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**AWARENESS AND KNOWLEDGE OF HUMAN PAPILLOMA VIRUS (HPV) IN UK
WOMEN AGED 25 YEARS AND OVER: RESULTS FROM A CROSS-
SECTIONAL INTERNET-BASED SURVEY**

Susanna Kola-Palmer, PhD¹ & Katie Dhingra, PhD²

¹Senior Lecturer, Department of Psychology, University of Huddersfield

²Reader, School of Social Sciences, Leeds Beckett University Email:

k.j.dhingra@leedsbeckett.ac.uk Phone: +44 113 8126730

ADDRESS FOR CORRESPONDENCE:

Dr Susanna Kola-Palmer

Department of Psychology

University of Huddersfield

Queensgate

Huddersfield

HD1 3DH

Ph: + 44 1484 471014

Email: s.kola-palmer@hud.ac.uk

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Abstract

Introduction: The expanding use of Human Papilloma Virus (HPV) testing within cervical screening requires an evaluation of public understanding of HPV. This study aimed to explore HPV awareness and knowledge using a previously psychometrically validated measure in a sample of UK women aged 25 years and over.

Methods: An anonymous web-based cross-sectional survey design was used, and responses recorded for 246 women (mean age = 37.59, SD = 9.20).

Results: Findings indicated limits to women's understanding of HPV, its transmission, treatment and link with cancer. The mean HPV knowledge score was 9.35 (4.43), and the mean HPV testing score was 3.34 (1.91). Multivariate analyses revealed that information-seeking following cervical screening and being a student is associated with higher HPV knowledge, and that having a positive HPV test result and having university education is associated with higher HPV testing knowledge.

Conclusions: These results highlight that there is a lack of knowledge and misunderstanding relating to HPV and its link with cancer in adult women in the UK. The findings suggest that public health HPV information campaigns are urgently needed, especially with a drop in UK cervical screening attendance rates, and with the upcoming change to HPV primary testing within the UK NHS cervical screening programme.

Key words: HPV, cervical cancer, oncology, knowledge, prevention

Introduction

Genital human papilloma virus (HPV) infection is one of the most common sexually transmitted infections worldwide. It is estimated that 11.4% of women with normal cervical cytological findings carry a detectable HPV infection, which rises to 89% in women with invasive cervical cancer (De Sanjose et al., 2012). Persistent HPV infection is the primary cause of cervical cancer. An estimated 569 847 new cases of cervical cancer are diagnosed annually worldwide, with approximately 311 365 cervical cancer deaths annually (Bray et al., 2018). Without changes in prevention and control, cervical cancer incidence and mortality are projected to increase, with a global rise of 36% in incidence and a rise of 44% in cervical cancer mortality in 2025 (De Sanjose et al., 2012). In the United Kingdom (UK), over 3000 women are diagnosed with cervical cancer annually, with around 870 cervical cancer deaths annually (Cancer Research UK). Worryingly, in England cervical screening attendance is at a 19-year low, and going down across all age groups (NHS, 2016; Jo's Trust, 2017).

HPV testing and vaccination are important elements for cervical cancer prevention, and testing for high-risk types of HPV is now being used worldwide within cervical screening programmes. It can be used as a primary screening test and shows higher sensitivity in detecting cervical abnormality than cytology (Antilla et al., 2010; Arbyn et al., 2006; Kitchener et al., 2011). For example, in England, HPV testing is used to triage cytology tests showing borderline changes or low-grade dyskariosis, reducing the number of women on early recall, and speeding up colposcopy follow-up for those with high-risk HPV (Kelly et al., 2011; Kitchener et al., 2009). In the UK and Australia, HPV testing is also used as a 'test of cure' for treatment of cervical abnormalities, allowing women to return to regular screening if no high-risk HPV infection is detected (Kitchener et al., 2008; Kitchener et al., 2013; Morrell & Qian, 2014). The UK NHS cervical screening programme will change to HPV primary testing in 2019 (Rebolj et al., 2019).

