical screening and a "routine" gynaecological review were synonymous. Throughout the interviews, the nEE women used the terms cervical screening and gynaecological examination interchangeably.

"...I started to have sexual intercourse and I thought that it would be good to do the whole… gynaecological review.." (PC5,34, Polish)

Barriers

Shared barriers between the two groups included, being asymptomatic, no knowledge of cervical screening and feeling embarrassed.

Barriers to cervical screening that were specific to the nEE group included language: language served as an obstacle from initially registering with the GP, to understanding the screen invite letter, to booking an appointment and even making travel arrangements to attend. Prioritisation of tasks such as sourcing employment, finding accommodation and schooling for their children, on migration, would further preclude participation with screening.

The person performing the smear test was of great importance to the majority of nEE women; they were not comfortable that in England practice nurses perform the majority of cervical smears, believing that smear tests should only be performed by a specialist (gynaecologist).

"The gynaecologists, so, you know, there is more studying involved. I don't want to sort of underestimate or underrate the nurses here, but it's more comfort, it being done by a doctor." (FG, Czech/Slovak)

Increasing uptake of screening in nEE women

Language was perceived to be the main barrier; suggestions were made to produce information in the native languages of these women. Targeting advertisements at specialised supermarkets, community centres or recruitment centres was thought to increase awareness and hence participation.

"Yes, maybe like some, like when you have like Polish shop or Polish restaurant, maybe just to leave some leaflets or something.." (PC14,29,Polish)

The women disclosed that many nEE women could live in isolation when they first arrive in England and therefore it might be difficult to reach them. The provision of education was believed to be a key factor; simply taking the time to explain what the purpose of a smear test is and the important role it plays in the prevention of cervical cancer. The participants believed that many nEE women would not have this knowledge on migration.

DISCUSSION

This mixed methods study shows that the barriers preventing cervical screening in England, identified in the nEE, were not exclusive to them and some were shared with nEN women and women from other cultural backgrounds different to their own [17, 18]. The cervical screening behaviours of the nEE women were specifically influenced by the manner in which they accessed healthcare services and their trust in healthcare/healthcare professionals in England.

The incidence of cervical cancer has been predicted to rise by 43%[19] in the UK between 2014 and 2035; from the findings of this study one may speculate that the migrant EE population will be contributing to this rise. The views and attitudes expressed by the EE women in this study suggest that they are not fully participating with cervical screening in England, supporting the findings from previous work in Birmingham which identified that the majority of EE women had not attended screening prior to their cervical cancer diagnosis[20]. Further, the uptake of cervical screening in their country of birth is suboptimal[21] and therefore there is the potential that many of the migrant EE women will not have been screened prior to migration, for example the largest EE population in England is from Poland[22], however screening uptake in Poland is only 25%[21, 23, 24].

This study indicates that there are two groups of migrant EE women who are not attending for cervical screening in England: those who have some knowledge but do not trust the English healthcare system fully and those who have no awareness of screening either in England or their country of birth. Targeted education to increase awareness of cervical screening in both these groups is imperative but the difficulty

will be in identify the latter group as they might not present to healthcare services in England.

The frequency of smear tests in England was an area of concern for the nEE women, who were of the belief that cervical screening should be offered on an annual basis in England. The "prolonged" screen interval was a motivating factor for some to travel for more frequent smear tests, for the vast majority access to screening more frequently even in their country of birth, would have been outside any national programme[25]. Annual screening has not been shown to add significant protection over the 3 or 5 yearly screen intervals[26], instead there is a risk of overtreatment of lesions that may spontaneously regress[27].

