Cervical Screening a Study on the Prevalence of the Risk-factors for Developing Cervical Cancer Among Young Women

Jennifer Cann
Dublin Institute of Technology

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“Cervical Screening”

A study on the prevalence of the risk-factors for developing cervical cancer among young women.

Jennifer Cann

Submitted to the Department of Social Sciences, Dublin Institute of Technology,
in partial fulfilment of the requirements leading to the award of
MA in Child, Family and Community Studies.

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Dublin Institute of Technology 26th September, 2008
Declaration of Ownership

I declare that the work being submitted is entirely my own and that all sources used have been acknowledged as required by the Dublin Institute of Technology (DIT).

Signed: ____________________________________

Date: ______________________________________
Acknowledgements

To Trish, my inspiration for raising awareness among women of the necessity of cervical screening.

To Dr. Dorit Deering, for her kind patience and continuous support whilst supervising me.

To my wonderful parents, who were always there for me whenever I needed them, yet always gave me the space I required.

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<tr>
<td>BNA</td>
<td>Borderline Nuclear Abnormalities</td>
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<tr>
<td>CIN</td>
<td>Cervical Intraepithelial Neoplasia (Grades 1, 2 and 3)</td>
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<tr>
<td>DIT</td>
<td>Dublin Institute of Technology</td>
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<td>HPV</td>
<td>Human Papillomavirus</td>
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<td>HSE</td>
<td>Health Service Executive</td>
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<td>IARC</td>
<td>International Agency for Research on Cancer (part of the World Health Organisation)</td>
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<td>ICSP</td>
<td>Irish Cervical Screening Programme</td>
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<td>ISSHR</td>
<td>Irish Study of Sexual Health and Relationships</td>
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<tr>
<td>LLETZ</td>
<td>Laser loop excision of the transformation zone</td>
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<tr>
<td>LSP</td>
<td>Lifetime (number of) Sexual Partners</td>
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<td>NCRI</td>
<td>National Cancer Registry of Ireland</td>
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<td>OCP</td>
<td>Oral Contraceptive Pill</td>
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<td>OC(s)</td>
<td>Oral Contraceptive(s)</td>
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<td>PAP</td>
<td>Papanicolaou smear</td>
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<tr>
<td>RSE</td>
<td>Relationship and Sexuality Education Programme</td>
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<td>SPSS</td>
<td>Statistical Program for Social Scientists</td>
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<td>STD(s)</td>
<td>Sexually Transmitted Disease(s)</td>
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<tr>
<td>STI(s)</td>
<td>Sexually Transmitted Infection(s)</td>
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<tr>
<td>TZ</td>
<td>(Cervical) Transformation Zone</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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Glossary

Abnormal Smear: Smears showing cervical cell abnormalities called dyskaryosis, but not benign changes such as infection or hormonal influences (Ni Riain et al, 2003, p. 66).

Biopsy: Removal of a sample of tissue from the body, for examination under a microscope (Ni Riain et al, 2003, p. 66).

Cervical Intraepithelial Neoplasia (CIN): Cervical Intraepithelial Neoplasia is not cancer. It is a histological (examination of a tissue biopsy) diagnosis. It describes varying degrees of abnormality of the cells within and confined to the epithelium (cervical lining or ‘skin’). There are three grades of CIN: I, II, III (Ni Riain et al, 2003, p. 66).


Cervical Cytology: A microscope examination of cells scraped from the surface of the cervix, for signs of abnormality (Ni Riain et al, 2003, p.66).

Cervical Smear Test: A screening test where a sample of the surface cells are taken from the skin of the cervix or vagina/vault, preserved immediately and sent to the laboratory for microscope examination (Ni Riain et al, 2003, p. 66).

Cohort: A generational group (Layte et al, 2006, p. xix)

Colposcopy: A low power magnification, light illuminated examination of the cervix and vagina looking for abnormalities of the tissue, carried out in a hospital with specialised facilities (Ni Riain et al, 2003, p. 66).

Cone Biopsy: A surgical removal of a cone-shaped section of the cervix to remove abnormal cells. The procedure is diagnostic but may be curative as well (Ni Riain et al, 2003, p.66).

Dyskaryosis: Term used in cytology to describe nuclear abnormalities in cervical cells. Dyskaryotic cells are classified as mild, moderate and severe and correlate with CIN I, CIN II and CIN III (Ni Riain et al, 2003, p. 66).

HPV: Human Papillomavirus is a group of wart viruses, of which a high proportion are sexually transmitted (Ni Riain et al, 2003, p. 67).

Hysterectomy: The surgical removal of the uterus (womb) – called total if it includes the cervix or subtotal / partial if the cervix is not entirely removed (Ni Riain et al, 2003, p. 67).
**Inadequate Smear**: A smear that cannot be safely read and reported by the laboratory. Causes include obscuring by blood or exudates, insufficient cells, destruction of cells due to air-drying or mishandling, broken slide (Ni Riain et al, 2003, p. 69).

**LLETZ**: Large Loop Excision of the Transformation Zone is a diagnostic and/or treatment method to remove the cervical areas of abnormality or concern (Ni Riain et al, 2003, p. 67).

**Mortality**: The number of deaths from a specified disease during a defined period of time in a given population (Ni Riain et al, 2003, p. 67).

**Normal Smear**: A smear result which is reported to be within normal limits (Ni Riain et al, 2003, p. 68).

**Opportunistic Smear/Screening**: A smear done when the opportunity presents, irrespective of the woman's ICSP eligibility or screening requirements: self referral (Ni Riain et al, 2003, p.68).

**Population-based Screening Programme**: An organized approach of managing a population of people to be screened to determine the likelihood of the disease, or not, that is being screened for (Ni Riain et al, 2003, p. 68).

**Prevalence (rate)**: May refer to have precancerous cervical abnormality or cancer. It is the total number of women who have a cervical precancerous lesion or cancer at a particular time (or during a particular period) divided by the population at risk of having a cervical precancerous lesion or cancer at this point in time or midway through the period (Ni Riain et al, 2003, p. 68).

**Radical hysterectomy**: Removal of the uterus, cervix, cuff of the vagina, parametrial tissues and pelvic lymph nodes (Ni Riain et al, 2003, p. 10).

**Radical radiotherapy**: External beam radiation or brachytherapy where radioactive isotopes are placed within or adjacent to the tumour (Ni Riain et al, 2003, p. 10).

**Transformation Zone**: The region of the cervix where the columnar cells of the inner cervix have or are changing to outer squamous cells. The process of change is call metaplasia. It is the area most at risk of abnormal change (Ni Riain et al, 2003, p. 69).
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Abstract
This study had three aims: to determine the prevalence of the risk-factors for contracting HPV (the Human Papillomavirus) and developing cervical cancer among young women; to establish if there are any links between the presence of these risk-factors, attendance for cervical screening and abnormal cervical screening results; and to ascertain the key barriers to the prevention of cervical cancer. The risk-factors were identified from literature as being sexually active at a young age, having increasing numbers of sexual partners for females and their partners, having had a sexually transmitted infection/disease (STI), smoking and long-term use of the oral contraceptive pill. The research was conducted through a quantitative, self-completion internet survey, completed by 242 women aged 18-24 attending a third-level institute and analysed using SPSS (the Statistical Package for Social Sciences). The findings showed that the prevalence of the sexual behaviour risk-factors tended to occur concurrently; being sexually active before age 17 was linked to increasing numbers of sexual partners and the occurrence of STIs. The findings also showed that approximately one-quarter of participants had attended for cervical screening, of which, over one-third reported abnormal results. Additionally, the findings demonstrated that the presence of the abovementioned sexual behaviour risk-factors tended to increase the likelihood of cervical screening attendance and the reception of an abnormal result. The key barriers to the prevention of cervical cancer were identified as a lack of knowledge about the primary and secondary prevention of cervical cancer: HPV and cervical screening respectively. The present study recommended that firstly, as the prevalence of the risk-factors appear to be increasing, cervical screening should be initiated from age 20 onwards, on the basis of the presence of the risk-factors, rather than being age-standardised at 25, and secondly, greater education and communication on the primary and secondary prevention of cervical cancer should be disseminated to adolescents and young people.
1.1 Introduction
This paper examines the prevalence of the risk-factors for developing cervical cancer among young women attending a third-level institute. Chapter One begins by illustrating the aims of the study and then explains the rationale for the research and provides an outline of the study.

1.2 Aims of the study
This study addresses the following three research questions:

1. What is the prevalence of the risk-factors for contracting HPV (the Human Papillomavirus) and developing cervical cancer among young women attending a third-level institute?
2. Are there any links between the presence of these risk-factors, attendance for cervical screening and the young women’s abnormal cervical screening results?
3. What are the key barriers to the prevention of cervical cancer among these young women?

In addressing these questions, the association between HPV, a sexually transmitted infection (STI), and cervical cancer is examined and the main risk-factors for contracting HPV and developing cervical cancer are identified from literature (International Agency for Research on Cancer, 2003, 2005).

Additionally, this study endeavours to answer these questions through the use of a quantitative, semi-standardised, self-completion questionnaire designed by the researcher (see Appendix A). These questionnaires were voluntarily completed via the internet, by 242 sexually active young women attending a third level institute.

1.3 Rationale of the Study
This study was undertaken as a result of discovering that young women have the third highest age-specific incidence rates of preinvasive cervical cancer in Ireland.

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1 Throughout this paper, the terms ‘young women’, ‘young men’ or ‘young people’, refers to the respective group between the ages of 18 and 24 inclusive.
(see Appendix B) (National Cancer Registry Ireland, 2006) and are also the third highest age group in attendance for colposcopy (a microscopic examination of the cervix) (Irish Cervical Screening Programme, 2004b). Yet, despite these statistics, there are great inconsistencies regarding the age at which age a young women should first attend for a cervical smear test; some doctors advise that within three years of first sexual intercourse a women should attend for cervical screening, while other doctors and the Irish Cervical Screening Programme (ICSP) advocate that screening women under the age of 25 is unnecessary, as invasive cervical cancer seldom occurs in this age group (Ni Riain, et al, 2003; CervicalCheck, 2008). Furthermore, ‘CervicalCheck- The National Cervical Screening Programme’ which has incorporated the ICSP and was launched in September 2008, is firstly, excluding all women aged under 25 from partaking in its cervical screening programme and secondly, is discouraging women under 25 from attending for opportunistic (self-referral) cervical screening, regardless of the presence of the risk-factors for developing cervical cancer (CervicalCheck, 2008; Martin et al, 2007).

Interest in this study was also garnered because of the recent availability of a vaccine against HPV: will it result in young women forgoing cervical screening in the belief that HPV-vaccination provides total protection against cervical cancer, even though other factors work in tandem with HPV to contribute to one’s risk of cervical cancer (International Agency for Research on Cancer, 2005).

1.4 Outline of the Study

Chapter One gives a brief outline of the research study, the aims of the research and the rationale for undertaking this study.

Chapter Two presents the literature review. Firstly, the theoretical framework on cervical screening and cervical cancer prevention in Ireland is examined. Next, the association between HPV and cervical cancer is explored, as are the risk-factors for contracting HPV and developing cervical cancer. Afterwards, the prevalence of these risk-factors among young women is briefly considered in the
Irish context and then the key barriers to the prevention of cervical cancer are investigated, including the impact that knowledge, or lack thereof, has on cervical cancer prevention. The initiation of cervical screening in various countries is then contemplated, drawing on international cervical screening guidelines, and lastly a summary is drawn.

Chapter Three outlines the research methodology of the present study and discusses the sampling framework and selection of participants. The chosen data collection method is then justified and the research instrument, the ethics of the study and the analysis of the data are considered.

Chapter Four presents the research findings from the present study under several headings, including: the prevalence of the HPV and cervical cancer risk-factors, participants’ cervical smear test attendance and results in relation to the risk-factors, and participants’ key barriers to cervical cancer prevention, including their knowledge of cervical cancer prevention.

Chapter Five discusses the research findings presented in Chapter Four, in relation to the aims of the research and the literature review, and draws a summary as to the prevalence of the risk-factors, the association between the presence of these risk-factors and the participants’ cervical screening attendance and abnormal screening results, and participants’ key barriers to cervical cancer prevention.

Chapter Six draws a conclusion as to the present research study and presents recommendations arising from the research findings and discussion.
2.1 Introduction
This chapter presents the rationale for young women to attend for cervical screening in the prevention of cervical cancer, by examining the risk-factors for developing cervical cancer and the prevalence of these risk-factors. Firstly, the incidence of cervical cancer is noted and the context for cervical screening in the prevention of cervical cancer is examined. Next, the relationship between the Human Papillomavirus (HPV) and cervical cancer is explored, focusing on the risk-factors for contracting HPV and developing cervical cancer (International Agency for Research on Cancer, 2003, 2005). The prevalence of these risk-factors is then briefly considered among young women in the Irish and where possible, international context, drawing on recent epidemiological studies. Afterwards, the key barriers to the prevention of cervical cancer are examined, focusing on the impact that knowledge has on cervical cancer prevention. The initiation of cervical screening in different countries is then concisely contemplated in relation to international guidelines, and lastly, a summary is drawn.

2.2 Cervical Cancer: Prevalence, Screening, Prevention and Treatment
Cancer of the cervix uterine, the neck of the womb (see Appendix C) (Schiffman et al, 2007; Shafi and Welton, 2007), develops when abnormal cervical cells begin unrestrained multiplying and form precancerous lesions (Department of Health and Ageing, Australian Government, 1991). Second only to breast cancer, cervical cancer is the most prevalent cancer among women worldwide (International Agency for Research on Cancer, 2003, 2005). Approximately 500,000 new cases and 270,000 deaths from cervical cancer occur annually; 80% of which occurs in developing countries (ibid). In Ireland, approximately 1,000 new cases of preinvasive and 180 new cases of invasive cervical cancer are diagnosed each year, whilst annually over 80 women die from cervical cancer, 70% of whom had not attended for regular cervical screening (Women's Health Council, 2006, in Martin et al, 2007; Irish Cervical Screening Programme, 2004a, 2004c, 2007; Department of Health and Children, 2006; Irish Cancer Society, 2006). This is one of the highest rates in Western Europe, with mortality rising annually by 1.5% (Prendiville, 2007; Comber and Gavin, 2004).
Epidemiological studies show consistent associations between the risk of cervical cancer, infection with HPV and sexual behaviour (these associations will be subsequently discussed), yet, secondary prevention remains the principal strategy for the prevention of cervical cancer (Muñoz et al, 1992a, 1992b in International Agency for Research on Cancer, 2003, 2005). The secondary prevention of cancer involves the opportunistic or population-based screening of individuals to detect (preinvasive) cancer at a stage when curative treatment is still possible, whereas primary prevention aims to avoid the development of cancer by reducing or eliminating exposure to the risk-factors that are known to cause cancer (International Agency for Research on Cancer, 2003; Sikora, 2007; Hakama et al, 2008). Therefore, the objective of cervical screening is to reduce the mortality from (and incidence of) the disease by identifying women with precancerous cervical lesions and early invasive cancers, and treating these women appropriately (International Agency for Research on Cancer, 2005, p. 9).