Although clinically effective, women can experience significant negative psychosocial effects of testing positive for HPV, including heightened anxiety, distress, stigma, fear, embarrassment, along with reactions of stress, confusion, shock and isolation (Daley et al., 2010; McCaffrey et al., 2004; McCaffrey, Waller, Nazroo, & Wardle, 2006; Maissi et al., 2004). However, there is also evidence that although women with a positive HPV result initially experience increased negative psychosocial consequences, at follow-up, these women have better psychosocial outcomes than women managed by repeat cytology (McCaffrey et al., 2010) or other management options (Maissi et al. 2005). A study from

Australia reported that women preferred management of mildly abnormal smears by HPV triage over repeat cytology, when informed of the relative advantages and disadvantages (McCaffrey et al., 2008).

In addition to the use of HPV testing in cervical screening, many countries have introduced HPV vaccination programmes. Thus, HPV vaccination and HPV triage, test of cure, and primary testing are important components of cervical cancer prevention; yet public knowledge about HPV and HPV vaccination is low (e.g., Almeida et al., 2012; Bowyer et al., 2013; McCusker et al., 2013; Radecki Breitkopf et al., 2016). Even within women with HPV-related malignancies, knowledge of HPV is low (Pils, Joura, Winter, Shrestha, Jaeger-Lansky & Ott, 2014). For example, in the study by Pils et al. (2014), which included women with gynaecological cancer not related to HPV as well as women with HPV-associated gynaecological cancer, the general recognition of the term HPV was 29.7%. While the women in the study were largely able to correctly identify their diagnosis, for the women with HPV-associated malignancies, they were unaware of the role HPV had played in their disease. Only 33.3% of women with an HPV-related cancer knew exactly what HPV was (Pils et al., 2014).

One of the limitations of previous HPV-knowledge research is the use of study-specific knowledge questionnaires, without known psychometric properties, making it difficult to compare knowledge across studies and populations. To our best knowledge, there is only one psychometrically validated HPV knowledge questionnaire (Waller et al., 2013). The measure has been used in a small number of studies to date. For example, the results from an international study of men and women in the USA, UK, and Australia revealed higher HPV awareness levels in the US than in the UK and Australia, but with significant gaps in HPV knowledge across all three countries (Marlow et al., 2013). In another study using the same validated measure it was found that knowledge of HPV does not necessarily result in knowledge of HPV testing (Dodd et al., 2014).

Given the significant change in cervical cancer prevention with the expanding use of HPV testing within cervical screening, further research focusing on evaluating public understanding of HPV is needed. The roll-out of HPV primary testing will result in a significant increase in the number of women receiving HPV results, and without sufficient knowledge or understanding to interpret it, it is conceivable that there will be an increased number of women who experience adverse psychosocial reactions (Patel, Moss, & Sherman, 2018). It has been pointed out that the widespread introduction of HPV testing and vaccination means it is important to monitor public awareness and knowledge, particularly

with validated measures that facilitate comparisons across time and between populations (Waller et al., 2013).

The aim of this study was to explore HPV awareness and knowledge in women eligible to participate in the UK cervical screening programme. We also aimed to explore basic and detailed knowledge of HPV, and examine predictors of HPV knowledge. The results of the study can help identify information needs, and thus aid in developing educational messages for public health HPV information campaigns. By responding to these needs it could further help women understand their HPV test results, and minimise anxiety and psychosocial distress associated with HPV testing results.

Methods

Participants

Between December 2014 and March 2015 we conducted a cross-sectional internet-based survey in the UK. Participant inclusion criteria included women aged > 25 years, as this is the age at which women become eligible to participate in the cervical screening programme in the UK. 246 participants were recruited using a number of convenience sampling strategies, including emails, internet, and social media outlining purpose and inclusion criteria. Participants completed an anonymous, self-administered 20-minute online survey in self-selected locations. All procedures were reviewed and approved by the university's ethics committee.

Measures

Demographic information

The background self-report information included age, marital status, parity, ethnicity, education, employment status, and household income. In addition, respondents self-reported their HPV status, previous cervical screening attendance, time since last smear test, and whether they sought further information following their last smear test.

