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# Prevention of Human Papillomavirus in a school-based setting

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### **Abstract**

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The overall aim of this thesis was to examine beliefs about human papillomavirus (HPV) prevention, especially vaccination, among parents, immigrant women, adolescents and school nurses, and to promote primary prevention among adolescents.

The methods used in the thesis were focus group interviews, individual interviews, a web-based questionnaire, and finally, a randomised controlled intervention study.

The immigrant women were largely in favour of HPV prevention, although barriers, such as logistic difficulties, and cultural or gender norms were found. Parents' decision concerning vaccination of their daughters depended on several factors. Regardless of their final choice, they made the decision they believed was in the best interest of their daughter. The benefits outweighed the risks for parents choosing to vaccinate while parents declining made the opposite judgement. The majority of the school nurses reported that the governmental financial support given because of the vaccination programme had not been used for the intended purpose. Three out of four nurses had been contacted by parents who raised questions regarding the vaccine; most were related to side effects. The educational intervention had favourable effects on the adolescents' beliefs regarding HPV prevention, especially among those with an immigrant background. Furthermore, the intention to use condom as well as actual vaccination rates among girls was slightly increased by the intervention.

Trust in the governmental recommendations and the amounts of information given are important factors in the complex decision about HPV vaccination. Attention given to specific needs and cultural norms, as well as the possibility to discuss HPV vaccination with the school nurse and provision of extra vaccination opportunities at a later time are all strategies that might facilitate participation in the school-based HPV vaccination programme. School nurses need sufficient resources, knowledge and time to meet parents' questions and concerns. The vaccinations are time-consuming and the governmental financial support needs to be used as intended, for managing the vaccination programme. A school-based intervention can have favourable effects on the beliefs and actual actions of young people and may possibly thus, in the long term, decrease the risk for HPV-related cancer.

*Keywords:* Human papillomavirus, HPV, vaccination, cervical cancer, school nurse, school health, immigrants, parents, adolescents, belief, attitude, decision, prevention, public health, randomised controlled trial, intervention, focus group interviews, vaccine hesitancy

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*To Hannah and Estelle*

I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.

Maya Angelou

To accomplish great things, we must not only act, but also dream; not only plan, but also believe.

Anatole France

# List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I Grandahl M, Tydén T, Gottvall M, Westerling R, Oscarsson M. (2012) Immigrant women's experiences and views on the prevention of cervical cancer: a qualitative study. *Health Expect*, 18:344–354
- II Gottvall M\*, Grandahl M\*, Höglund A.T, Larsson M, Stenhammar C, Andrae B, Tydén T. (2013) Trust versus concerns—how parents reason when they accept HPV vaccination for their young daughter. \**These authors have contributed equally.* *Ups J Med Sci*, 118(4):263-270
- III Grandahl M, Oscarsson M, Stenhammar C, Nevéus T, Westerling R, Tydén T. (2014) Not the right time: why parents refuse to let their daughters have the human papillomavirus vaccination. *Acta Paediatr*, 103(4):436-441
- IV Grandahl M, Tydén T, Rosenblad A, Oscarsson M, Nevéus T, Stenhammar C. (2014) Population-based survey of school nurses' attitudes and experiences regarding the recently implemented human papillomavirus vaccination programme in Sweden. *BMC Public Health*, 14:540
- V Grandahl M, Rosenblad A, Stenhammar C, Tydén T, Westerling R, Larsson M, Oscarsson M, Andrae B, Dalianis T, Nevéus T. School-based intervention for the prevention of HPV among adolescents: a randomised controlled study. *Submitted*

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# Abbreviations

CG	Control group
HBM	Health Belief Model
HCP	Health Care Professional
HPV	Human papillomavirus
IG	Intervention group
MMR	Measles-mumps-rubella
OR	Odds ratio
RCT	Randomised controlled trial
SFI	Swedish for immigrants
STI	Sexually transmitted infection
WHO	World Health Organization

# Prologue

Life is fragile. This is something I experience daily in my clinical work as a nurse in the paediatric emergency department at the Children's Hospital in Uppsala. I meet children suffering from minor illnesses and children affected by life-threatening conditions. I meet parents in different stages of life, parents of new-borns and parents of adolescents. I meet them in joy and in sorrow, at the beginning of life and at the end. Each of them has their own story. One thing I am convinced of is that every parent wants to do what they believe is best for their child, regardless of family composition, who they are or where they come from.

My clinical work is focused on caring and medical treatment. Due to my genuine interest in preventive medicine, however, I embarked upon a Master's programme in public health at Uppsala University. This was something that brought together at last, my interest in people, medicine and prevention. I was interested in knowing why and how as well as which factors are associated with individual behaviour and health. These studies changed my life and I was fortunate enough to be introduced to scientific research and given the opportunity to accomplish this thesis. It took me a long time, but I finally found my purpose in life.