It is these precursors of invasive cervical cancer that are screened for, rather than the cancer itself, as these lesions have in principle, the capacity to progress to invasive cervical cancer if left untreated (Shafi and Welton, 2007; International Agency for Research on Cancer, 2005). Although cervical cancer is always a potentially lethal disease, its preinvasive stage, “during which the disease can be treated so that its progression to overt disease is stopped”, is 3-10 years (Cole and Morrison, 1978, in Hakama et al, 2008, p. 1404; Shafi and Welton, 2007; Kitchener et al, 2008; Government of Ireland, 1996).

Cervical screening, also known as a cervical smear test or a papanicolaou (PAP) smear, takes approximately five minutes and involves a registered smertaker (a specifically trained nurse or doctor) scraping cells from the surface of the woman's cervix; these cells are then sent to a cervical cytology laboratory to be microscopically examined for precancerous cervical cell abnormalities (Irish Cancer Society, 2008; Ni Riain et al, 2003; Nevid et al, 1995). As there is no single European classification system, abnormal cervical screening results, representing a continuum risk for invasive cervical cancer, are classified in Ireland
using Cervical Intraepithelial Neoplasia (CIN) or Bethesda terminology (International Agency for Research on Cancer, 2005; Bano et al, 2008; Castle et al, 2007; Irish Cervical Screening Programme, 2004b). There are three CIN grades (I, II and III) corresponding to mild, moderate and severe dyskaryosis (see Appendix D) (Government of Ireland, 1996; International Agency for Research on Cancer, 2005). Additionally, ‘borderline nuclear abnormalities’ (BNA) describes uncertain cervical cell abnormalities not yet classifiable under CIN (Kitchener et al, 2006). It is estimated that 84% of (Irish) smears are normal or negative for CIN, 6% report abnormalities and 10% are inadequate, meaning that the smear does not give an accurate result (Ni Riain et al, 2003; McGoogan, 2004; Leeson, 2005).

The assessment of abnormal screening results and the prevention of cervical cancer in the majority of (developed) countries, including Ireland, conventionally involves three-stages: a smear test, colposcopy/biopsy and treatment (see Appendix E) (Bosch et al, 2008; Kitchener et al, 2006; Ni Riain et al, 2003; McGoogan, 2004). These three-stages are dictated by specific management protocols (see Appendix F) (ibid). Since approximately one-third of lesions will spontaneously regress without treatment, these protocols aim to prevent the over-diagnosis and over-treatment of cervical lesions (Hakama et al, 2008; European Cervical Cancer Screening Network, 2003; International Agency for Research on Cancer, 2003). However, as two-thirds of lesions will persist or progress to a higher grade of CIN, at the progression rate of 3-5 years per grade, these protocols also prescribe the management of abnormal cervical screenings (Ni Riain et al, 2003; Shafi and Welton, 2007). Persistent lesions require a colposcopy, whereby the cervix is viewed under a microscope, followed by a biopsy of the abnormal cervical cells for further cervical cytology (microscopic examination) (Ni Riain et al, 2003; Government of Ireland, 1996). Consequently, as cervical screening only detects changes in the cervical cells (Leeson, 2005), the assessment of abnormal screenings and the selection of those necessitating treatment, depends primarily on their colposcopy and biopsy findings (Shafi and Welton, 2007; Irish Cervical Screening Programme, 2005a).
Where preinvasive cervical cancer (CIN2/3) is diagnosed, ablative (removal) treatment procedures are employed in Ireland: the ‘laser loop excision of the transformation zone’ (LLETZ) excisions the required area with least morbidity, while a cone biopsy involves the “surgical removal of a cone-shaped section of the cervix to remove abnormal cells” and is associated with cervical stenosis and incompetence (Ni Riain et al, 2003, p. 66; Cancerbackup, 2007; Leeson, 2005 Spitzer, 2007; Stanley, 2008). These procedures necessitate approximately six weeks healing time for the cervix, yet, as the precancerous lesions are fully removed in approximately 90% of women, these treatments may be more accurately viewed as cancer risk-reducing interventions (Castle et al, 2007; McGoogan, 2004; Kitchener et al, 2006; Cancerbackup, 2007). Conversely, where invasive cervical cancer (CIN3+) is diagnosed and depending on the stage of cancer and whether fertility is desired, treatments may comprise: hysterectomy, chemotherapy and dual treatment with both radiation and surgery (Ni Riain et al, 2003; Spitzer, 2007; Shafi and Welton, 2007).

Therefore, as the chief hindrance in preventing cervical cancer is a failure to be screened at all, the International Agency for Research on Cancer (IARC), part of the World Health Organisation (WHO), asserts that a fully competent organised national cervical screening programme could result in an 80% mortality reduction, as opportunistic screening tends to miss women at greatest risk (International Agency for Research on Cancer, 2003, 2005; Albreht et al, 2008). In 2000, a pilot project of the Irish Cervical Screening Programme (ICSP) was launched entitling women aged 25-60 to free cervical screening at five-year intervals (Irish Cervical Screening Programme, 2004a; Irish Cervical Screening Project, 2003, in Comber and Gavin, 2004). The ICSP, now incorporated into ‘CervicalCheck- The National Cervical Screening Programme’, had aimed to be national by January 2006 (Department of Health and Children, 2006; Government of Ireland, 2001), but is only being initiated nationwide since September 2008 (Irish Cervical Screening Programme, 2008a, 2008b). Consequently, the absence of an organised national cervical screening programme has contributed to Ireland’s rising cervical cancer mortality rate, as opportunistic screening remained the only option for the
majority of Irish women (Comber and Gavin, 2004; Treanor et al, 2002; Prendiville, 2007).

2.3 The Human Papillomavirus (HPV), Cervical Cancer and the Risk-Factors

HPV is an extremely common sexually transmitted virus that approximately 80% of individuals will be infected with at some stage in their lives, although the majority of individuals will spontaneously clear HPV infections within two years of being infected (Scheurer et al, 2005, in Martin et al, 2007; Shafi and Welton, 2007; Martin et al, 2007; Leeson, 2005). Over 200 HPV strains have been identified, 40 of which infect the genital tract, for example, ano-genital warts; of these, 15 are considered high-risk or oncogenic for cervical cancer (Walboomers et al, 1999, in Myers et al, 2008; Stanley, 2008; International Agency for Research on Cancer, 2003, 2005; Schiffman et al, 2007). As HPV infection is evident in over 99% of cervical cancer specimens, persistent oncogenic HPV infection in the cervical transformation zone (TZ) (see Appendix C) is established as the aetiological cause of cervical cancer and CIN (Walboomers et al, 1999, in International Agency for Research on Cancer, 2003, 2005; zur Hausen, 1999, in International Agency for Research on Cancer, 2003; Kjaer et al, 2002). HPV persistency takes 2-15 years, signifying that preinvasive cervical cancer can be detected within three years of HPV infection (Kitchener et al, 2006; Woodman et al, 2001, in Sasieni and Castanon, 2006; Mao et al, 2006, in Harper and Paavonen, 2008).

The risk-factors for HPV infection are well-established through epidemiological studies, as being related to one’s sexual behaviour; specifically, the age at first sexual intercourse and increasing numbers of sexual partners for females and their sexual partners (see Appendix G) (Muñoz et al, 1992a, 1992b, in International Agency for Research on Cancer, 2005; Bosch et al, 2002). The age of first sexual intercourse, at the age of peri-menarche or approximately age 17, is linked partly to the age at first HPV exposure, but primarily to the opinion that the developing cervix is at high-risk for HPV infection to establish persistency (Bosch et al, 2002; Todd and Shafi, 2004). In recent Irish research, 62% of young women with
preinvasive cervical cancer debuted sexually before age 14 (O’Connor et al., 2008). Furthermore, increasing numbers of sexual partners enhances the likelihood of concurrent HPV infections with multiple HPV types and the probability of persistent oncogenic HPV infection (Schiffman et al., 2007; Deacon et al., 2000; International Agency for Research on Cancer, 2005). Research demonstrates that women reporting over nine sexual partners had a HPV incidence rate of 69% (Ley et al., 1991, in Moscicki, 2005). Yet, sex with only one partner and a lack of knowledge about a partner’s prior sexual experiences is also associated with HPV infection, especially where the partner has had several other sexual partners (Moscicki, 2005; Winer et al., 2003). Consequently, the abovementioned sexual behaviour risk-factors also reflect the probability of becoming infected with HPV (International Agency for Research on Cancer, 2003).

Sexually transmitted infections (STIs), especially HPV associated ano-genital warts, are also considered risk-factors, as they cause inflammation of the cervix, allowing the HPV infection direct access to the cervical cells, thus promoting HPV persistency (Moscicki, 2005; Bosch et al., 2002; Todd and Shafi, 2004; International Agency for Research on Cancer, 2003, 2005). Irish research demonstrated that 80% of young Irish women presenting with CIN3, also had chlamydia (O’Connor et al., 2008). Additionally, STIs negatively affect one’s immune system, reducing the likelihood of clearing HPV infection (Shafi and Welton, 2007; Bosch et al., 2002).

However, since only a small fraction of HPV-infected women will eventually develop cervical cancer, there must be other exogenous or endogenous factors which, acting in-conjunction with HPV, influence the progression from cervical infection to cervical cancer (International Agency for Research on Cancer, 2003, p. 216).

These factors are smoking and long-term (more than five years) use of oral contraceptives (OC), as they increase about fourfold and twofold respectively, the risk of developing cervical cancer (Ni Riain et al., 2003; International Agency for Research on Cancer, 2003, 2005; International Collaboration of Epidemiological
Studies of Cervical Cancer, 2007). OC are considered co-factors, as they influence infection and enhance the effect of oestrogens on cervical cells, directly inducing and increasing the “cell proliferation and transcription of HPV”, whilst permitting HPV easier access to the TZ (de Villiers, 2003, in Cotton et al, 2007, p. 138; Green et al, 2003, in Cotton et al, 2007). Yet, OC use itself does not automatically indicate cervical cancer causation; firstly, in developed countries, women using OC typically have increased cytological surveillance (hence the association) (Bosch et al, 2002; International Collaboration of Epidemiological Studies of Cervical Cancer, 2007) and secondly, women using OC “are more likely to be exposed to HPV than are those using barrier methods” (Sasieni, 2007, p. 1591).

Studies investigating the effects of tobacco smoking show that the risk of developing (cervical) cancer rises with increasing exposure to smoking;

> smokers were found to maintain cervical HPV infections significantly longer and to have a lower probability of clearing an oncogenic infection than women who never smoked (Giulian et al, 2002, in International Agency for Research on Cancer, 2005, p. 43; Deacon et al, 2000).

Specifically, HPV-infected women who smoke 20 cigarettes or more a day, have a significant risk of progressing to a higher CIN grade; 2.5 times that of women who have never smoked, in addition to a threefold increased risk of CIN treatment failure (Shafi and Welton, 2007; Aclaudious et al, 2002, in Frega et al, 2003). Furthermore, a smoking reduction intervention study among women with minor-grade lesions resulted in a reduction in lesion size, further supporting the role of smoking in HPV carcinogenesis (Szarewski et al, 1996, in International Agency for Research on Cancer, 2005; Shafi and Welton, 2007). Other co-factors under evaluation for increasing the risk of developing cervical cancer include multiparity, nutritional factors and socioeconomic status (Bosch et al, 2002; Akers et al, 2007).

A recent development in the primary prevention of cervical cancer is the use of HPV-type 16/18 vaccines, ‘Gardasil’ and ‘Cervarix’, as these HPV strains are
responsible for approximately 70% of cervical cancers (International Agency for Research on Cancer, 2003, 2005; Myers et al, 2008; Bosch et al, 2002; Kulasingam et al, 2007). Since 2007, the Australian Government provides HPV-vaccination free to females aged 12-13, via a school-based immunisation delivery programme (Stanley, 2008; Franco and Cuzick, 2008); the United Kingdom (UK) proposes to offer the same beginning September 2008 (UK Joint Committee on Vaccination and Immunisation, 2007, in Stanley, 2008), as will the Irish Department of Health commencing September 2009 (Houston, 2008). However, concerns exist that HPV-vaccinated females will be less likely to attend for cervical screening, due to a belief that vaccination offers complete cervical cancer prevention, even though at the time of publication, no HPV-vaccine had a life-long duration or provides cross-protection against all oncogenic HPV types (Kulasingam and Myers, 2003, in Myers et al, 2008; Goldie et al, 2004, in Myers et al, 2008; Kulasingam et al, 2007; Stanley, 2008; Prendiville, 2007; Harper and Paavonen, 2008). Nevertheless, as HPV-vaccines are administered prior to sexual debut, vaccination should help address inconsistencies such as the age at which to begin screening (Myers et al, 2008; Stanley, 2008; Kulasingam et al, 2007). Furthermore, although beyond the scope of this paper, advances have been made in HPV testing as a primary screening test to detect persistent oncogenic HPV infection, before changes in the cervical cells are detectable through cervical screening (Franco and Cuzick, 2008; Castle et al, 2007; International Agency for Research on Cancer, 2003, 2005; Prendiville, 2007).

Therefore, as the probability of developing preinvasive cervical cancer becomes appreciable only when persistent oncogenic HPV infection occurs, the abovementioned risk-factors can be used to help characterise an individual woman's risk (Castle et al, 2007; International Agency for Research on Cancer, 2005; Plummer et al, 2007, in Schiffman et al, 2007; Barry et al, 2007).
2.4 The Prevalence of the HPV and Cervical Cancer Risk-Factors among Young Women in the Irish Context

In Ireland, the prevalence of the risk-factors for contracting HPV and developing cervical cancer are becoming gradually more common, due to the increasingly liberal views of sexuality that many young people hold; approximately 83% of young people are sexually active (Malesevic, 2003; Schubotz et al, 2002; Cousins et al, 2008; Layte et al, 2006). The legal age for heterosexual and homosexual intercourse in Ireland is 17 (Rundle et al, 2008), yet the demographically representative ‘Irish Study of Sexual Health and Relationships’ (ISSHR), reported that 31% of young men and 22% of young women had sexual intercourse before age 17 (Layte et al, 2006). This study also noted that the mean age for sexual debut was 16.9 for young men and 17.4 for young women (ibid). Thus, as the mean age for sexual debut was 21 in the 55-64 age cohort, with only 11% of men and 2% of women reporting intercourse before age 17, the average age for first sexual intercourse is decreasing (Rundle et al, 2008; Layte et al, 2006; Lalor et al, 2007). These findings are consistent with international research; in America, the mean age of sexual debut was approximately 17 (Mosher et al, 2002, in Castle et al, 2007), while in the UK it was 16, down from 21 years-of-age in the 1950s (Wellings et al, 2005, in Sasieni and Castanon, 2006).