HPV Knowledge Questionnaire

General HPV knowledge and HPV testing knowledge was measured using the HPV Knowledge Questionnaire (Waller et al., 2013). It consists of 15 general HPV knowledge items (e.g., HPV is very rare, HPV can cause cervical cancer), and 6 items assessing HPV testing (e.g., an HPV test can tell you how long you have had an HPV infection). The scale uses a mixture of true and false items to minimise response bias, and the response format is true/false, with a 'don't know' option, coded as incorrect. The scale is scored to obtain a total HPV knowledge score (possible range of scores 0-21), or a total general HPV knowledge (possible range of scores 0-15) and total HPV testing knowledge scores (possible range of scores 0-6) can also be calculated.

Acceptable reliability and validity have been established (Waller et al., 2013). In the present sample, Cronbach's alpha was .92 for the 21-item scale, .90 for the 15-item general HPV knowledge section, and .77 for the 6-item HPV testing section.

Statistical analyses

Differences in general HPV knowledge and HPV testing knowledge were assessed using one-way independent analyses of variance and independent *t*-tests. Two multiple regression analyses were conducted, with general HPV knowledge and HPV testing knowledge as the dependent variables in their respective models. Sociodemographic variables were entered, as well as time since last smear test, cervical screening attendance status, HPV status, and further information seeking.

The responses for marital status (married/living as married versus single), number of children (no children/have children), education (less than university level/university level), employment (student/employed), and ethnicity (minority/majority) were collapsed into dichotomous dummy variables to facilitate statistical analyses. Analyses were conducted on non-missing responses. All analyses were conducted using IBM SPSS V.22.

Results

Descriptive statistics

Study participant characteristics are presented in Table 1 (N = 246). The mean age was 37.59 (*SD* = 9.20) years. The sample was primarily white (94%), educated (75% university education), employed (68%), and high earners (70% reported household income over £25 000/year).

[Insert Table 1 about here]

Individual items General HPV knowledge

Eighty six percent of women were aware that HPV can cause cervical cancer, and 73% were aware that HPV can be transmitted via sexual intercourse, while only 59% were aware that HPV can be passed on by genital skin-to-skin contact. Eighty percent of women correctly answered the false statement that HPV always has visible signs and symptoms, and 53% of women were aware that there are many types of HPV. Eighty six percent of women were aware that a person could have HPV for many years without knowledge. Seventy percent of women were aware that using condoms reduces the risk of getting HPV. Seventy two percent of women were aware that having many sexual partners increases the risk of getting HPV. Only 37% of women were aware that most sexually active people will get HPV at some point in their lives, although 69% correctly responded to the false statement about HPV being very rare. Less than half the sample (48%) was aware that HPV can cause genital warts, although 78% of women were aware that HPV cannot cause HIV/Aids. Fifty four percent of women correctly answered the statement about HPV being cured by antibiotics, although only 27% of women correctly answered that HPV usually doesn't need any treatment. Sixty five percent of women correctly answered the question about men and HPV.

Individual items HPV testing knowledge

Knowledge levels were generally lower for HPV testing than for general HPV knowledge. Eighty two percent of women were aware that HPV positive results does not mean definitely getting cervical cancer, and 69% of women were aware that an HPV test can be done at the same time as a smear test. However, only about half the sample was aware that HPV testing is not carried out to indicate if the HPV vaccine is needed, and only 46% were aware that an HPV test cannot tell the duration of a HPV infection. Only 31% of women were aware that if an HPV test shows that a woman does not have HPV, her risk of cervical cancer is low.

General HPV knowledge

There were statistically significant differences in general HPV knowledge depending on HPV status, $F(2, 241) = 8.52, p < .001$. Tukey post hoc tests revealed that HPV positive women had significantly higher knowledge scores ($M = 12.68, SD = 2.51$) than HPV negative women

($M = 9.21$, $SD = 3.96$) and women unaware of their HPV status ($M = 8.78$, $SD = 4.85$). There were no significant differences in knowledge scores between HPV negative women and those unaware of their HPV status.

Although there were trends in the data indicating that women who deem themselves regular cervical screening attenders have higher knowledge scores ($M = 9.60$, $SD = 4.30$) than women who deem themselves non-attenders ($M = 7.82$, $SD = 4.91$), or irregular attenders ($M = 8.44$, $SD = 4.92$), this trend was statistically non-significant, $F(2, 241) = 2.00$, $p = .14$.