Consequently, this thesis has a paediatric public health perspective and the goal is to reach a deeper understanding of benefits and barriers regarding the implemented HPV vaccination programme in Sweden. A successful vaccination programme contributes to high coverage, and high coverage will decrease the burden of HPV and HPV-related cancer. This is beneficial for both the individual and public health in general.

*Somewhere in Sweden in January 2012, just before the implementation of the national HPV vaccination programme. She was a single mother of two daughters, aged 13 and 14. Like all parents, she wanted to do what was best for her children. Her daughters would soon be offered HPV vaccination and she would have to make the decision to consent to or decline the vaccine. The decision was easy; she had already made up her mind and would decline the vaccine. It was not considered necessary, she had a strong religious faith and believed that the vaccine would encourage an immoral way of life. Besides, she was aware of how her daughters lived their lives, and sex was a non-existent issue. Her daughters would not be sexually active until they got married. About one year later, the eldest daughter became*

*pregnant and went to a city nearby to have an abortion. The mother was aware of neither the pregnancy nor the abortion.*

*My mother came home from the hospital. She had visited my aunt who was seriously ill, and she had told my mum "If only I had attended the controls". I was just a little girl and knew neither which disease she was talking about nor which controls she referred to. My aunt died shortly after. Years later I realized that the disease was cervical cancer and the controls were the cervical cancer screening controls.*

In the 1980s, the German virologist Harald zur Hausen and his research group discovered the link between cervical cancer and human papillomavirus. In 2008, zur Hausen was awarded the Nobel Prize in Physiology or Medicine "for the discovery of human papillomavirus causing cervical cancer". At the same time vaccination against human papillomavirus was approved and vaccination programmes were implemented in several countries worldwide.

# Introduction

## Human papillomavirus

### The global burden of human papillomavirus

Human papillomavirus (HPV) is a common sexually transmitted infection (STI) among women and men worldwide<sup>1</sup> and is a major cause of individual suffering, loss of quality of life and increased healthcare costs. Cervical cancer is the third most common cancer among women globally, with an estimated incidence of 530 000 and an annual mortality of 275 000.<sup>2</sup> Many women are affected at a relatively young age and about half of all cases appear before the age of 50.<sup>3</sup> There is a strong correlation between the level of development in a country and cervical cancer incidence. The majority (85%) of all cases occur among women in developing countries. The highest levels are found in sub-Saharan Africa, South-central Asia and South America, due to lack of, or limited access to, national screening programmes. The lowest rates are found in North America, Australia/New Zealand and Western Europe.<sup>2</sup>

### HPV characteristics

HPV is transmitted through skin-to-skin contact and via skin-to-mucosa, unlike other STI transmitted by body fluids. The virus appears in more than 200 different types with different characteristics.<sup>4</sup> The various infections and diseases that can be caused by the virus range from cutaneous warts to cancer.<sup>5</sup> An HPV infection can be persistent and the visible warts may cause great concern for the affected individual.<sup>6</sup>

Most HPV infections are asymptomatic and heal spontaneously within one to two years,<sup>7</sup> but persistent HPV infections may also cause cancer. According to the International Agency for Research on Cancer 13 of the HPV types are identified as oncogenic or high-risk HPV (HPV16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59 and 66).<sup>8</sup> The high-risk HPV types 16 and 18 are associated with 70% of all cases of cervical cancer. HPV can also cause cancer in the vulva, anus, penis, vagina and oropharynx.<sup>9</sup> The most common low-risk HPV types 6 and 11 are related to over 90% of all cases of genital warts.<sup>3</sup>

The peak incidences of HPV infection occur at a young age, in late adolescence or in young adulthood.<sup>1</sup> In Swedish studies, the prevalence of HPV among young Swedish women and men attending a youth clinic was examined.<sup>10 11</sup> Among the cohort of non-HPV vaccinated, sexually active young women, aged 15-23, the majority (62%) were positive for HPV 16 and other high-risk HPV.<sup>11</sup> The prevalence of genital HPV was 70% among the young women<sup>11</sup> and the prevalence of oral HPV was about 10% among both sexes.<sup>10</sup> In a population based study among Swedish high-school students the oral HPV prevalence was found to be significantly low, among both young men and women.<sup>12</sup>