It has been proposed that the process of acculturation follows a linear path that is determined by the length of residence in the migrating country[28]. In this study, the impact of length of residence in England on cervical screening behaviours was not clear and since it only included first generation EE women, future work would need to be undertaken exploring the cervical screening behaviours in second or subsequent generations. However work conducted by Jackowska et al[13] in migrant EE women in London between 2008-2009 found similar themes to the present study, highlighting that there has been little change in behaviours and attitudes and also any efforts that might have been made to engage this group with cervical screening in England have not been fully effective. "The context of reception" is also believed to influence the process of acculturation[29]. This refers to the behaviours and attitudes of the receiving society; the data from this study indicates that this is where changes can be made to improve screening participation in the migrant EE group. Healthcare processionals in

England (the receiving society) have a vital role to play; they need to understand the context in which the health beliefs of the migrant EE women are formed, i.e. the set up/provision of healthcare in their country of origin. Individualised education on the natural history of cervical cancer and cervical screening will need to be provided to justify the differences (from their country of origin) in the provision of cervical screening services in England. It is possible that migrant EE women represent a group that are inherently less likely to engage with healthcare services in the county of migration; a Norwegian study found similar problems with engaging EE women with healthcare and cervical screening in Norway[30].

Outreach community work and opportunistic promotion of cervical cancer prevention strategies are required, ideally when the women first make contact with healthcare services in England (primary or emergency care). The main limiting factors of adopting this strategy are those of resource and time, particularly in the emergency setting, however, it might be argued that the resource/cost implication of cervical cancer treatment is significantly greater.

Limitations

A non-random consecutive sampling method was utilised to recruit participants for the questionnaire component. Due to the scale of the study and the relatively low population of nEE women in the study area, this was the most achievable method of recruitment and participants were recruited from a large geographical region and multiple institutions. Difficulties were experienced in identifying and engaging nEE participants in the community; highlighting the challenges in accessing this population for the purpose of health promotion. Women attending colposcopy clinics

completed the majority of surveys and it may be argued that by default these women are already engaging with cervical screening. However, they provide an insight into to what motivated them to participate rather than primarily focusing on the barriers, which is also very important[31]. nEE women who have not joined community groups or integrated with the community were not sampled, and it could be argued that this the group that we need to target.

For the interview component of the study, the participants were asked to self-volunteer, these women might represent the group women who are already more engaging with health promotion. Nevertheless some of the women had not always participated with cervical screening or engaged with healthcare services in England. This group of women provided an insight into what induced a change in their health behaviours and what their barriers were prior to this.

It is acknowledged that the nEE is a very heterogeneous group and not all the countries of interest were represented, therefore the findings might not be representative since it is not correct to assume the populations are entirely the same. However, it did show that many of the views and health behaviours were shared amongst women from the different EE countries.

CONCLUSION

The cervical screening behaviours of the nEE population to England appeared to be, in part, governed by their perception and/or level of trust overall in the English healthcare system, which prevents them from wholly accepting screening advice and/or recommendations. Their pre-existing knowledge of cervical cancer and their

screening behaviours prior to migration also play a role. To increase uptake in this high-risk group of women (nEE), targeted education should be provided at the initial point of contact with healthcare services in England.

Disclosures

The authors have no conflict of interest.

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Table 1 Socio-demographic characteristics