Approaching statistical significance, there was a trend suggesting that time since last smear test influence HPV knowledge scores, $F(3, 240) = 2.66$, $p = .05$, with women who had a smear test in the past 18 months having higher knowledge scores ($M = 9.87$, $SD = 4.29$) than women who never had a smear test ($M = 7.22$, $SD = 5.59$) and women who had a smear test over 36 months ago ($M = 7.53$, $SD = 4.21$).

Women who sought further information after their last smear test had significantly higher knowledge scores ($M = 12.25$, $SD = 2.94$) than women who did not seek further information ($M = 8.82$, $SD = 4.46$), $t(237) = 4.44$, $p < .001$.

There was a statistically significant differences in knowledge scores depending on employment status, $t(241) = 2.13$, $p = .03$, with students reporting significantly higher knowledge ($M = 10.25$, $SD = 3.69$) than those employed ($M = 8.96$, $SD = 4.66$). Household income did not influence HPV knowledge scores, $F(2, 240) = .23$, $p = .80$. Marital status did not influence HPV knowledge scores, $t(242) = .87$, $p = .38$. There were no significant differences in HPV knowledge depending on ethnicity, $t(244) = 1.01$, $p = .31$. There were no significant differences in HPV knowledge depending on level of education, $t(244) = .51$, $p = .61$.

HPV testing knowledge

There were statistically significant differences in HPV testing knowledge depending on HPV status, $F(2, 240) = 14.65$, $p < .001$. Tukey post hoc tests revealed that HPV positive women had significantly higher knowledge scores ($M = 5.12$, $SD = 1.20$) than HPV negative women ($M = 3.36$, $SD = 1.76$) and women unaware of their HPV status ($M = 2.97$, $SD = 1.94$). There were no significant differences in knowledge scores between HPV negative women and those unaware of their HPV status.

There was a similar trend indicating that women who deem themselves regular cervical screening attenders have higher HPV testing knowledge scores ($M = 3.48$, $SD =$

1.91) than women who deem themselves non-attenders ($M = 2.47, SD = 1.70$), or irregular attenders ($M = 3.00, SD = 2.01$), however, this trend was statistically non-significant, $F(2, 240) = 2.82, p = .06$.

There was a statistically significant difference in HPV testing knowledge scores depending on the time since last smear test, $F(2, 239) = 3.52, p = .02$. Post hoc Tukey tests revealed that women who had a smear test in the past 18 months had significantly higher knowledge scores ($M = 3.65, SD = 1.92$) than women who never had a smear test ($M = 2.22, SD = 1.92$).

Women who sought further information after their last smear test had significantly higher knowledge scores ($M = 4.64, SD = 1.40$) than women who did not seek further information ($M = 3.14, SD = 1.90$), $t(236) = 4.50, p < .001$.

There was no statistically significant differences in HPV testing knowledge scores depending on employment status, $t(240) = .65, p = .53$. Household income did not influence HPV testing knowledge scores, $F(2, 239) = .19, p = .83$. There were no differences in HPV testing scores depending on marital status, $t(241) = 1.44, p = .15$. There were no significant differences in HPV testing knowledge depending on ethnicity, $t(243) = .50, p = .62$. Finally, there were no significant differences in HPV testing knowledge depending on level of education, $t(243) = .85, p = .40$.

Predicting general HPV knowledge

Age, employment status, income, marital status, ethnicity, education, time since last smear test, cervical screening attendance status, HPV status and further information seeking after last smear test were all entered into a multiple regression. The model was significant, $F(15, 204) = 2.60, p < .001$, and explained 16% of variance in general HPV knowledge. Two predictor variables were statistically significant, with further information seeking after smear test recording the highest beta value ($\beta = .25$), followed by employment status ($\beta = -.23$). These results suggest that seeking further information and being a student is associated with higher HPV knowledge. See Table 2.