The ISSHR found that the average number of female sexual partners (LSP) for young men was 6: 35% reported 1 LSP, while 21% reported 10 or more LSP (Layte et al, 2006; McGee et al, 2008). For young women, the average number of male sexual partners (LSP) was 4: 50% reported 1 LSP, while 8% reported more than 10 LSP (ibid). In comparison, 53% of men and 82% of women within the 55-64 age cohort reported 1 LSP, while 8% of men and only 2% of women in the same cohort reported more than 10 LSP, demonstrating that the average number of sexual partners is increasing (ibid). The ISSHR figures for same-sex partnerships were similar in all age cohorts, although they could not be verified for young people (McGee et al, 2008).
Additionally, the ISSHR noted that 94% of sexually active young women reported always using contraceptives: 46% reported using the oral contraceptive pill (OCP) (McGee et al, 2008; Layte et al, 2006; Cousins et al, 2008). The Irish Contraception and Crisis Pregnancy study reported slightly higher findings, whereby 55% of young women reported OCP use (Rundle et al, 2004, in Cousins et al, 2008; Shiely et al, 2004). In contrast, only 24% of young women in the UK reported consistent OCP use (Botting and Dunnell, 2000, in Peto et al, 2004).

In Ireland, the incidence of smoking among 18-34 year-olds was 34% (Central Statistics Office, 2002). More specifically, Irish research found that 19% of young people classified themselves as smokers (Currie et al, 2003, in Lalor et al, 2007), with young women having higher rates of current and lifetime smoking than young men (HSE, 2003, in Lalor et al, 2007). International research reports similar findings; in the UK, female smoking stands at 26% (Office for National Statistic, 2002, in Peto et al, 2004; Sierra-Tores et al, 2003, in Bano et al, 2008).

Further related to the risk-factors for developing cervical cancer, the ISSHR noted that 2% of young men and 2.6% of young women reported being diagnosed with an STI (McGee et al, 2008; Cousins et al, 2008; Layte et al, 2006). Moreover, the incidence of ano-genital warts, “the clinically visible manifestation of infection with HPV” (Health Protection Surveillance, 2008a, p. 1), has increased tenfold in Ireland since 1989 and is now the most commonly reported STI; 78% (2,726) of reported cases occurred in individuals aged under 29 (National Disease Surveillance Centre, 2001, in Comber and Gavin, 2004; Health Protection Surveillance, 2008b). These statistics are mirrored in Australia (Grulich et al, 2003, in McGee et al, 2008) and the UK, whereby 50% of all reported STIs occurred in young people, of which ano-genital warts/HPV was most commonly reported (Weinstock et al, 2004, in Moscicki, 2005; Collins et al, 2002, in Bano et al, 2008). Consequently, these studies indicate that STIs, particularly among young people, are increasing (Gilson and Mindel, 2001).
The increases in the prevalence of the aforementioned cervical cancer risk-factors and especially in HPV diagnoses, suggests a high transmission and infection rate of HPV among young people (Leeson, 2005; Harper and Paavonen, 2008; International Agency for Research on Cancer, 2003). Approximately 40% of 20-year-old women are estimated to be HPV-positive at any one time, 10% of which are oncogenic HYP types, while 55% of young people who become HPV-positive, do so within three years of sexual debut (Leeson, 2005; Harper and Paavonen, 2008; Moscicki, 2005; Winer et al, 2003; Collins et al, 2002, in Bano et al, 2008). In Ireland, Keegan and colleagues (2007) revealed that 31% of opportunistically screened young women were HPV-positive, reducing steadily to 11% of women aged over 35 (Keegan et al, 2007; Cuschieri et al, 2004, in Keegan et al, 2007). This corresponds to international research which indicates that whilst young women have the highest acquisition and prevalence rate of oncogenic HPV, non-persistent HPV infections decrease with age (Harper and Paavonen, 2008; Shafi and Welton, 2007; Cuzick et al, 2003, in Cotton et al, 2007; Winer and Koutsky, 2004, in Cotton et al, 2007).

Nonetheless, in Ireland, HPV prevalence was found to increase with CIN grade, from 11% in normal screening results, to 100% in CIN2/3 results (Keegan et al, 2007; Cuschieri et al, 2004, in Keegan et al, 2007). This is comparable to international research, whereby 93% of women aged under 29 with high-grade cervical abnormalities and 89% with low-grade abnormalities were also HPV-positive (Kjaer et al, 2002). Additionally, in Ireland in 2000, young women accounted for 23% of CIN2/3 findings, an increase from 14% in 1997, even though this age group represented just 17% of all smears (Treonor et al, 2002). This is in contrast to the over-55 age group which accounted for just 3% of CIN2/3 findings in 2000 (Treonor et al, 2002). Furthermore, in 2005 (the most recent data available), women aged under 25 demonstrated the third-highest age-specific incidence rate of CIN3, at 1.72 per 1,000, a massive increase from 0.48 in 1995 (see Appendix B) (National Cancer Registry Ireland, 2006; Treanor et al, 2002).
These studies correspond to evidence that as the prevalence of the risk-factors for contracting HPV and developing cervical cancer are increasing among young Irish women, so to are cervical abnormality incidences, especially preinvasive cervical cancer (Keegan et al, 2007; Treanor et al, 2002), thus demonstrating the necessity of including young women in routine cervical screening (Bano et al, 2008; Treanor et al, 2002).

2.5 The Key Barriers to Cervical Cancer Prevention

In Ireland, cervical cancer is currently prevented through secondary prevention; namely, cervical screening (International Agency for Research on Cancer, 2003; Ni Riain et al, 2003).

Studies indicate that in general, women are aware of the need to have a smear test, however, because of the barriers identified, are often reluctant to have one (Neilson and Jones, 1998, in Irish Cervical Screening Programme, 2004c, p. 22).

The barriers to cervical screening encompass both personal and practical barriers (Irish Cervical Screening Programme, 2004c). Personal barriers, comprising emotional barriers relating to the woman herself, include: embarrassment, ‘don’t think I need a cervical smear test, and ‘don’t know where to go to get a cervical smear test’ (ICSP Barometer Survey, 2004, in Irish Cervical Screening Programme, 2004c; Irish Cancer Society, 2006). These barriers are supported by Irish and international research which noted other personal barriers such as: ‘concerns about having a male smearaker’, ‘fear of the screening process’ and ‘fear of what might be found’ (Walsh et al, 2003; Walsh, 2006; Irish Cancer Society, 2006; Ni Riain et al, 2003; Fylan, 1998). Furthermore, ‘uncertainty about what age to begin screening’, ‘fear of pain’, considering oneself not to be at risk of developing cervical cancer, ‘don’t know what a cervical smear test is for’, and previous negative experiences with the health service, are also deterrents to screening (Ni Riain et al, 2003; Summers and Fullard, 1998, in Fylan, 1998; Irish Cancer Society, 2006; MacGregor et al, 1994, in Fylan, 1998). Ethnic differences, such as language barriers, may also deter women from attending for cervical screening (Ni Riain et al, 2003).
Conversely, the practical barriers to cervical screening relate to the availability of screening and the woman's perception about the importance of cervical screening, which in turn influences her attitudes towards screening (Irish Cervical Screening Programme, 2004c; Philips et al, 2003). The practical barriers are established by research as including: a lack of time, concerns about the cost of screening, unsuitable appointment times, a lack of access and fears about confidentiality (Ni Riain et al, 2003; Irish Cancer Society, 2006; The ICSP Barometer Survey, 2004, in Irish Cervical Screening Programme, 2004c; Walsh et al, 2003; Walsh, 2006). An additional practical barrier to screening is a common perception by women that if they are not offered a smear test by their health-provider, then they do not need one (Hennig and Knowles, 1990, in Irish Cervical Screening Programme, 2004c; Irish Cancer Society, 2006).

As evident, these barriers to screening are typically related to a woman's lack of knowledge about secondary cervical cancer prevention; such as not knowing that a cervical smear test can help prevent cancer (Irish Cervical Screening Programme, 2004c; Philips et al, 2003). A lack of knowledge by women and their healthcare-providers about the meaning of a cervical smear test result can also compound barriers to screening: for example, by misinterpreting a positive (for CIN) result as indicating cancer, or a negative result as indicating no risk of cervical cancer, instead of a low risk (World Health Organisation, 2005, in Sasieni and Castanon, 2006; International Agency for Research on Cancer, 2005; Marteau et al, 2001; Fylan, 1998). Furthermore, a misunderstanding of the concept of 'precancerous lesion' or receiving an ‘abnormal’ result may cause psychological distress including anxiety and concerns about future fertility (Lerman et al, 1991, in Kahn et al, 2001; Rosgrad, 2002, in Chew-Graham et al, 2006; Karasz et al, 2003, in Chew-Graham et al, 2006). In addition, embarrassment, stigma and lowered self-esteem may also be felt with an ‘abnormal’ result, as the association between HPV and cervical cancer may be interpreted by some women as indicating promiscuity (McKie, 1993, in International Agency for Research on Cancer, 2005; Posner and Vessey, 1988, in Kitchener et al, 2006).
Research in Ireland has indicated that the majority of women have limited knowledge of the purpose of a cervical smear test and of the meaning of cervical screening results, thus amplifying their anxiety and fear about cervical screening (Cotter et al, 1999, in Martin et al, 2007; Alder and Foxwell, 1999, in Walsh, 2006). For example, when asked a series of questions about the purpose of a cervical smear test, 50% of Irish women believed it detected infection/STIs, 78% thought that it detected cervical cancer and 70% (correctly) stated that a cervical smear test detected changes in the cells of the cervix; only 1% did not know the purpose of a cervical smear test (Walsh et al, 2003; Walsh, 2006). Not surprisingly, 37% of Irish women reported feeling that they did not know enough about cervical screening (ibid). Nevertheless, research approximates that over half of women can correctly identify a ‘normal’ smear test result as meaning a low risk of cervical cancer, although roughly 9% believe a normal result means no risk of cervical cancer (Cotter et al, 1999, in Martin et al, 2007). Furthermore, demographically representative research by the Irish Cancer Society demonstrated that two-thirds of women aged 20-30 have never had a cervical smear test; 40% of whom claimed a low level of knowledge about cervical cancer prevention (Cervical Screening & Cancer Awareness and Attitudes Survey, 2006, in Irish Cervical Screening Programme, 2007; Irish Cancer Society, 2006).

Research has also demonstrated that women have little knowledge of the primary prevention of cervical cancer, specifically the association with HPV (Summers and Fullard, 1998, in Fylan, 1998; Stark et al, 2008; Marlow et al, 2007). Despite the high prevalence of HPV, studies range from 20% of young people (Irish Cancer Society, 2006) to 75% of third-level students having ‘heard of’ HPV (Gerend and Magloire, 2008). These latter students also correctly identified HPV risk as associated with being sexually active and having many sexual partners, albeit 64% of participants wanting to know more about HPV (ibid). Additionally, research shows that sexually active young women have a low awareness of the high risk for contracting HPV and therefore, a low knowledge of primary cervical cancer prevention (Frega et al, 2003; Yacobi et al, 1999, in Frega et al, 2003),
even though 17% of female third-level students are estimated to have attended for cervical screening (Philips et al, 2003).

Studies have demonstrated that improved communication, education and information on the primary and secondary prevention of cervical cancer, specifically regarding the transmission of HPV and the importance of cervical screening, increases the probability of screening by counteracting the anxieties and fears that are key barriers (Wilkinson et al, 1990, in Kitchener et al, 2006; Ronco et al, 1994, 1999, in International Agency for Research on Cancer, 2005; Eaker et al, 2001a, 2001b, in International Agency for Research on Cancer, 2005; O’Malley et al, 2002, in International Agency for Research on Cancer, 2005; Irish Cancer Society, 2006). Additional education has also been found to increase the uptake of preventative cervical screening, by improving understanding of information, communication and accessibility to services (see Appendix H) (Sabates and Feinstein, 2006; Fylan, 1998). Consequently, sufficient knowledge helps encourage a good communicative relationship (Kahn et al, 2001) and may reduce the likelihood of the smear-takers gender acting as a barrier to screening and a deterrent to communication (Roter and Hall, 1992, in Kahn et al, 2001; Girgis et al, 1996, in Irish Cervical Screening Programme, 2004c). Increased knowledge may also, at least in the short-term, influence the potentially controllable behavioural factors that increase a woman's risk of developing cervical cancer, namely possible risky sexual behaviours and smoking (Philips et al, 2003). Additionally, as attitudes to screening are linked to perceptions about its importance, increased knowledge may lead to a change in individual valuations of screening and the adoption of preventative health behaviours, such as compliance with follow-up appointments (Philips et al, 2003; Kahn et al, 2001).

It is important however, that women are given unbiased, accurate information on the processes, consequences and benefits of screening, including the fact that screening cannot prevent all cases of pre- or invasive cancer (International Agency for Research on Cancer, 2005). This allows young women to make an informed choice of whether to attend for screening, based on the presence of the
risk-factors for developing cervical cancer, rather than simply using the woman's biological age to determine her entitlement to cervical screening (International Agency for Research on Cancer, 2005; Barry et al, 2007; Irwig et al, 2006; Philips et al, 2003; Castle et al, 2007). Consequently, such knowledge also helps ensure that healthcare-providers respect patient autonomy in decision-making and contributes to equity of access, whereby smear-takers have an ethical responsibility to provide screening to those whose sexual and behavioural history warrants cervical screening (International Agency for Research on Cancer, 2005; Irwig et al, 2006; Entwistle et al, 1998, in Philips et al, 2003).