		Total	nEN	nEE
Recruitment Setting; n(%)	**Colposcopy clinic**	288 (87)	229 (80)	59 (20)
	Community	43 (13)	20 (47)	23 (53)
Age in Years (median/range) n= 330 (nEN= 248, nEE- 82)		31 (24-64)	31 (24-64)	31 (24-55)
Relationship status; n(%) **n= 331 (nEN= 249, nEE- 82)**	Married	102 (31)	77 (31)	25 (30)
	Widowed	1 (0)	0	1(1)
	Divorced	12 (4)	10 (4)	2 (2)
	Separated	8 (2)	7 (3)	1 (1)
	In a civil partnership	2 (1)	1 (0)	1 (1)
	In a relationship	104 (31)	75 (30)	29 (35)
	Co-habiting	45 (14)	37 (15)	8 (10)
	Single	57 (17)	42 (17)	15 (18)
Education; n(%) **n= 323 (nEN= 247, nEE- 76)**	No formal Qualifications	23 (7)	22 (9)	1 (1)
	Trade/technical /vocational	27 (8)	14 (6)	13 (17)
	GCSE's/O Levels or equivalent	92 (29)	75 (30)	17 (22)
	A Level or equivalent	83 (26)	68 (28)	15 (20)
	First degree	53 (16)	39 (16)	14 (18)
	Post Graduate degree	45 (14)	29 (12)	16 (21)
Employment Status n(%) **n= 331 (nEN= 249, nEE- 82)**	Employed full time	173 (52)	121 (49)	52 (63)
	Employed part time	94 (28)	77 (31)	17 (21)
	Unemployed	32 (10)	27 (11)	5 (6)
	Retired	5 (2)	5 (2)	0
	Housewife	27 (8)	19 (8)	8 (10)
Ethnicity n(%) n= 331	English	249 (75)		
	Bulgarian	1 (0)		
	Czech	7 (2)		
	Hungarian	4 (1)		
	Latvian	6 (2)		
	Lithuanian	4 (1)		
	Polish	39 (12)		
	Romanian	4 (1)		
	Slovakian	17 (5)		
Country of Birth n(%) n=331	England	249 (75)		
	Bulgaria	1 (0)		
	Czech	7 (2)		
	Hungary	3 (1)		
	Latvia	6 (2)		
	Lithuania	4 (1)		
	Poland	39 (12)		
	Romania	5 (2)		
	Slovakia	17 (5)		

Table 2 Cervical screening behaviours and knowledge

			Total n (%)	nEN n (%)	nEE n(%)	P value
Why are cervical smears tests preformed? (select all true options) (n= 327)	Diagnose pre-cancerous cervical cells	Correct	278 (85)	223 (90)	55 (71)	**<0.01**
		Incorrect	49 (15)	26 (10)	23 (29)	
	Diagnose cervical cancer	Correct	163 (50)	131 (53)	32 (41)	0.07
		Incorrect	164 (50)	118 (47)	46 (59)	
	Pick up STD's	Correct	253 (77)	199 (80)	54 (69)	0.05
		Incorrect	74 (23)	50 (20)	24 (31)	
	As part of a full gynaecological examination	Correct	239 (73)	197 (79)	42 (54)	**<0.01**
		Incorrect	88 (27)	52 (21)	36 (46)	
Aware of free cervical screening in England (n=330)		Yes	319 (97)	243 (98)	76 (94)	0.10
		No	11 (3)	6 (2)	5 (6)	
Source of information about smear tests (n=322)		GP	158(49)	114 (47)	44 (57)	0.10
		Friends	15 (5)	10 (4)	5 (6)	0.38
		Smear invitation letter	164 (51)	131 (53)	33 (43)	0.10
		Other	9 (3)	4 (2)	5 (6)	**0.04***
Recommended screening commencement age in England (median/range) (n=279)			25 (13-40)	25 (15-40)	25 (13-40)	n/a
Recommended screen frequency in England (n=314)		Every 6 months	5 (2)	0	5 (7)	**<0.01**
		Every year	23 (7)	10 (4)	13 (18)	
		Every 3 years	285 (91)	229 (95)	56 (76)	
Have you ever had a smear test? (n=328)		Yes	317 (96)	242 (98)	75 (93)	0.07
		No	9 (3)	4 (2)	5 (6)	
		Not sure	2 (1) 1	1 (0)	1 (1)	
Age of first smear test (median/range) (n=296)			24 (15-55)	24 (15-40)	21 (15-35)	n/a

Country of first smear test (n=311)	England	262 (84)	236 (100)	26 (35)	
	Bulgaria	1 (0)			
	Czech	7 (2)		n/a	
	Hungary	2 (1)			
	Latvia	3 (1)			
	Lithuania	1 (0)			
	Poland	28 (9)			
	Romania	3 (1)			
	Slovakia	4 (1)			
Timing of most recent smear test (n=322)	Never had one	7 (2)	4 (2)	3 (4)	0.12
	0-3 years	302 (94)	232 (95)	70 (89)	
	4-5 years	10 (3)	7 (3)	3 (4)	
	More than 5 years	3 (1)	0	3 (4)	
Country of most recent smear test (n=310)	England	289 (93)	237 (100)	52 (71)	
	Bulgaria	1 (0)		n/a	
	Czech	3 (1)			
	Latvia	2 (1)			
	Poland	13 (4)			
	Romania	1 (0)			
	Slovakia	1 (0)			
Always attends for a smear test (n=321)	Yes	294 (92)	221 (91)	73 (94)	0.78
	No	23 (7)	19 (8)	4 (5)	
	Cannot remember	3 (1)	2 (1)	1 (1)	