[Insert Table 2 about here]

Predicting HPV testing knowledge

Age, employment status, income, marital status, ethnicity, education, time since last smear test, cervical screening attendance status, HPV status and further information seeking after last smear test were all entered into a multiple regression. The model was significant, $F(15, 204) = 2.99, p < .001$, and explained 18% of variance in HPV testing knowledge. Three predictor variables were statistically significant, with HPV positive status versus HPV status unknown recording the highest beta value ($\beta = -.45$), followed by HPV positive status versus HPV negative status ($\beta = -.39$), and level of education ($\beta = .14$). These results suggest that having an HPV positive test result and having university education is associated with higher HPV testing knowledge. See Table 3.

[Insert Table 3 about here]

Discussion

The purpose of this study was to assess knowledge of HPV and HPV testing in a sample of adult women. In this sample of primarily white, highly educated, employed, high household income women in the UK, some interesting findings regarding HPV knowledge emerge.

The major findings of the study were fivefold, and can be grouped into knowledge of HPV, link to cervical cancer, HPV transmission, and HPV treatment. Firstly, over two-thirds of respondents knew that HPV is common, while less than 40% of respondents were aware that most sexually active people will get HPV at some point. Just over half of respondents were aware that there are many types of HPV, while under half of the respondents knew that HPV can cause genital warts. Secondly, over 80% of respondents were aware of the link between HPV infection and cervical cancer. Over 80% of women were aware that HPV positive results do not mean definitely getting cervical cancer, while only 31% were aware that a HPV-negative result means a low risk of cervical cancer. Thirdly, with regards to transmission of HPV, 70% of respondents knew HPV can be reduced by condom use and 72% knew that having many partners increase HPV risk. Over half of the respondents knew that early intercourse increases the risk of HPV. Fourth, fewer than half of our respondents had known that HPV does not require treatment, and just over half knew that HPV cannot be cured by antibiotics. Finally, in multivariate analyses of potential correlates of HPV knowledge, HPV status, having a university education, information seeking, and being a higher education student emerged as independent predictors.

The mean HPV knowledge score was 9.35 (SD = 4.43, max score = 15), which is 0.82 higher than the mean knowledge score (8.53) reported for UK women by Marlow et al. (2013). Knowledge of HPV appear to have increased since the publication of the Marlow et al. (2013) study, particularly awareness of HPV treatment, but also HPV transmission knowledge. The proportion of correct responses between respondents in this study and UK women in Marlow et al.'s (2014) study was similar for the statements relating to condom use in reducing risk of HPV (70% vs. 68%), having many sexual partners increases the risk of getting HPV (72% vs. 75%), having sex at an early age increases the risk of getting HPV (56% vs. 58%), HPV is very rare (69% vs. 67%), and HPV can cause genital warts (48% in both studies).

HPV testing knowledge in the current sample was generally low. The mean HPV testing score was 3.34 (SD = 1.91, max score = 6), which is 0.43 higher than the mean HPV testing score (2.91) reported by Dodd et al. (2014) for UK men and women. Of particular concern for cervical screening, is that only 31% of women in our study were aware that a HPV negative test indicates her risk of cervical cancer is low. Additionally, only 69% of women were aware that HPV testing is done at the same time as a cervical screening test.

These findings suggest low levels of HPV knowledge, confusion or lack of complete understanding of HPV. Women's knowledge of HPV and of HPV as a risk factor for cervical cancer will be integral in influencing the acceptance of HPV testing and changes in cervical screening to HPV primary testing (Patel et al., 2018). A number of studies have found stigma, embarrassment and shame associated with positive HPV results (e.g., Patel et al., 2018; McCaffery et al., 2006). Studies have also found that knowledge of HPV being sexually transmitted is associated with greater levels of stigma and shame (Waller, Marlow, & Wardle, 2007; O'Connor et al., 2014). This suggests the need for careful consideration of how information and education about HPV is phrased and implemented as part of cervical screening, to maximise screening attendance and to minimise negative psychosocial impact.