For these reasons, there is a need to impart knowledge, regarding the primary and secondary prevention of cervical cancer, within educational programmes (Irish Cancer Society, 2006; Walsh et al, 2003). In 1997, the Relationships and Sexuality Education Programme (RSE) was introduced into Irish schools “to provide young people with a holistic understanding of sexuality in the context of relationships” (Cousins et al, 2008, p. 9). However, the ISSHR reported that approximately 18% of young people received no sex education in school (Rundle et al, 2008; Layte et al, 2006). Furthermore, although RSE is mandatory in schools, discretion is provided regarding the content of its teaching; there is no onus to provide education on the primary or secondary prevention of cervical cancer, respectively, the HPV risk-factors and cervical screening (Hyde and Howlett, 2004; Rundle et al, 2008; Department of Education, 1997). Rundle and colleagues (2008) argue that such discretion and the fact that the proportion of adolescents receiving RSE decreases as they progress through school, suggests that many young people may not have received adequate sex education (Rundle et al, 2008; Maycock et al, 2007; Cousins et al, 2008). For example, approximately 80% of young people reported a lack of information regarding STIs within formal sex education (Hyde and Howlett, 2004). Consequently, there is a need to provide comprehensive academic sex education, incorporating information on cervical cancer and the associated risk-factors, that is also easily transferable to public educational programmes (Martin et al, 2007; Irish Cancer Society, 2006).
2.6 International Cervical Screening Programmes

Worldwide and European guidelines differ regarding the age at which to initiate cervical screening (Hakama et al, 2008; European Union, 2003). The IARC recommends that

organized [cervical screening] programmes should not include women aged less than 25 years in their target populations
(International Agency for Research on Cancer, 2005, p. 240),

while European guidelines recommend that cervical screening commences “definitely not before the age of 20” (European Commission, 2003, as cited in Sasieni and Castanon, 2006, p. 118). Their rationale is that firstly, as the incidence of invasive cervical cancer among women aged under 20 is low, the probability that abnormalities will progress to cervical cancer is also low (International Agency for Research on Cancer, 2005; Stoler and Schiffman, 2001, in Myers et al, 2008; Sasieni and Castanon, 2006), and secondly, that aggressive treatment (LLETZ or cone biopsy) of cervical lesions in such women, increases the risk of subsequent adverse obstetric outcomes, such as preterm delivery (Kyrgiou et al, 2006, in Myers et al, 2008; Kyrgiou et al, 2006, in Prendiville, 2007; Sadler et al, 2004, in Moscicki, 2005; Bruinsma et al, 2007, in Bano et al, 2008). Nevertheless, both guidelines advocate screening every 3-5 years, as this provides effective cover inline with the progression rates of CIN (European Commission, 2003, in Sasieni and Castanon, 2006; International Agency for Research on Cancer, 2005; Shafi and Welton, 2007; Leeson, 2005).

American cervical screening guidelines recommend that annual screening begins “at age 21 or 3 years after sexual debut, whichever comes first” (American Cancer Society, 2007, in Myers et al, 2008, p. 34; the American College of Obstetricians and Gynecologists, 2002, in Spitzer, 2007; the US Preventative Services Task Force, no year, in Myers et al, 2008). These recommendations are founded on research which concludes that,

young women are especially susceptible to infection with HPV [as] they are more sexually active with more partners ... [yet] most HPV-related lesions in young women regress within three years
hence the phrasing, “or 3 years after sexual debut” (American Cancer Society, 2007, in Myers et al, 2008, p. 34). Notably, these recommendations have resulted in a 94% reduction in the cumulative incidence of invasive cervical cancer (see Appendix J) (Benard et al, 2001, in Akers et al, 2007), and are similar to Australia’s national cervical screening programme, which advocates that all women who have had sexual intercourse, attend from ages 18-20 or within two years of sexual debut, whichever is later, biannual screening (Department of Health and Ageing, Australian Government, 1991).

In 1988, inline with long-term research reporting a lower average age for sexual debut and increased numbers of sexual partners, STIs and HPV, Iceland’s organised cervical cancer screening programme commenced biannual screening from age 20 (Peto et al, 2004, in Sigurdsson and Sigvaldason, 2007; Sigurdsson, 1993, in Sigurdsson and Sigvaldason, 2007). Although this approach is not in keeping with the IARC guidelines, Sigurdsson and Sigvaldason (2007) revealed that 37% of CIN2/3 lesions in the period 1999-2003, occurred in the 20-24 age group, thus supporting screening initiation before age 25. Their research also demonstrated significantly increased detection rates of preinvasive cervical cancer in women aged under 29 (ibid), corresponding to data from Ireland (National Cancer Registry Ireland, 2006), the UK (Miller, 2002, in Sigurdsson and Sigvaldason, 2007; Department of Health, 2003, in Sasieni and Castanon, 2006), the Nordic countries (Sigurdsson, 1995, in Sigurdsson and Sigvaldason, 2007; Antilla et al, 1999, in Sigurdsson and Sigvaldason, 2007) and America (Dunn and Martin, 1967, in International Agency for Research on Cancer, 2005). Conversely, in other countries where cervical screening also continues until approximately age 60, the instigation of population-based screening differs: Finland and the Netherlands begin screening at age 30; the UK, Spain, Belgium, France, Italy, Ireland and Norway at age 25; New Zealand, Canada, Japan, Sweden, Germany and Austria at age 20; and Luxembourg from age 15 (International Agency for Research on Cancer, 2005; Sasieni and Castanon, 2006;
Spitzer, 2007; Schaffer et al, 2000). However, all countries endorse a maximum screening interval of five years, in accordance with international recommendations (International Agency for Research on Cancer, 2005).

As a result of national screening programmes in the majority of the abovementioned countries (except Ireland), a reduction in mortality from cervical cancer has occurred by up to 80% (see Appendix J) (WHO, 1986, in Hakama et al, 2008; International Agency for Research on Cancer, 2005; Martin et al, 2007). However, cervical cancer prevalence rates are still increasing gradually, due to a combination of increased HPV transmission and changes in sexual lifestyles, especially among younger women (Nieminen et al, 2002, in International Agency for Research on Cancer, 2005). Nevertheless, these organised screening programmes are based on cost-effectiveness and cost-minimisation analysis for each country, in order to ensure that resources are used most efficiently and projected at the target population, those for whom cervical cancer places the most burden (International Agency for Research on Cancer, 2005; Hakama, 1984, in Hakama et al, 2008). Therefore, in accordance with HPV persistency and CIN progression rates, the underlying assumption in countries that commence screening around the age of 20, is that, for the majority of women, regular sexual intercourse begins between the ages of 16-18 (Sasieni and Castanon, 2006; Kitchener et al, 2006; Woodman et al, 2001, in Sasieni and Castanon, 2006).

The argument against age-standardised screening programmes is that they ignore one’s individual risk for developing cervical cancer (unlike America and Australia) (Bano et al, 2008). This too will be the case in Ireland; once CervicalCheck is in operation, all women aged under 25, who would like to be screened, will be discouraged from attending for cervical screening on the basis of their age, rather than being offered screening on the basis of their individual risk for developing cervical cancer (CervicalCheck, 2008; Castle et al, 2007; Barry et al, 2007). Yet, considering that women under 25 present the third highest age-specific incidence of preinvasive cervical cancer (CIN3) in Ireland and that the peak
incidence occurs between the ages of 25-29 (see Appendix B) (National Cancer Registry Ireland, 2006), arguments arise that,

> introducing Irish women to the cervical screening system before the age of 25 may be beneficial and may identify those at risk of developing later abnormalities (Keegan et al, 2007, p. 19),

even if detected abnormalities are not treated until a later age. Furthermore, commencing cervical screening from age 25 does not automatically mean that women will attend; attendance rates for organised screening programmes are approximately only 70% (International Agency for Research on Cancer, 2005), demonstrating that some women, who may be at high-risk for cervical abnormalities, may continue postponing screening, possibly due to a lack of knowledge about cervical cancer prevention (Bano et al, 2008). Therefore, initiating screening before age 25 encourages women to become habitual about cervical screening and in combination with increased educational programmes, should help reduce any barriers, deterrents and erroneous knowledge to and of cervical cancer prevention (Sasieni and Castanon, 2006; Keegan et al, 2007; Bano et al, 2008).

2.7 Summary
This chapter examined the theoretical framework for cervical screening and demonstrated that cervical cancer is preventable in its preinvasive stage, through regular cervical screening and the early detection and treatment of precancerous lesions (International Agency for Research on Cancer, 2003, 2005). The causal relationship between persistent HPV infection and cervical cancer was also examined, and the risk-factors for contracting HPV and developing cervical cancer were identified as being sexually active at a young age, having increasing numbers of sexual partners for females and their partners, having an STI, smoking and long-term oral contraceptive use (ibid). It was also evident that the prevalence of these risk-factors is increasing among young women in Ireland (Layte et al, 2006). In addition, the key barriers to the prevention of cervical cancer were examined and it was demonstrated that the majority of the barriers to cervical screening can be overcome through increased knowledge of the primary
and secondary prevention of cervical cancer, namely the HPV risk-factors and the importance of cervical screening (Walsh et al, 2003; Sabates and Feinstein, 2006). The age of screening initiation in various international cervical screening programmes was also considered in relation to international guidelines and best-practice (International Agency for Research on Cancer, 2003, 2005). Finally, the chapter concluded that, as women under 25 present the third highest incidence of preinvasive cervical cancer in Ireland (National Cancer Registry Ireland, 2006), cervical screening should be initiated before age 25, on the basis of one’s risk for developing cervical cancer, as ascertained from the abovementioned risk-factors (Keegan et al, 2007; Castle et al, 2007).

This literature review provided the foundation for the present study to address the following research questions:

4. What is the prevalence of the risk-factors for contracting HPV and developing cervical cancer among young women attending a third-level institute?

5. Are there any links between the presence of these risk-factors, attendance for cervical screening and the young women’s abnormal cervical screening results?

6. What are the key barriers to the prevention of cervical cancer among these young women?

The following chapter examines the methodology used in the present study to address the above aims.
3.1 Introduction
The three core objectives of the present study are: to establish the prevalence of the HPV and cervical cancer risk-factors among young women attending a third-level institute; to determine if any links exist between the presence of these risk-factors, attendance for cervical screening and the abnormal results of these young women; and to ascertain these young women's key barriers to the prevention of cervical cancer. The risk-factors were identified from literature as: being sexually active at a young age, having increasing numbers of sexual partners (LSP) for females and their partners, long-term oral contraceptive use, smoking and the occurrence of an STI.

This chapter firstly describes the sampling framework and selection of participants and then justifies the chosen research methodology. Next, the research instrument is comprehensively discussed and the ethical framework for the research is described. The analysis of data is then concisely explained and lastly, a conclusion is drawn.

3.2 Sample and Selection
This study was based on a sample of 242 sexually active females aged 18-24 attending a third-level institute in Ireland; the participants’ mean age was 21 (Table 1 and Figure 1 below show the distribution of participants’ ages). Respondents’ inclusion in the sample was delineated by the following criteria: they had had sexual intercourse, they completed the survey and they were between the ages of 18-24, as CervicalCheck, the national cervical screening programme, advocates that women under 25 do not require cervical screening (CervicalCheck, 2008). Consequently, these inclusion criteria eliminated 166 of the 408 initial respondents, demonstrating a 59% inclusion rate.

In addition, 41% (N=99) of participants were single; 30% (N=72) were in a short-term relationship of less than 2 years; 26% (N=64) were in a long-term relationship of more than 2 years; and 3% (N=7) were in a long-term relationship and co-habiting.
A minimum target sample of 200 participants was set to ensure adequate representation of the target population, even though the precise number of young women attending the third-level institution could not be ascertained.

Table 1: Participants’ ages (N=242)

<table>
<thead>
<tr>
<th>Participants age</th>
<th>Mean</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21</td>
<td>21</td>
<td>18-24</td>
</tr>
</tbody>
</table>

Figure 1: Distribution of participants’ ages (N=242)

The sampling framework used to select respondents was internet sampling: after successfully piloting the survey, an internet link entitled ‘female sexual health survey,’ was posted on all student email accounts by a public relations officer associated with the third-level institute, inviting female students to visit a website to complete the survey (Sarantakos, 2005; Bryman, 2004). Therefore, as all female students had a choice of partaking in the survey, the sample was constructed through self-selection (Sarantakos, 2005). Furthermore, to encourage female students to participate in the survey, the link to the website was posted for four weeks during March and April, and pink-coloured information posters and leaflets (see Appendix K) were distributed around the institute’s campuses and in the ladies bathrooms. However, as not all respondents were included in the study, the sample is a non-probability ‘purposive sample’, as inclusion was based on the
abovementioned criteria, namely respondents who were relevant to the study (Sarantakos, 2005; Denscombe, 2003).

3.3 Research Methodology

The choice of data collection was directly influenced by the abovementioned core objectives of this study. Therefore, due to the sensitive nature of the subjective information required, a quantitative, self-completion, internet survey, designed by the researcher, was deemed most suitable in collecting this information, as this method focuses on objectivity and anonymity in the large-scale (Sarantakos, 2005). Furthermore, as there is no interaction between respondent and researcher, the anonymity afforded should have encouraged respondents to complete the survey honestly, thus helping to achieve representativeness of the specified population (ibid), whilst preventing social desirability occurring; “the tendency for respondents to distort answers in ways that will make them look better or will avoid making them look bad” (Fowler, 1995, p. 28).

Additionally, the use of a quantitative survey allowed for the examination of relationships between independent and dependent variables “with the degree of accuracy that is required to establish social trends or to inform social policies” (Sarantakos, 2005, p. 45). Independent variables, for example, the participant’s self-reported presence of the HPV and cervical cancer risk-factors and their knowledge of cervical cancer prevention are considered to influence dependent variables, which for the present study included the participant’s attendance for cervical screening and their abnormal cervical screening results (Bryman, 2008). As internet usage is particularly high among the sample group (Jones, 2002, as cited in Bryman, 2004), the internet survey also allowed greater representative access to the target population than would the distribution of questionnaires by hand (Bryman, 2004, 2008). Moreover, internet surveys facilitate accurate responses to questions, resulting in less missing data, while their asynchronous nature allows respondents to complete the survey in their own time (ibid).
3.4 Research Instrument
The survey (see Appendix A) was divided into four sections containing a maximum of 42 questions: socio-demographic information (items 1-3 on age, relationship status and confirmation of attendance at the third-level institute), sexual history, cervical screening attendance and results, and barriers to cervical cancer prevention. In consideration for the respondents, the survey was structured with the more intimate questions at the end so that respondents were not discomforted, while the survey was also designed to skip to the next appropriate question after each filter question (Bryman, 2004, 2008). To garner greater depth of information, respondents were invited to elaborate upon their answers for several questions (*ibid*) and in addition, the majority of questions were structured to allow comparability with the risk-factors for developing cervical cancer as identified from literature (International Agency for Research on Cancer, 2003, 2005).

3.4.1 Prevalence of the HPV and Cervical Cancer Risk-factors
Items 4-5 and 28-36 in the survey, addressed the prevalence of the risk-factors for contracting HPV and developing cervical cancer, including respondents age at sexual debut, their number of sexual partners (LSP), their partner’s LSP, their length of oral contraceptive use and their incidences of smoking and STIs (International Agency for Research on Cancer, 2003, 2005).