Table 3 Cervical screening behaviours and knowledge of cervical cancer prevention in their country of birth for the nEE women

		n(%)
Screening programme available in their country of birth n=74	Yes	57 (77)
	Not sure	17 (23)
Cervical screening behaviours n=73	Attends for smears only in country of birth	7 (10)
	Attends for smears in England only	40 (55)
	Attends for smears both in country of birth and England	26 (36)
Reason for attending for smears in their country of birth (select all that apply) n=28	More convenient	1 (4)
	Smears performed more often	7 (25)
	Performed by a gynaecologist/doctor	17 (61)
	Includes full gynaecological check-up	19 (68)
	Distrust of English doctors	5 (18)
Frequency of attendance for smears in country of birth n=25	Every 2-3 years	7 (28)
	Every year	14 (56)
	More than once a year	4 (16)
Is the HPV vaccine available in their country of birth n=68	Yes	25 (37)
	No	2 (3)
	Not sure	41 (60)
Is the HPV vaccine part a national vaccination programme in their country of birth n=68	Yes	6 (9)
	No	13 (19)
	Not sure	49 (73)

Table 4 Multivariate analysis models for the associations between socio-demographic factors and knowledge of cervical cancer prevention

Model 1- Purpose of cervical smears; R^2 = 0.02, Adjusted R^2 = 0.01			
Variable	**Standardized Co-efficient Beta**	**P Value**	**95% CI**
Age	0.08	0.21	1.52-3.13
Education	0.09	0.14	-0.01-0.02
Relationship status	0.05	0.41	-0.02-0.17
Employment status	-0.08	0.17	-0.19-0.03
Model 2- General HPV knowledge; R^2 = 0.07, Adjusted R^2 = 0.06			
Variable	**Standardized Co-efficient Beta**	**P Value**	**95% CI**
Age	-0.1	0.10	-0.11-0.01
Education	0.22	**<0.01**	0.41-1.22
Relationship status	0.03	0.62	-0.26-0.16
Employment status	-0.03	0.56	-0.62-0.34
Model 3- HPV Testing knowledge; R^2 = 0.05, Adjusted R^2 = 0.04			
Variable	**Standardized Co-efficient Beta**	**P Value**	**95% CI**
Age	-0.04	0.51	-0.04-0.02
Education	0.17	**<0.01**	0.12-0.55
Relationship status	0.09	0.14	-0.03-0.19
Employment status	-0.05	0.37	-0.37-0.14
Model 4- HPV vaccine knowledge; R^2 = 0.05, Adjusted R^2 = 0.03			
Variable	**Standardized Co-efficient Beta**	**P Value**	**95% CI**
Age	-0.15	**0.01**	-0.07- (-) 0.01
Education	0.12	**0.03**	0.02-0.41
Relationship status	-0.04	0.47	-0.14-0.06
Employment status	-0.04	0.47	-0.31-0.14

Table 5: Participant characteristics for qualitative interviews

Recruitment Setting	**Colposcopy clinic**		14(30)
n(%)	**Community**		32(70)
Age (median/range)			34(25-63)
Relationship status	Married		24(52)
n(%)	In a relationship		12(26)
	Single		10(22)
Ethnicity	White British		20(43)
n(%)	White Eastern European		26(57)
		Czech	4
		Hungary	3
		Latvia	2
		Lithuania	3
		Poland	7
		Romania	2
		Slovakia	4
		Slovenian	1

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