Multivariate analyses

HPV status influence general HPV knowledge as well as HPV testing knowledge, and it emerged as a significant independent predictor in the regression analysis predicting HPV testing knowledge. The multiple regression predicting HPV testing knowledge revealed that having an HPV positive test result and having university education is associated with higher HPV testing knowledge. The finding that women with HPV positive test results have higher

levels of HPV testing knowledge is consistent with past research (Holcomb et al., 2004; Tiro et al., 2007). It is also consistent with past research indicating awareness of HPV is greater in women with abnormal smear tests (Waller et al., 2003). It's been previously demonstrated that education level is associated with HPV knowledge (e.g., Dodd et al., 2014; Marlow et al., 2013), suggesting that targeting HPV-related information to women with lower educational attainment may be worthwhile.

Information seeking following cervical screening increases knowledge (both general and testing), and emerged as an independent significant predictor of general HPV knowledge. Previous research has demonstrated that active information-seeking behaviour increase knowledge and may also increase screening behaviour (Shim, Kelly & Hornik, 2006; Neiderdeppe et al., 2007; Kelly et al., 2010). Women reported seeking information from the internet, GP/nurses and family/friends, a similar range of sources to that reported in other studies (e.g., Kelly et al., 2010; Donadiki et al., 2013).

The only demographic variable to demonstrate any differences in knowledge was employment status, with students having higher general knowledge scores than those employed. This was also a significant independent predictor of general HPV knowledge. We are unclear on why this is the case; it may be that students general willingness and ease at using the Internet to seek information and health information (Dobrinsky & Harittai, 2012; Stellefson et al., 2011) is the reason for this association. However, further demonstration and replication of this association is required before we can be sure of its importance and its mechanisms.

The results of the present study, along with those of Marlow et al. (2013) and Dodd et al. (2014) suggest that women in the UK still require further information about HPV. HPV prevalence knowledge is relatively low, and the message that most sexually active people will at some point in their lives have a HPV infection may further serve to reduce stigma associated with HPV (Waller, Marlow, & Wardle, 2007). HPV treatment appears to be an area of misunderstanding and low knowledge, as identified within this sample and also the Marlow et al. study. In addition, public health campaigns should also focus on HPV prevention knowledge and HPV testing knowledge, as there appears to be gaps in knowledge and understanding here. Most women surveyed were aware of that HPV can cause cervical cancer, but few understand that receiving a HPV negative result mean that the risk of getting cervical cancer is low. This points to women not fully understanding the role HPV testing has within cervical screening, something for health care professionals involved in screening to consider.

The media has been shown to be a common source of information about HPV (Pitts, Dyson, Rosenthal, & Garland, 2007), and shown to increase knowledge of HPV after coverage of the introduction of the HPV vaccine (Kelly et al., 2009). Recent research suggest that emphasising the high prevalence of HPV and association with normal sexual behaviour in an attempt at normalising it may be a key way to minimise any possible negative psychological outcomes (Dodd et al., 2016). With cervical screening rates falling in England, and lack of understanding and knowledge identified as a reason why the attendance rates are falling, public information campaigns are necessary and important.

Limitations and strengths

The results from this study should be interpreted with the following limitations in mind. Firstly, a cross-sectional study design was used, therefore casual conclusions can not be inferred. Prospective studies are recommended to further explore and fully examine these associations. Secondly, participants were recruited from the community in a variety of ways and we have no way of knowing how many chose not respond to the survey. This may have led to recruitment bias, with more health-oriented and more conscientious respondents opting to take part in the study. Thus, there may be reduced generalisability to the general population of UK women. Nonetheless, the study sample demographic characteristics are similar to that found in the previous two studies which used the same validated measure of HPV knowledge (Dodd et al., 2014; Marlow et al., 2013).

The strengths of the study include the use of a validated measure of HPV knowledge, allowing comparison of results with previous studies. Furthermore, rigorous web-based surveys are very valuable tools, and overcome the issue of low response rate associated with survey employing random digit dialling or postal questionnaires (Sinclair, O'Toole, Malawaraarachichi, & Leder, 2012). In the UK, approximately 89% of households have internet access, and 70% of adults access the internet using a mobile phone or a smart phone (ONS, 2016).

Conclusion

In summary, the results from this study suggests that while some aspects of HPV knowledge appear to have increased since Marlow et al.'s 2013 and Dodd et al.'s 2014 studies, general population levels of knowledge and understanding of HPV and its transmission, prevention, treatment and link with cervical cancer remain concerning.