3.4.2 Respondents’ Cervical Screening Attendance and Cervical Screening Results
Items 15-21 and 23-24, contained 9 questions on respondents’ cervical smear test attendance and results, including the management of abnormal results and the age of screening initiation. These questions allowed for comparability against the prevalence of the abovementioned risk-factors, while the latter question was included for comparability against international screening guidelines and best-practice (*ibid*).
3.4.3 The Key Barriers to Cervical Cancer Prevention

Items 25-26 focused on respondents’ personal (emotional) and practical (availability of screening) barriers to the secondary prevention of cervical cancer; cervical screening. These items were structured so that comparability was possible with the barriers identified in the literature review, while respondents could also state barriers not included in the predetermined answers (Walsh, 2006; Walsh et al, 2003; Ni Riain et al, 2003; Irish Cancer Society, 2006).

Items 6-14, 22 and 41-42, addressed respondents’ knowledge of the primary and secondary prevention of cervical cancer; namely, their knowledge of HPV and its risk-factors and their knowledge of the purpose of cervical screening and the meaning of a normal smear test result. These questions intended to see if knowledge or lack thereof, was a barrier in the prevention of cervical cancer, and also allowed for comparison with the levels of knowledge identified in the literature review (Walsh, 2006; Walsh et al, 2003; Irish Cancer Society, 2006; International Agency for Research on Cancer, 2005; Philips et al, 2003).

Finally, items 27 and 37-40, briefly examined respondents’ attitudes towards young women attending for cervical screening, paying for screening and HPV-vaccination. These items were measured using the Likert Scale and included as further possible barriers to the prevention of cervical cancer (Irish Cervical Screening Programme, 2004c, 2008a; Treanor et al, 2002; Keegan et al, 2007).

3.5 Research Ethics

The Economic and Social Research Council (2006) specify six principles of ethical research which sustain and encourage good ethical practice in social science research. Whilst conducting the present study, these principles were addressed as follows:

1. Research must ensure integrity and quality: the data was collected and downloaded into a database by a reputable, commercial research website, www.surveymonkey.com, and in addition to the quantitative design, this
allowed less chance for researcher bias intrusion or errors in the processing of data (Bryman, 2008).

2. Participants must be fully informed of the research and their participation in the research: this was done via a detailed survey cover page (see Appendix A), whilst consent for participation was implied in the completion of the survey (Sarantakos, 2005).

3. Confidentiality and anonymity of participants must be respected: no names, email addresses or any identifying characteristics were required from respondents and further guarantees of confidentiality and anonymity were detailed on the cover page (see Appendix A). Additionally, direct comparisons were not made between participants in the study; this provided added confidentiality and anonymity (International Collaboration of Epidemiological Studies of Cervical Cancer, 2007).

4. Participation must be voluntary: all female students in the third-level institute were invited to participate in the research and participation was on the basis of self-selection (Sarantakos, 2005).

5. Harm to participants must be avoided: to ease any concerns that arose for respondents during the survey, they were automatically directed to the ICSP recommended website, www.tellher.ie, for further information on cervical screening and other related matters, when they exited or completed the survey. Respondents were also protected from mental harm, as the survey could be completed at the respondent’s choice, whether online, emailed or posted to the researcher (see Appendix A) (Sarantakos, 2005; Bryman, 2008).

6. The researcher must be independent: the data was gathered through a self-completion internet survey, so as to protect the researcher’s neutrality and ensure that respondents were not influenced by the researcher (Sarantakos, 2005).

The Declaration of Helsinki (World Medical Association, 2004) was also examined to ensure that the research was compliant with these ethical guidelines.
3.6 Data Analysis
The data gathered for this research was analysed using the computer-based Statistical Package for Social Sciences (SPSS), version 15. All closed-question variables were coded according to whether they were interval (the distance between the categories are equal, for example, participants’ age) or nominal (the categories cannot be rank ordered, for example, form of contraceptive) (Bryman, 2004; Denscombe, 2003). The relationships between these variables were determined using three statistical tests: the Chi-Square measured association between two nominal variables, the t-test between an interval and a nominal variable, and Pearson’s Correlation measured association between two interval variables (Bryman, 2004, 2008; Miller et al, 2002).

3.7 Conclusion
This chapter described the sample and selection of participants for the present study and justified the selection of an internet survey as the most appropriate data collection method of addressing the aforementioned core objectives of this research. The research instrument in relation to the literature review was then explained, as was the ethical framework for the protection of research participants. Lastly, the analysis of the data was briefly described.

An account of the research findings is presented in the next chapter.
4.1 Introduction
This chapter presents the research findings from the present study and is divided into six chronological sections: the introduction, participants’ prevalence of the risk-factors for contracting HPV and developing cervical cancer, participants’ cervical screening attendance and cervical screening results, participants’ key barriers to the prevention of cervical cancer and lastly, a concise summary of the findings.

The data is presented using tables and bar charts, and where possible, statistics are rounded off to the nearest whole percentage. ‘Statistical association’ was obtained using the Chi-Square Test ($\chi^2$), t-test (t) or Pearson correlation (r) where appropriate; this asserts that the relationship between the variables are generalisable to the population the sample was drawn from (Bryman, 2004, 2008). Participants’ key encapsulating comments are also presented, followed by their age and where applicable, the letters CS indicate that they have attended for cervical screening (see Appendix L for all qualitative comments made by participants).
4.2 Prevalence of HPV and Cervical Cancer Risk-Factors

4.2.1 Participants’ Age at First Sexual Intercourse
The mean age of sexual debut was 17.5 (see Table 2). Figure 2 shows that 27% (N=66) of participants had sexual intercourse before age 17, which is considered a high risk for HPV infection.

Table 2: Participants’ mean age at first sexual intercourse and mean number of sexual partners (N=242)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants’ age at first sexual intercourse</td>
<td>17.5</td>
<td>17</td>
<td>14-22</td>
</tr>
<tr>
<td>Participants’ lifetime number of sexual partners</td>
<td>4</td>
<td>3</td>
<td>1-25</td>
</tr>
</tbody>
</table>

Figure 2: Distribution of participants’ ages at first sexual intercourse (N=242)

4.2.2 Participants’ Lifetime Number of Sexual Partners (LSP)
Table 2 shows that participants’ mean LSP was 4. Figure 3 shows that 69% (N=167) of participants reported at least 2 LSP, which increases the risk of contracting HPV.
4.2.3 Participants’ Partner’s Number of Sexual Partners (LSP)

Table 3 shows that 31% (N=75) of participants seldom or never ask about their sexual partner’s sexual history.

Table 3: Participants’ inclination to ask about their sexual partners sexual history (N=242)

<table>
<thead>
<tr>
<th>Inclination to ask</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always/Usually</td>
<td>116</td>
<td>48%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>51</td>
<td>21%</td>
</tr>
<tr>
<td>Seldom/Never</td>
<td>75</td>
<td>31%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>242</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

55% (N=134) of participants knew their current (or last) sexual partner’s number of previous sexual partners (LSP); a mean of 3 (see Table 4). Figure 4 shows that 79% (N=106) reported 1 or more previous LSP, which elevates the risk for HPV infection.

Table 4: Participants’ current (or last) sexual partner’s mean number of previous sexual partners (N=134)

<table>
<thead>
<tr>
<th>Participants partner’s lifetime number of sexual partners</th>
<th>Mean</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>0-20</td>
</tr>
</tbody>
</table>
4.2.4 Participants’ Incidence of Sexually Transmitted Infections (STIs)
Table 5 shows that 9% (N=21) of participants reported having had an STI, which increases the risk for HPV infection.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever had an STI</td>
<td>9% (N=21)</td>
<td>76% (N=185)</td>
<td>15% (N=36)</td>
<td>100% (N=242)</td>
</tr>
<tr>
<td>Currently smoke</td>
<td>29% (N=71)</td>
<td>71% (N=171)</td>
<td>0</td>
<td>100% (N=242)</td>
</tr>
</tbody>
</table>

4.2.5 Participants’ Incidence of Smoking
Increasing exposure to smoking heightens one’s risk: Table 5 shows that 29% (N=71) of participants reported smoking, the mean number of cigarettes per week was 40 (see Table 6).

<table>
<thead>
<tr>
<th>Participants who reported smoking (N=71)</th>
<th>Mean</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
<td>30</td>
<td>5-150 cigarettes per week</td>
</tr>
</tbody>
</table>
4.2.6 Participants’ Oral Contraceptive use

62% (N=149) of participants reported use of the oral contraceptive pill (OCP), a risk-factor; 77% (N=114) of participants who reported OCP use also reported using male condoms. Figure 5 shows firstly, the distribution of contraceptive use and secondly, the length of OCP use; 15% (N=22) of OCP users reported 5 or more years use, which further increases the risk of developing cervical cancer.

![Figure 5: Distribution and length of oral contraceptive pill use (N=242)](image)

(* other forms of contraception included the Implant, Morning-after Pill, Depo-injection, Copper Coil and Nuva-Ring)

4.2.7 Participants’ Simultaneous Incidence of the Sexual Behaviour Risk-Factors

The prevalence of the sexual behaviour risk-factors were statistically examined to ascertain if they occurred simultaneously.

Table 7 shows a significant relationship (r=-.386; p=0.001) between participants age at sexual debut and her number of sexual partners (LSP), indicating that the younger her age at sexual debut the greater her LSP. Table 7 also shows a significant relationship (r=.316; p=0.001) between participants LSP and her
partner’s LSP; only 14% (N=19) of participants and their partners had a joint history of no previous sexual partners, which is considered a low risk for contracting HPV.

**Table 7: Inter-correlation of sexual behaviour risk-factors**

<table>
<thead>
<tr>
<th></th>
<th>Participants age at sexual debut</th>
<th>Participants number of sexual partners (LSP)</th>
<th>Participants partner’s number of LSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants age at sexual debut</td>
<td>/</td>
<td>r= -0.386** N=242</td>
<td>r= 0.316** N=134</td>
</tr>
<tr>
<td>Participants number of sexual partners (LSP)</td>
<td>r= -0.72 N=242</td>
<td>/</td>
<td>r= 0.316** N=134</td>
</tr>
<tr>
<td>Participants partner’s number of LSP</td>
<td>r= -0.72 N=242</td>
<td>r= 0.316** N=134</td>
<td>/</td>
</tr>
</tbody>
</table>

* p<0.05  ** p<0.01  *** p<0.001

Additionally, Figures 6 and 7 show that participants who reported an STI had a significantly (t=5.741; p=0.001; df=204) higher mean number of sexual partners (6.3) and a significantly (t= -2.056; df=204; p=0.041) lower mean age of sexual debut (16.8).

**Figure 6: Participants’ mean number of sexual partners and incidence of STIs (N=242)**
4.2.8 Summary of Results for the Presence of the Risk-Factors

Table 8: Summary of results for the presence of the risk-factors (N=242)

<table>
<thead>
<tr>
<th>Risk-factor</th>
<th>All women (N=242)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
</tr>
<tr>
<td><strong>Age at first intercourse</strong></td>
<td></td>
</tr>
<tr>
<td>▪ 17 and under</td>
<td>66 (27%)</td>
</tr>
<tr>
<td>▪ 18 and over</td>
<td>176 (73%)</td>
</tr>
<tr>
<td><strong>Number of sexual partners</strong></td>
<td></td>
</tr>
<tr>
<td>▪ only 1</td>
<td>75 (31%)</td>
</tr>
<tr>
<td>▪ 2 or more</td>
<td>167 (69%)</td>
</tr>
<tr>
<td><strong>Partners number of previous sexual partners (N=134)</strong></td>
<td></td>
</tr>
<tr>
<td>▪ none</td>
<td>28 (21%)</td>
</tr>
<tr>
<td>▪ 1 or more</td>
<td>106 (79%)</td>
</tr>
<tr>
<td><strong>Sexually Transmitted Infection/Disease</strong></td>
<td></td>
</tr>
<tr>
<td>▪ yes</td>
<td>21 (9%)</td>
</tr>
<tr>
<td>▪ no</td>
<td>221 (91%)</td>
</tr>
<tr>
<td><strong>Smoking</strong></td>
<td></td>
</tr>
<tr>
<td>▪ yes</td>
<td>71 (29%)</td>
</tr>
<tr>
<td>▪ no</td>
<td>171 (71%)</td>
</tr>
<tr>
<td><strong>Oral Contraceptive Use</strong></td>
<td></td>
</tr>
<tr>
<td>▪ yes</td>
<td>149 (62%)</td>
</tr>
<tr>
<td>▪ no</td>
<td>93 (38%)</td>
</tr>
</tbody>
</table>
4.3 Participants’ Cervical Screening Attendance Relative to the Presence of the Risk-Factors

This section describes participants’ cervical screening attendance and then determines if attendance was associated with the presence of the aforementioned risk-factors.

4.3.1 Participants’ Cervical Screening Attendance

28% (N=68) of participants had attended for cervical screening. A significant association was found (t=5.225; df=240; p=0.001) between screening attendance and participants current age; nevertheless, Figure 8 shows that just 33% (N=59) of all participants aged 20 or over have attended for screening.

Figure 8: Participants current age and cervical screening attendance (N=242)

Table 9 shows that participants’ mean age at first cervical screening was 19, the mean number of cervical smear tests was 2 and the mean screening interval time was just less than 2 years. Figure 9 shows that 56% (N=38) of participants who attended for screening did so before age 20 (the minimum recommended screening age is 20).
Table 9: Mean age at, and number and interval of cervical smear tests (N=68)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>STD. Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at first cervical smear test</td>
<td>19</td>
<td>19</td>
<td>1.7</td>
<td>16-24</td>
</tr>
<tr>
<td>Number of cervical smear tests</td>
<td>2</td>
<td>2</td>
<td>1.354</td>
<td>1-6</td>
</tr>
<tr>
<td>Cervical screening interval</td>
<td>1.8  years</td>
<td>1 year</td>
<td>1.26</td>
<td>6 months -5 years</td>
</tr>
</tbody>
</table>

Figure 9: Participants’ age at first cervical smear test (N=68)

Figure 10 shows that 51% (N=35) of participants attended their Family GP for cervical screening, while 31% (N=21) did not pay for screening; the approximate mean cost was €36.

Figure 10: Cost of, and attendance for, cervical screening (N=68)

(* other attendance included Maternity Hospital, Gynaecologist, Health-Board Clinic, Well Woman Centre and Family Planning Centre)
4.3.2 Participants’ Age at First Sexual Intercourse

Figure 11 shows no statistical association ($\chi^2=3.068; p=0.8; df=1$) between cervical screening attendance and participants who made their sexual debut before age 17, which is considered a risk-factor; just 36% (N=24) of participants sexually active before age 17 have attended for screening.

![Figure 11: Participants’ cervical screening attendance and age at sexual debut (N=242)](image)

Additionally, although a significant relationship was found demonstrating that initiation of cervical screening was linked with participants age at sexual debut ($r=0.466; p=0.001$), Table 10 (using *) shows that 37% (N=25) of participants were screened within a year of sexual debut (this is not recommended practice).
Table 10: Participants’ age at sexual debut and initiation of cervical screening (N=68)

<table>
<thead>
<tr>
<th>Age at First Screening</th>
<th>Participants Age at Sexual Debut</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>16</td>
<td>3 *</td>
<td>1 *</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td>1 *</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>21</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Screened</td>
<td>10 (15%)</td>
<td>14 (21%)</td>
</tr>
</tbody>
</table>

4.3.3 Participants’ Lifetime Number of Sexual Partners (LSP)

Figure 12 shows that participants who reported 2 or more LSP, a risk-factor, had a statistically higher ($\chi^2=9.706; p=0.002; df=1$) screening attendance than participants reporting 1 LSP.

**Figure 12: Participants’ cervical smear test attendance and number of sexual partners (N=242)**
4.3.4 Participants’ Partner’s Number of Sexual Partners (LSP)

Figure 13 shows no statistical association ($\chi^2=0.23; \ p=0.879; \ df=1$) between cervical screening attendance and participants whose partner reported more than 1 previous LSP, a risk-factor.

Figure 13: Participants’ cervical smear test attendance by their partner’s number of previous sexual partners (N=134)

4.3.5 Participants’ Incidence of Sexually Transmitted Infections (STIs)

Figure 14 shows a significantly ($\chi^2=13.007; \ p=0.001; \ df=1$) higher cervical screening attendance for participants who reported an STI, a risk-factor.

Figure 14: Participants’ cervical smear test attendance and their incidence of sexually transmitted infections (N=242)
4.3.6 Participants’ Incidence of Smoking

Figure 15 shows no significant association ($\chi^2=2.516; p=0.113; df=1$) between screening attendance and participants who reported smoking, a risk-factor.

**Figure 15: Participants’ cervical smear test attendance and their incidence of smoking (N=242)**

4.3.7 Participants’ Oral Contraceptive Pill (OCP) use

Although no statistical association ($\chi^2=3.252; p=0.71; df=1$) was found between cervical screening attendance and participants who reported OCP use, a risk-factor, Figure 16 shows a significant link ($\chi^2=7.376; p=0.025; df=2$) between screening attendance and increasing duration of OCP use.

**Figure 16: Participants’ cervical smear test attendance in relation to increasing duration of oral contraceptive pill use (N=149)**
### 4.3.8 Summary of Results of Statistical Tests for Cervical Screening Attendance

**Table 11: Attendance for cervical screening relative to the presence of the risk-factors (N=242)**

<table>
<thead>
<tr>
<th>Risk-factor</th>
<th>Cervical Screening</th>
<th>Statistical Association</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (N=68)</td>
<td>No (N=174)</td>
</tr>
<tr>
<td>Age at first intercourse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 and under (N=66)</td>
<td>24 (36%)</td>
<td>42 (64%)</td>
</tr>
<tr>
<td>18 and over (N=176)</td>
<td>44 (25%)</td>
<td>132 (75%)</td>
</tr>
<tr>
<td>Number of sexual partners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>only 1 (N=75)</td>
<td>11 (15%)</td>
<td>64 (85%)</td>
</tr>
<tr>
<td>2 or more (N=167)</td>
<td>57 (34%)</td>
<td>110 (66%)</td>
</tr>
<tr>
<td>Partners number of previous sexual partners (N=134)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>none (N=28)</td>
<td>7 (25%)</td>
<td>21 (75%)</td>
</tr>
<tr>
<td>1 or more (N=106)</td>
<td>28 (26%)</td>
<td>78 (74%)</td>
</tr>
<tr>
<td>Sexually Transmitted Infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes (N=21)</td>
<td>13 (62%)</td>
<td>8 (38%)</td>
</tr>
<tr>
<td>no (N=221)</td>
<td>55 (25%)</td>
<td>166 (75%)</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes (N=71)</td>
<td>25 (35%)</td>
<td>46 (65%)</td>
</tr>
<tr>
<td>no (N=171)</td>
<td>43 (25%)</td>
<td>128 (75%)</td>
</tr>
<tr>
<td>Oral Contraceptive Use (N=149)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 years or less use (N=127)</td>
<td>37 (29%)</td>
<td>90 (71%)</td>
</tr>
<tr>
<td>5 or more years use (N=22)</td>
<td>11 (50%)</td>
<td>11 (50%)</td>
</tr>
</tbody>
</table>
4.4 Participants’ Cervical Screening Results Relative to the Presence of the Risk-Factors

Participants’ cervical screening results were statistically examined for association between abnormal results and the abovementioned risk-factors.

4.4.1 Participants’ Cervical Screening Results

93% (N=63) of participants who had attended for cervical screening knew their screening results; 64% (N=40) were normal and 36% (N=23) reported abnormalities, including 7 cases of preinvasive cervical cancer, CIN2/3 (see Table 12). Additionally, all participants reporting CIN2/3 (11%) attended for 6 monthly or annual screening.

**Table 12: Distribution of participants known cervical smear test results (N=63)**

<table>
<thead>
<tr>
<th>Cervical Smear Test Results</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>40</td>
<td>64%</td>
</tr>
<tr>
<td>Borderline Abnormalities/Changes (BNA)</td>
<td>12</td>
<td>19%</td>
</tr>
<tr>
<td>CIN 1</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>CIN 2</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>CIN 3</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>63</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Figure 17 shows a trend between the grade of abnormal screening results and attending for colposcopy/biopsy; 65% (N=15) of abnormal results received further investigation.

**Figure 17: Management and treatment of cervical abnormalities (N=23)**
4.4.2 Participants’ Age at First Sexual Intercourse
Figure 18 shows a statistical association ($\chi^2=6.260; p=0.012; df=1$) between abnormal results and participants who made their sexual debut before age 17, a risk-factor.

**Figure 18:** Participants’ age at sexual debut and their cervical screening results (N=63)

4.4.3 Participants’ Lifetime Number of Sexual Partners (LSP)
Figure 19 shows a statistical association ($\chi^2=6.835; p=0.009; df=1$) between abnormal cervical screening results and participants who reported 2 or more LSP, a risk-factor.

**Figure 19:** Participants’ lifetime number of sexual partners and their cervical screening results (N=63)
4.4.4 Participants’ Partner’s Number of Sexual Partners (LSP)

Figure 20 shows that no statistical association could be ascertained between abnormal screening results and participants whose partner reported more than 1 previous LSP, a risk-factor, as only 43% (N=10) of participants who reported cervical abnormalities knew their partner’s LSP.

![Figure 20: Participants’ cervical screening results and their partner’s number of sexual partners (N=33)](image)

4.4.5 Participants’ Incidence of Sexually Transmitted Infections (STIs)

Figure 21 shows no statistical association ($\chi^2=0.657; p=0.417; df=1$) between abnormal screening results and participants’ who reported ever having an STI.

![Figure 21: Participants’ cervical screening results and their incidence of sexually transmitted infections (N=63)](image)
4.4.6 Participants’ Incidence of Smoking

Figures 22 and 23 show no statistical association between abnormal cervical screening results and firstly, participants who reported smoking ($\chi^2=0.445;\ p=0.505;\ df=1$) and secondly, their number of cigarettes smoked per week ($t=0.830;\ p=0.401;\ df=22$).

![Figure 22: Participants’ cervical screening results and their incidence of smoking (N=63)](image)

![Figure 23: Participants’ cervical screening results and their mean number of cigarettes smoked per week (N=63)](image)

4.4.7 Participants’ Oral Contraceptive Pill (OCP) use

Although Figure 24 shows no statistical association ($\chi^2=2.140;\ p=0.143;\ df=1$) between abnormal screening results and increasing duration of OCP use, half the participants who reported long-term OCP use, also reported cervical abnormalities.
Figure 24: Participants’ cervical screening results and length of oral contraceptive pill use (N=45)

![Graph showing participants' length of OCP use]

4.4.8 Summary of Results of Statistical Tests for Cervical Screening Results

**Table 13: Cervical screening results, relative to the presence of the risk-factors (N=63)**

<table>
<thead>
<tr>
<th>Risk-factor</th>
<th>Cervical Screening Results</th>
<th>Statistical Association</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal (N=40)</td>
<td>Abnormal (N=23)</td>
</tr>
<tr>
<td>Age at first intercourse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 17 and under (N=23)</td>
<td>10 (43%)</td>
<td>13 (57%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 18 and over (N=40)</td>
<td>30 (75%)</td>
<td>10 (25%)</td>
</tr>
<tr>
<td>Number of sexual partners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• only 1 (N=10)</td>
<td>10 (100%)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2 or more (N=53)</td>
<td>30 (57%)</td>
<td>23 (43%)</td>
</tr>
<tr>
<td>Partner’s number of previous sexual partners (N=33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• none (N=6)</td>
<td>5 (84%)</td>
<td>1 (16%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1 or more (N=27)</td>
<td>18 (67%)</td>
<td>9 (33%)</td>
</tr>
<tr>
<td>Sexually Transmitted Infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• yes (N=13)</td>
<td>7 (54%)</td>
<td>6 (46%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• no (N=50)</td>
<td>33 (66%)</td>
<td>17 (34%)</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• yes (N=24)</td>
<td>14 (58%)</td>
<td>10 (42%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• no (N=39)</td>
<td>26 (67%)</td>
<td>13 (33%)</td>
</tr>
<tr>
<td>Oral Contraceptive Use (N=45)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 4 years or less use (N=35)</td>
<td>26 (74%)</td>
<td>9 (26%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 5 or more years use (N=10)</td>
<td>5 (50%)</td>
<td>5 (50%)</td>
</tr>
</tbody>
</table>
4.5 Participants’ Key Barriers to Cervical Cancer Prevention

This section identifies participants’ key barriers to the prevention of cervical cancer.

4.5.1 Participants’ Knowledge of Cervical Cancer Prevention

Figure 25 shows that participants’ perceived sufficient knowledge of cervical cancer, the secondary prevention of cervical cancer (cervical screening) and the primary cause of cervical cancer (HPV), was considerably low. Nevertheless, an association was found between participants’ attendance for cervical screening and participants’ perceived sufficient knowledge of cervical cancer ($\chi^2=8.487; p=0.004; df=1$) and cervical smear tests ($\chi^2=29.916; p=0.001; df=1$).

**Figure 25: Participants’ perceived sufficient knowledge of cervical cancer, cervical screening and HPV (N=242)**

Do you feel you know enough about...

<table>
<thead>
<tr>
<th></th>
<th>Cervical cancer?</th>
<th>Cervical screening?</th>
<th>HPV?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27</td>
<td>59</td>
<td>20</td>
</tr>
<tr>
<td>No</td>
<td>215</td>
<td>183</td>
<td>222</td>
</tr>
</tbody>
</table>

Table 14 shows that 72% (N=174) of participants correctly identified that the purpose of a cervical smear test is to ‘detect changes in the cells of the cervix’, while Table 15 shows that 72% (N=175) of participants correctly identified that a normal cervical smear test means ‘a low risk of developing cervical cancer’. However, Figure 26 shows that of participants who had attended for cervical screening, 16% (N=11) did not correctly identify the purpose of a cervical smear test, while 21% (N=14) did not identify the meaning of a normal result.
Table 14: Knowledge of the purpose of a cervical smear test (N=242)

<table>
<thead>
<tr>
<th>The purpose of a cervical smear test is to</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detect changes in the cells of the cervix</td>
<td>174</td>
<td>72%</td>
</tr>
<tr>
<td>Detect cervical cancer</td>
<td>33</td>
<td>13%</td>
</tr>
<tr>
<td>Detect STIs/infection</td>
<td>26</td>
<td>11%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>9</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 15: Knowledge of the meaning of a normal cervical smear test result (N=242)

<table>
<thead>
<tr>
<th>A normal cervical smear test result means a ....</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk of developing cervical cancer</td>
<td>175</td>
<td>72%</td>
</tr>
<tr>
<td>No risk of developing cervical cancer</td>
<td>19</td>
<td>8%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>48</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>242</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 26: Knowledge of participants who had attended for cervical screening (N=68)

Furthermore, although 34% (N=82) of participants reported awareness of HPV prior to this research, when asked to list the risk-factors for contracting HPV, Table 16 shows that 47% (N=115) said they did not know and 26% (N=62) stated they had never heard of HPV (the correct risk-factors identified are marked ‘●’).
Nevertheless, a significant association ($\chi^2=7.327; \ p=0.007; \ df=1$) was found between cervical screening attendance and awareness of HPV.

Table 16: Knowledge of the risk-factors for contracting HPV (N=242)

<table>
<thead>
<tr>
<th>Risk Factor for contracting HPV</th>
<th>Frequency</th>
<th>% Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know</td>
<td>115</td>
<td>47%</td>
</tr>
<tr>
<td>Never heard of HPV</td>
<td>62</td>
<td>26%</td>
</tr>
<tr>
<td>Having (unprotected) sex ●</td>
<td>65</td>
<td>27%</td>
</tr>
<tr>
<td>Having many sexual partners ●</td>
<td>10</td>
<td>4%</td>
</tr>
<tr>
<td>Being sexually active at a young age ●</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Other: smoking, cervical cancer, family history</td>
<td>28</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total responses</strong></td>
<td><strong>282</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Additionally, participants’ abovementioned lack of knowledge about cervical cancer prevention was apparent in their qualitative comments:

- “This form of cancer I know very little about in comparison to others, for example Breast Cancer” (Participant 395, age 23).
- “I have a vague idea about smear tests, but don’t understand in detail for example when they are necessary and what exactly takes place” (Participant 344, age 19).
- “I just know that most people my age get them to check for STIs” (Participant 266, age 21, CS).
- “I thought it was only when women have unprotected sex that they need to have a smear test” (Participant 367, age 19).
- “There definitely needs to be better awareness of the HPV virus as a cause of cervical cancer. I was not aware that it even existed until I visited my GP with the symptoms of the virus” (Participant 219, age 22, CS, CIN1).
4.5.2 Participants’ Reception of Sex Education in School

78.5% (N=190) of participants received sex education in school; Figure 27 shows that information on cervical screening, cervical cancer and HPV was seldom included.

- “The only sexual health education I’ve received in school has been from a religious standpoint advocating abstinence and giving very little attention to actual physical health” (Participant 122, age 21).