Therefore, further public health campaigns are needed to ensure the success of the cervical screening programme and thereby saving the lives of women. Specifically, public health campaigns focused on increasing HPV testing knowledge, which is lower than general HPV knowledge, may further serve to reduce or minimise the possibility of negative psychosocial impact of being diagnosed with HPV, and also influence women's acceptance of the change to HPV primary testing within cervical screening.

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Table 1. Descriptive statistics for sample ($N = 246$).

Variable	N (%)	Mean (SD)	Range min-max
Age		37.59 (9.20)	
Single	67 (27)		
No Children	112 (46)		
University education	184 (75)		
Employed	166 (68)		
Income			
< £10k	25 (10)		
£10k – 24999	47 (19)		
> £25k	171 (70)		
White ethnicity	229 (93)		
Smear history			
Non-attender	17 (7)		
Irregular attender	32 (13)		
Regular attender	195 (79)		
Last smear			
Never	9 (4)		
< 18 months	142 (58)		
19-36 months	74 (30)		
> 36 months	19 (8)		
HPV status			
Positive	25 (10)		
Negative	99 (40)		
Unknown	120 (49)		
Further info seeking	36 (15)		
HPV knowledge		9.35 (4.43)	0-15
HPV testing score		3.34 (1.91)	0-6

Table 2. Multiple regression analysis results for correlates of general HPV knowledge.

	R²	β	B	SE	CI 95% (B)
Model	.16***				
Age		.07	.03	.04	-.04 / .10
Employment		-.23**	-2.20	.77	-3.72 / -.68
Marital status		-.06	-.55	.73	-1.99 / .89
Ethnicity		.06	1.04	1.16	-1.25 / 3.33
Education		.13	1.34	.70	-.04/ 2.71
Income		reference			
< £10k					
Income £10k – £24 999		-.05	-.56	1.23	-2.99 / 1.87
Income > 25k		.08	.78	1.24	-1.66 / 3.21
Last smear		reference			
never					
Last smear < 18mo		.09	.77	2.36	-3.87 / 5.42
Last smear 18- 36mo		.09	.84	2.40	-3.90 / 5.57
Last smear > 36mo		-.04	-.66	2.33	-5.25 / 3.93
Smear Att Non	Reference				
Smear Att Irregular		-.03	-.34	1.93	-4.13/3.46
Smear Att Regular		.11	1.22	1.83	-2.40/4.83

HPV status	Reference				
positive					
HPV status		-17	-1.51	1.62	-4.71 / 1.68
negative					
HPV status		-18	-1.54	1.64	-4.77 / 1.68
unknown					
Further info		.25*	3.06	1.36	.39 / 5.74
seeking					

Note. Statistical significance: * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3. Multiple regression analysis results for correlates of HPV testing knowledge.

	R²	β	B	SE	CI 95% (B)
Model	.18***				
Age		-.12	-.03	.02	-.05 / .01
Employment		-.04	-.17	.33	-.82 / .47
Marital status		-.08	-.32	.31	-.93 / .29
Ethnicity		.03	.25	.49	-.72 / 1.23
Education		.14*	.63	.30	.04/ 1.21
Income		reference			
< £10k					
Income £10k – £24 999		-.10	-.50	.52	-1.53 / .53
Income > 25k		-.01	-.03	.53	-1.07 / 1.00
Last smear		reference			
never					
Last smear < 18mo		.12	.45	1.00	-1.52 / 2.42
Last smear 18- 36mo		.09	.38	1.02	-1.63 / 2.39
Last smear > 36mo		.06	.39	.99	-1.56 / 2.35
Smear Att Non	Reference				
Smear Att Irregular		.03	.16	.82	-1.45/1.78
Smear Att Regular		.17	.82	.78	-.72/2.36

HPV status	Reference				
positive					
HPV status		-.39*	-1.53	.69	-2.88 / -.17
negative					
HPV status		-.45*	-1.71	.70	-3.08 / -.33
unknown					
Further info		.10	.52	.58	-.61 / 1.66
seeking					

Note. Statistical significance: * $p < .05$; ** $p < .01$; *** $p < .001$