No association was found between reception of sex education and attendance for cervical screening ($\chi^2=0.692; p=0.406; df=1$), or perceived knowledge of cervical cancer ($\chi^2=0.010; p=0.921; df=1$), cervical screening ($\chi^2=0.232; p=0.630; df=1$) or HPV ($\chi^2=0.544; p=0.462; df=1$).

![Figure 27: Information included in sex education (N=190)](image)

4.5.3 Participants’ Attitudes

Figure 28 presents participants’ attitudes as possible barriers to cervical cancer prevention; however, no association was found between attendance for cervical screening and attitudes towards screening women under 25 ($\chi^2=3.535; p=0.60;
df=1), paying for cervical screening ($\chi^2=0.009; p=0.923; df=1$), HPV-vaccination ($\chi^2=1.860; p=0.173; df=1$) or free cervical screening ($\chi^2=0.001; p=0.977; df=1$).

**Figure 28: Attitudes towards cervical screening and HPV-vaccination**

(N=242)

Participants’ qualitative comments regarding these attitudes included:

- “As a student I would definitely be more likely to take cost into account. It’s easy to know you shouldn’t, but immediate concerns take priority. Young people are the most easily receptive to being educated about this stuff, so if testing were free in conjunction with that, it might be very easy to form good habits” (Participant 065, age 20, CS).

- “Having it as a free service will make attendance more common and therefore take embarrassment out of it” (Participant 157, age 24, CS).

- “I think women are more sexually active younger and younger and therefore the lower age limit for a smear should be lowered” (Participant 052, age 21).

- “The risk is too low to be feasible [screening women under 25], but it should depend on sexual activity and the age you begin to be sexually active” (Participant 290, age 21).

- “I am under 25 and have already had colposcopy and LLETZ. I was relieved to have had the test done and been treated so early on. Under 25s
are still at risk from cell changes which could result in cervical cancer if undetected” (Participant 314, age 24, CS, CIN3).

- “Any preventative measure against the development of cancer is great in my eyes. I think however, that it is the decision of the girl and her parents following adequate education of the risks of HPV” (Participant 067, age 22, CS).

4.5.4 Participants’ Personal and Practical Barriers to Cervical Screening Attendance

The abovementioned lack of knowledge about the prevention of cervical cancer was also evident in the personal (emotional) and practical (availability of screening) barriers to cervical screening attendance, as reported by participants who had not attended for cervical screening (N=174; 72%).

<table>
<thead>
<tr>
<th>Table 17: Personal barriers to cervical screening (N=174)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Barriers</strong></td>
</tr>
<tr>
<td>Don’t think I need a cervical smear test/never told to have one</td>
</tr>
<tr>
<td>Embarrassment</td>
</tr>
<tr>
<td>Fear of cervical screening/what might be found</td>
</tr>
<tr>
<td>Don’t know where to go for cervical screening</td>
</tr>
<tr>
<td>Concerns about having a male smearaker</td>
</tr>
<tr>
<td>Told not to have a smear test until age 25+</td>
</tr>
<tr>
<td>Don’t know what cervical smear tests are for</td>
</tr>
<tr>
<td>Don’t know at what age to have a cervical smear test</td>
</tr>
<tr>
<td><strong>Total responses</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 18: Practical barriers to cervical screening (N=174)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Practical Barriers</strong></td>
</tr>
<tr>
<td>Lack of time</td>
</tr>
<tr>
<td>Too expensive</td>
</tr>
<tr>
<td>Fears about confidentiality</td>
</tr>
<tr>
<td>Unsuitable appointment times</td>
</tr>
<tr>
<td>No practical barrier stated</td>
</tr>
<tr>
<td><strong>Total responses</strong></td>
</tr>
</tbody>
</table>
These barriers were also highlighted in participants’ qualitative comments:

- “My doctor told me I don’t need one till I'm 25, even though I’d like one done and then a nurse told me I should get one done ASAP cos I'm with my boyfriend and on the pill 5 years” (Participant 87, age 21).
- “It’s not something iv thought about. I suppose I pr esume when I need to get one (for example depending on age) I’d hear through friends or whatever” (Participant 158, age 20).
- “I have attempted to go for a smear test in the past but I get too frightened and nervous that I am never able to go through with it” (Participant 240, age 22).

(See Appendix L for all qualitative comments made by participants).

4.6 Summary of Key Findings

This chapter presented the findings from an internet survey completed by 242 sexually active young women attending a third-level institute. Findings on the prevalence of the risk-factors for contracting HPV and developing cervical cancer were presented and statistical associations were found between the sexual behaviour risk-factors; namely, being sexually active at a young age, having multiple sexual partners and reporting an STI. The findings also demonstrated statistical associations between cervical screening attendance and the presence of 3 risk-factors: 2 or more sexual partners, an STI and increasing duration of OCP use. Statistical associations were also found between abnormal cervical screening results and being sexually active before age 17 and having 2 or more sexual partners; over one-third of cervical screenings reported abnormalities. Finally, the key barriers to the prevention of cervical cancer, indicated a lack of sufficient knowledge about cervical cancer, the secondary prevention of cervical cancer (cervical screening) and the primary cause of cervical cancer (HPV).

The next chapter discusses the findings presented in this chapter.
5.1 Introduction
This chapter discusses the research findings, presented in Chapter Four, in relation to the aims of this research, the foundation for which was outlined in the literature review in Chapter Two. This chapter begins by examining the prevalence of the risk-factors among the sample group, namely being sexually active at a young age, females and their partners having increasing numbers of sexual partners (LSP), having an STI, smoking and long-term oral contraceptive use (International Agency for Research on Cancer, 2003, 2005). The cervical screening attendance of participants is then compared against these risk-factors and against best-practice and international guidelines (ibid), followed by a discussion of participants’ cervical screening results in relation to the risk-factors and recent research. Afterwards, participants’ key barriers to the prevention of cervical cancer, specifically their knowledge of the primary and secondary prevention of cervical cancer are examined and lastly, a summary is drawn.

5.2 Discussion of Findings
5.2.1 Prevalence of HPV and Cervical Cancer Risk-Factors
The findings from the present study suggest that the prevalence of the risk-factors, especially the sexual behaviour risk-factors, may be increasing. The mean age for sexual debut in the present study was 17.5, with over one-quarter of participants reporting sexual intercourse before the legal age of 17 in Ireland (Rundle et al, 2008). Furthermore, over two-thirds of participants reported at least two sexual partners (LSP) (the mean was four) and considering the present study’s findings that the younger the participant at sexual debut, the higher her number of LSP tended to be, this suggests that a substantial proportion of the participants may have been exposed to HPV for lengthy periods (Bosch et al, 2002; Todd and Shafi, 2004). Additionally, as the findings from the present study demonstrated that the more LSP reported by participants, the more LSP her partner was inclined to report, the tenfold increase in the transmission and infection rate of HPV among young people in Ireland is comprehensible, especially as less than one-sixth of participants in the present study reported a joint history with their partner.

The findings from the present study that one-third of participants seldom or never ask about their partners sexual history, is worrisome in light of the fact that the lack of such knowledge is associated with increased HPV infection (Moscicki, 2005; Winer et al, 2003). Moreover, findings from the present study that one-tenth of participants reported an STI while one-sixth did not know if they had an STI, may be indicative of this lack of knowledge and corresponds to the present study’s findings that having an STI is associated with increasing numbers of LSP and a younger age at sexual debut. These findings are comparable to the demographically representative ‘Irish Study of Sexual Health and Relationships’ (ISSHR) (Layte et al, 2006) and suggests that the prevalence of the sexual behaviour risk-factors for contracting HPV may be increasing among young women. This is also consistent with the fact that HPV is the most commonly reported STI among young people in Ireland; unaided, several participants in the present study stated they were HPV-positive (see Appendix L) (Gilson and Mindel, 2001; Health Protection Surveillance Centre, 2008b).

Over one-quarter of participants in the present study reported smoking and although the reported mean of 40 cigarettes per week was below the significant level of 120, this still suggests that if participants were to contract HPV, they may not be able to clear the infection as easily and may have a greater risk of progressing to a higher grade of CIN and of CIN treatment failure (Shafi and Welton, 2007). Moreover, the incidence of oral contraceptive pill (OCP) usage by approximately two-thirds of participants in the present study, one-sixth of whom reported more than five years use, in-conjunction with abovementioned prevalence of the sexual behaviour risk-factors, suggests not only a greater risk of HPV persistency within the sample group, but also a higher prevalence of the co-factors that influence the progression from HPV infection to preinvasive cervical cancer (International Agency for Research on Cancer, 2003; Leeson, 2005; Harper and Paavonen, 2008).
5.2.2 Cervical Screening Attendance

The findings from the present study demonstrated that less than one-third of participants had attended for cervical screening, which was comparable to research (Irish Cancer Society, 2006). The present study also demonstrated, encouragingly, that participants were more inclined to attend for cervical screening if the abovementioned sexual behaviour risk-factors were present. However, it appears that the minimum time-frame needed for HPV to establish persistency may not have been consistently followed in relation to these risk-factors (Kitchener et al, 2006). For example, the findings from the present study indicated that of participants who had attended for cervical screening, over one-third did so within a year of sexual debut, while over half did so before the minimum recommended screening age of 20 (European Commission, 2003, in Sasieni and Castanon, 2006). These statistics suggest that these young women were screened needlessly, as a HPV infection will not have had time to establish persistency or to spontaneously clear itself within a year; consequently, inaccurate cervical screening results are possible (Martin et al, 2007; Kitchener et al, 2006). Moreover, although the likelihood is low that cervical abnormalities detected in women under 20 will progress to cervical cancer (Sasieni and Castanon, 2006), all abnormal screening results must follow management protocols until negative results are acknowledged (see Appendix F), with the possibility that meanwhile these young women may experience avoidable psychological distress (Karasz et al, 2003, in Chew-Graham et al, 2006).

Conversely, the findings from the present study that approximately only one-third of participants sexually active before age 17 and one-third of participants aged 20 and over have attended for screening, suggests two possibilities: firstly, the minimum age for screening and the risk-factors for contracting HPV were not present so cervical screening was uncalled-for, or secondly, participants were not offered or were refused cervical screening, regardless of the risk-factors, as they were not aged 25 (Castle et al, 2007; International Agency for Research on Cancer, 2005; Ni Riain et al, 2003). The present study also indicated that although an increasing duration of OCP use improved the likelihood of cervical
screening attendance, presumably due to increased cytological surveillance (Bosch et al, 2002), the presence of the co-factors alone, OCP use and smoking, had no association with cervical screening attendance. This suggests that the sexual behaviour risk-factors were not present and so cervical screening was unwarranted, or the influence these co-factors have on the HPV-dependent pathway of carcinogenesis was not thoroughly contemplated when examining the need for cervical screening (International Collaboration of Epidemiological Studies of Cervical Cancer, 2007; International Agency for Research on Cancer, 2003).

5.2.3 Cervical Screening Results

In relation to the initiation of cervical screening, Ireland advocates that screening women aged under 25 is not necessary (Ni Riain et al, 2003), yet the findings from the present study demonstrated that over one-third of cervical screening results were abnormal, including one-tenth CIN2/3 (preinvasive cervical cancer). These results are considerably higher than the estimation that less than one-tenth of smears are abnormal (ibid) and remains so, even when the one-third of lesions that are expected to spontaneously regress, are deducted from the results (Hakama et al, 2008; International Agency for Research on Cancer, 2003). Two possibilities may account for this heightened incidence of cervical abnormality within the present study: firstly, a percentage of these abnormal results may actually be inaccurate results, due to the aforementioned high proportion of cervical smear tests performed on participants aged under 20 and within a year of sexual debut (Stoler and Schiffman, 2001, in Myers et al, 2008) or secondly, the association between abnormal screening results and the strength of the risk-factors for contracting HPV, specifically being sexually active before age 17 and having increasing LSP, suggests that the duration and amount of exposure to HPV has determined the probability that some of the young women who participated in the present study may have been infected with HPV (Deacon et al, 2000).

Furthermore, the finding from the present study that the woman’s partner’s LSP has no association with abnormal cervical screening results, suggests that an
increased risk of cervical abnormalities and HPV infection may be more strongly associated with sexual intercourse with a new partner, than with the one partner who has reported many LSP (Winer et al, 2003; Deacon et al, 2000). Alternatively, the present study’s findings that less than half of participants who reported cervical abnormalities knew their partner’s LSP, supports the concept that a lack of knowledge about a partner’s sexual history is associated with HPV infection (Moscicki, 2005; Winer et al, 2003). The present study also showed no association between long-term OCP use and abnormal screening results, which suggests that long-term OCP use itself may not strictly be a potential cervical cancer risk-factor; conversely, this finding may be attributed to the high prevalence of combined OCP and male condoms usage in the present study, which may have protected participants from contracting HPV (International Collaboration of Epidemiological Studies of Cervical Cancer, 2007; Sasieni, 2007). A lack of association with abnormal results was also found between participants’ incidence of smoking and their STI status; however, as the present study was only an immediate snap-shot of cervical screening attendance and results, it is possible that an extended study would highlight long-term associations between the presence of these co-factors and the progression of oncogenic HPV infection and/or CIN grades (Shafi and Welton, 2007; Bosch et al, 2002).

Nevertheless, the present study found that the management of abnormal cervical screening results was in accordance with protocol (see Appendix F), as all participants reporting CIN2/3 (preinvasive cervical cancer) had attended for colposcopy/biopsy and also attended for screening at six monthly or annual intervals. Furthermore, the findings from the present study that only one-third of participants reporting CIN2/3 had undergone LLETZ, in-conjunction with the findings that some participants had attended for six cervical smear tests, suggests that smeartakers favour monitoring the progression of CIN2/3 rather than employing ablative procedures (Keegan et al, 2007). However, considering that Ireland does not advocate screening women under 25, even if the young women in the present study had attended for cervical screening from age 20 based on the
presence of the risk-factors, attending for six cervical screenings is still a higher screening rate than the yearly screening advocated for this age group by American cervical screening guidelines and may have caused the young women distress (American Cancer Society, 2007, in Myers et al, 2008; International Agency for Research on Cancer, 2003, 2005). Additionally, although the mean cervical screening interval of two years found in the present study was more frequent than the 3-5 years advocated in Ireland, the considerably higher presence of cervical abnormalities and the consequence of their management (more frequent screening) may account for this finding (International Agency for Research on Cancer, 2003, 2005). Moreover, the present study found that just under one-tenth of participants who had attended for screening, did not know their results; this suggests that they are either awaiting their results or were not informed of them, through their own lack of follow-up or that of their smeartakers (Kahn et al, 2001).

The finding from the present study that seven participants reported preinvasive cervical cancer screening results, indicates a CIN3 (N=3) incidence rate of 47.6 per 1,000 women aged 18-24, which is remarkably higher than the 1.72 reported (see Appendix B) (National Cancer Registry Ireland, 2006). When considered that the highest incidence of preinvasive cervical cancer occurs in the 25-29 age cohort (see Appendix B) (ibid), this suggests that the initiation of cervical screening should begin prior to age 25, firstly, to detect cervical abnormalities that would otherwise not be detected until after age 25 and then possibly at a higher CIN grade and secondly, to reduce the burden of preinvasive cervical cancer among the 25-29 age group (Keegan et al, 2007).

5.2.4 The Key Barriers to the Prevention of Cervical Cancer
The present study demonstrated that participants had a low level of perceived sufficient knowledge, that is, participants felt they did not know enough, about cervical cancer, cervical screening and HPV, which is consistent with Irish research (Cotter et al, 1999, in Martin et al, 2007; Alder and Foxwell, 1999, in Walsh, 2006). This lack of knowledge was evident as just under three-quarters of
participants in the present study correctly stated that the purpose of a smear test was to detect changes in the cells of the cervix, whilst the same proportion of participants correctly identified that a normal cervical smear test result meant a low risk of developing cervical cancer; this is similar to other research (Walsh et al, 2003; Walsh, 2006). Moreover, although the present study demonstrated that sufficient knowledge of cervical cancer and cervical screening was statistically associated with cervical screening attendance, approximately one-fifth of participants who had attended for cervical screening in the present study did not correctly identify the purpose of cervical screening or the meaning of a normal smear test result. This suggests that the additional role of smeartakers as educators was not adequately exercised, as every women who attends for cervical screening must be informed, accurately, of the processes and consequences of screening, including knowing the purpose of cervical screening and the meaning of a normal/abnormal result (Ni Riain et al, 2003; Stark et al, 2008; International Agency for Research on Cancer, 2005). In addition, the inaccurate association made by one-tenth of participants in the present study that cervical screening detects STIs, supports the above insinuation and indicates that some participants may have attended for cervical screening in the belief that it was an STI test.

In relation to knowledge about HPV, one-third of participants in the present study reported awareness of HPV prior to the research, which was statistically related to cervical screening attendance. Yet, awareness of HPV does not necessarily imply knowledge, as was evident when participants in the present study were asked to list the risk-factors for contracting HPV; only one-quarter of the participants correctly identified that the risk-factors are linked to sexual behaviour, whilst half said they did not know and one-quarter stated they had never heard of HPV. These findings suggest that although ano-genital warts/HPV is the most commonly reported STI among young people in Ireland, the lack of knowledge about the transmission of HPV may have contributed to its high prevalence and may also be indicative of the high proportion of abnormal screening results found in the present study (Health Protection Surveillance, 2008b). Moreover, this observed low knowledge about the high risk for contracting HPV, in-conjunction
with the demonstrated lack of knowledge about cervical screening, additionally suggests a poor communicative relationship between healthcare-providers and the participants in the present study, regarding the primary and secondary prevention of cervical cancer (Frega et al, 2003; Sabates and Feinstein, 2006; Kahn et al, 2001).

The findings from the present study that General Practitioners were the primary location for cervical screening attendance, suggests that they were also the main providers of information, and considering that knowledge of cervical cancer prevention tended to be statistically higher among participants in the present study who had attended for screening, this suggests that young women’s knowledge about cervical cancer prevention was not being adequately addressed, prior to the initiation of screening and within school-based sex education (Rundle et al, 2008). The present study found that whilst more than three-quarters of participants had received sex education in school, information on cervical cancer, cervical screening and HPV was seldom included, demonstrating the discretion afforded to schools regarding the content of their sex education curriculum (Hyde and Howlett, 2004; Department of Education, 1997). Furthermore, the present study demonstrated that nearly one-quarter of participants had received no formal sex education, which is higher than estimated (Rundle et al, 2008) and may have exaggerated participants’ lack of knowledge and communication about cervical cancer prevention (Sabates and Feinstein, 2006). Additionally, the findings from the present study that reception of sex education tended to have no influence on participants’ knowledge of the primary and secondary prevention of cervical cancer, indicates the limitations of sex education in providing a comprehensive understanding of physical health within sexuality and relationships (Cousins et al, 2008; Martin et al, 2007; Irish Cancer Society, 2006). Consequently, this was also likely to exasperate the barriers to the initiation of screening (World Health Organisation, 2005, in Sasieni and Castanon, 2006).

In the present study, the participants’ personal and practical barriers to the initiation of cervical screening, were consistent with research and tended to
reiterate their lack of knowledge and communication about cervical cancer prevention as discussed above, for example: ‘don’t know what cervical smear tests are for’, ‘concerns about having a male smear-taker’ and ‘fear of cervical screening/what might be found’ (Kahn et al, 2001; Walsh et al, 2003; Walsh, 2006). Additionally, barriers reported in the present study, including ‘don’t think I need a cervical smear test’, ‘told not to have a cervical smear test until I am age 25+’, ‘don’t know at what age to have a cervical smear test’ and ‘lack of time’, suggest firstly, a lack of knowledge and communication between participants and their healthcare-provider about the risk-factors associated with cervical cancer and the importance of cervical screening and suggests secondly, that some participants may have been refused screening (Irish Cancer Society, 2006; Sabates and Feinstein, 2006; Fylan, 1998). Yet, considering the high proportion of cervical smear tests carried out on women under 20 in the present study, these barriers imply that smear-takers and participants were unsure about the initiation of screening in women outside the eligible aged 25-60 population (CervicalCheck, 2008). Consequently, these barriers also suggest that within the present study, smear-takers were firstly not respecting patient autonomy in decision-making about attending for screening, possibly because of participants’ abovementioned lack of knowledge and communication regarding cervical cancer prevention, and secondly, smear-takers were not exercising their ethical responsibility to provide screening to those who are most in need of it, by thoroughly reviewing their sexual and behavioural history (International Agency for Research on Cancer, 2005; Irwig et al, 2006).

Although the participants in the present study generally stated that paying for cervical screening was a barrier and that cervical screening should be free of charge to all women, the present study showed that the third-level institute’s health centre was the least expensive location for cervical screening; all participants who attended there reported paying less than €40. Therefore, as free cervical screening for all women is not considered cost-effective in Ireland (CervicalCheck, 2008), it is possible that if the young women in the present study were informed of the discounted health services available to them and crucially, of
the importance of cervical screening in the prevention of cervical cancer, the cost of screening may become a lesser concern (Irish Cancer Society, 2008; Ni Riain et al, 2003). Additionally, the majority of participants in the present study stated that women under 25 should be screened; yet, the abovementioned barriers and the findings that only one-third of participants aged 20 and over have attended for cervical screening, suggests that if the young women in the present study were offered screening by their healthcare-provider, they would avail of it (Hennig and Knowles, 1990, in Irish Cervical Screening Programme, 2004c). Finally, participants in the present study largely agreed that young girls should be vaccinated against HPV; however, their comments (see Appendix L) suggest that whilst they support the primary prevention of cervical cancer, they acknowledge that HPV-vaccination is not the panacea for cervical cancer, instead more education on the primary and secondary prevention of cervical cancer is required (Stark et al, 2008).

5.3 Methodological Limitations of the Research

A number of limitations occurred in relation to this research; shrewd readers may find more. Firstly, as no information was known about the young women who declined to respond to the present study, the findings cannot be extrapolated to all young women attending a third-level institute (Barry et al, 2007), whilst the confinement of the present study’s sample to young third-level female students makes generalisations about the female population as a whole problematic (Philips et al, 2003). Secondly, studies have demonstrated that sufficient knowledge about cervical cancer prevention and the uptake of preventative screening is positively associated with educational achievement, with the inference that such knowledge may be poorer in the wider population than in the third-level sample used in the present study (Philips et al, 2003; Gerend and Magloire, 2008; Sabates and Feinstein, 2006). Thirdly, participants in the present study were not asked how many sexual partners they have had in the last year; as HPV is transient the likelihood of infection establishing persistency becomes more probable if the woman has had multiple partners in the last year (Winer et al, 2003). Fourthly, due to the small number of preinvasive cervical cancer cases
reported in the present study, statistical associations could not be ascertained between preinvasive cervical cancer screening results and the presence of the risk-factors. A further limitation in the present study, was that the third-level institute’s emailing system did not differentiate between male and female students; however, due to the stereotypically pink design of the present study’s internet survey, the depth of information required from respondents and the study’s inclusion criteria, the likelihood of males having participated in the present study was implausible.

5.4 Summary
This chapter discussed the research findings in relation to the aims of the present study. The discussion showed a high prevalence of the sexual behaviour risk-factors for contracting HPV among participants in the present study, which increased the likelihood of cervical screening attendance, but may have contributed to the high incidence of STIs. Additionally, a high prevalence of the co-factors (smoking and long-term OCP use) that act in-conjunction with HPV to increase the risk of developing cervical cancer was also noted among participants (International Agency for Research on Cancer, 2005). This chapter also referred to the high proportion of cervical screenings performed within the present study, on participants aged under 20 and within a year of sexual debut and concluded that this may have played a part in the high proportion of abnormal cervical screenings (one-third) reported. Additionally, the discussion of participants’ abnormal results and the prevalence of the sexual behaviour HPV risk-factors within the present study, suggested that some participants may be infected with HPV, while the lack of association between abnormal results and the presence of the co-factors, suggested that the effects the co-factors have may be more visible long-term. The discussion of the key barriers to the prevention of cervical cancer implied that knowledge of and communication about preventing cervical cancer in the present study was not adequately addressed, prior to the initiation of cervical screening, within school-based sex education and with healthcare-providers; consequently, this may have exaggerated the barriers to cervical screening attendance. Finally, as no consistent pattern emerged in the present study
regarding the initiation of cervical screening, the discussion concluded that firstly, healthcare-providers were uncertain about the best practice for screening women aged under 25 and secondly, healthcare-providers needed to pay more attention to the presence of the risk-factors, especially the sexual behaviour risk-factors, when initiating cervical screening, rather than depending on an age-standardised cervical screening initiation of 25.
6.1 Introduction
This chapter draws a conclusion as to the present study and makes recommendations based on the findings and discussion.

6.2 Conclusion
The present study used a self-completion internet survey as outlined in Chapter Three, to examine the prevalence of the risk-factors for contracting HPV and developing cervical cancer, among 242 sexually active female students aged 18-24 attending a third-level institute. Consistent with the ISSHR’s findings (Layte et al, 2006), the present study demonstrated that the prevalence of the sexual behaviour risk-factors for contracting HPV, which tended to occur concurrently, appear to be increasing among young women; namely, being sexually active at a young age, having increasing numbers of sexual partners for females and their partners, and having an STI. This also corresponds to research that HPV, the aetiological cause of cervical cancer, is the most commonly reported STI among young people in Ireland (Gilson and Mindel, 2001; Health Protection Surveillance Centre, 2008b). Moreover, a high prevalence of the co-risk-factors, smoking and long-term OCP use, was also noted within the present study, which is again comparable to research (Layte et al, 2006).

The present study also demonstrated that the presence of the sexual behaviour risk-factors tended to increase the likelihood of firstly, attending for cervical screening and secondly, receiving an abnormal cervical screening result; although less than one-third of participants in the present study had attended for screening, over one-third of screening results were abnormal, including one-tenth preinvasive cervical cancer. Nevertheless, this high proportion of abnormal results may be accounted for by the abovementioned high prevalence of the sexual behaviour risk-factors and the findings from the present study that over one-half of participants attended for screening before the minimum recommended cervical screening age of 20, whilst over one-third of participants attended for screening within a year of sexual debut (European Commission, 2003, in Sasieni and Castanon, 2006; Deacon et al, 2000). Furthermore, the present study also
demonstrated that healthcare-providers appeared to be inconsistent in their approach to screening young women, as some participants were screened before a HPV infection would have time to establish persistency (Kitchener et al, 2006), while other participants were refused cervical screening on the basis of their age, under 25.

Finally, the present study also demonstrated that participants’ key barrier to the prevention of cervical cancer, appeared to be a low level of sufficient knowledge about the prevention of cervical cancer; this lack of knowledge was linked to a lack of communication and education from both healthcare-providers and school-based sex education, about the transmission of HPV and the purpose and importance of cervical screening. Consequently, the present study found that such insufficient education and communication tended to exasperate the personal (emotional) and practical (availability of screening) barriers to cervical screening attendance, and may have contributed to firstly, the high prevalence of the sexual behaviour risk-factors found within the present study and secondly, to the considerable proportion of participants who reported having an STI (one-tenth).

6.3 Recommendations
Several recommendations stem from the results of the present study and the consequent discussion of these findings.

Firstly, greater education and communication about the importance and purpose of cervical screening and the risk-factors for developing cervical cancer, specifically the transmission of HPV, needs to be disseminated to adolescents and young people; this may lead to the adoption of preventative health behaviours, such as reducing possible risky sexual behaviours and may also alleviate the anxieties associated with cervical screening attendance (Sabates and Feinstein, 2006; Fylan, 1998; Philips et al, 2003; Kahn et al, 2001).

Secondly, as the present study showed, the prevalence of the risk-factors, specifically the sexual behaviour risk-factors for contracting HPV, appear to be
increasing among young women. Therefore, rather than initiating cervical screening by reason of age-standardisation which may result in young women being refused screening irrespective of their risk, cervical screening guidelines should stipulate the initiation of screening from age 20 onwards based on the presence of the established risk-factors, as this is a more accurate determinant of the young woman’s necessity in attending for cervical screening (International Agency for Research on Cancer, 2003, 2005). As such, these guidelines may firstly, reduce the high proportion of inaccurate cervical screenings reported in the present study, secondly, detect abnormalities that would otherwise not be detected until after age 25 and then possibly at an advanced CIN grade and thirdly, such guidelines may also encourage young women to become habitual about cervical screening (Sasieni and Castanon, 2006; Keegan et al, 2007). Additionally, the sensitive personal information provided by participants in the present study, suggests that young women may be willing to provide such information for risk-stratification to their healthcare-providers, making risk-based cervical screening feasible (Barry et al, 2007).

A final recommendation made by the present study, is that a long-term, in-depth study on the cervical screening attendance and results of young women in relation to the presence of the risk-factors is carried out; this will help determine if the current minimum age of 25 for free cervical screening with CervicalCheck should be lowered, in keeping with current research reporting a lower mean age for first sexual intercourse and increasing numbers of sexual partners and STIs, especially HPV (Layte et al, 2006; Sigurdsson and Sigvaldason, 2007; Gilson and Mindel, 2001; Health Protection Surveillance Centre, 2008b).
Bibliography


Additional Information

www.tellher.ie (an Irish educational website on cervical cancer and the human papillomavirus)

www.surveymonkey.com (a reputable, commercial research website; used in the collection of data for the present study)