## Risk factors for HPV and HPV-related diseases

Most people are infected with HPV at some point in life; about 80% of all sexual active individuals have had an HPV infection.<sup>6</sup> Several factors are associated with cervical cancer and HPV-related diseases. Risk-taking sexual behaviour is crucial: a high number of new partners, low and/or incorrect use of condoms and young age at first sexual intercourse, are also associated with increased morbidity.<sup>13</sup> Also the long-term use of hormonal contraceptives,<sup>14</sup> smoking and comorbidity with other STIs, such as chlamydia or HIV, are related to an increased burden of HPV and HPV-related diseases.<sup>15</sup> Younger girls whom become sexually active early on have an increased risk for STIs and some specific HPV types because of the biology of the cervix. The cervix is more vulnerable in this age, since it is covered with delicate tissue and more easily damaged, and the most susceptible area, transformation zones, are larger.<sup>16</sup>

## Prevention of HPV

The incidence of HPV infections and HPV-related diseases can primarily be reduced by primary and secondary prevention. Primary prevention of HPV is mainly a reduction of the number of sexual partners, HPV vaccination, and the correct and consistent use of condoms. Although a condom provides considerable protection (70%) if used correctly (and consistently), it does not give complete protection since HPV is transmitted by skin-to-skin contact and by vaginal, anal and oral sex. Consequently areas not covered by the condom can be infected by the virus.<sup>17 18</sup>

Vaccination against the most common HPV types related to cervical cancer has been licensed worldwide since 2006 and 2007.<sup>19</sup> The bivalent vaccine, Cervarix® protects against HPV 16 and 18 and the quadrivalent vaccine Gardasil® protects against HPV 6,11,16 and 18. Both vaccines are prophylactic and contain virus-like particles. The virus-like particles trigger the immune response that is effective if exposed to the real viruses, although

the vaccine cannot cause an HPV infection or an HPV-related disease.<sup>20</sup> Both vaccines protect against approximately 70% of all cervical cancer incidents and the quadrivalent HPV also protects against genital warts.<sup>8 21</sup> For best protection the vaccine should be distributed to girls not previously exposed to HPV, i.e. before the first sexual contact.<sup>22 23</sup> The prophylactic vaccine is recommended by the World Health Organization (WHO) to girls from the age of 9<sup>24</sup> and it is highly effective in young women<sup>23</sup> and young girls before the age of 14<sup>25</sup>. Another reason for vaccinating younger girls is that they have a better immune response,<sup>22 26</sup> although the vaccines are also effective among older women up to age 45.<sup>27 28</sup> There is currently an ongoing debate regarding vaccination of boys, and the vaccine is approved for boys in many countries.<sup>29-31</sup>

The quadrivalent HPV vaccination was given as a three-dose series over the course of six months with the second and third dose given two and six months after the first dose. Since January 2015, the quadrivalent vaccine has been recommended as a two-dose series for the youngest girls in the school based vaccination programme.<sup>32</sup>

The next generation of vaccines, a 9-valent prophylactic vaccine was approved by the U.S. Food and Drug Administration in December, 2014. In addition to the HPV types covered by the quadrivalent HPV vaccine, the 9-valent vaccine also protects against the oncogenic types 31, 33, 45, 52 and 58. The vaccine has been recommended by the European Medicines Agency since March 2015, and has the potential to increase prevention of cervical cancer to 90% and also to increase prevention of other HPV-related cancers and pre-cancers.<sup>33-35</sup>

HPV vaccine is considered safe and effective. The most common side effects linked to the vaccine are mild and temporary: pain and swelling around the injection site, and headache and fever.<sup>22 36</sup> Studies have found no association with adverse events such as autoimmune diseases.<sup>37 38</sup> A large cohort study<sup>37</sup> among Swedish and Danish girls aged 10-17 found no association between HPV vaccine and severe side-effects such as autoimmune, neurological or venous thromboembolism.

## HPV vaccination programmes

To protect the population from HPV and HPV-related diseases many western countries and most European countries have implemented national vaccination programmes for girls aged 9-14.<sup>24 39</sup> According to a US study<sup>30</sup> it is cost effective to only include girls if the coverage rate reaches 75%. The USA and Australia were two of the first countries to implement programmes for young girls, followed by Canada, the UK, Belgium, the Netherlands, France, Italy, Norway, Denmark, Slovenia and many more. The coverage rates for the youngest age groups differ between countries and within regions, and the highest rates are found in school-based vaccination

programmes.<sup>19</sup> In the USA the coverage rate for the older girls aged 13-17 was 39.7% in 2014<sup>40 41</sup> compared to the school-based programs in the UK which had a coverage rate of 87.8% (all doses) among the routine cohort (aged 12-13).<sup>38</sup> In Australia, Austria, Canada and the USA boys are also included in the national vaccination programme.<sup>29 40 42-44</sup>

HPV vaccines have been commercially available in Sweden since 2007 for girls aged 13-17 and have been subsidized by the government at a cost of about 180€. For girls not included in the subsidy the cost was considerably higher. In 2011 about 25% of girls in the target group had been vaccinated in this opportunistic screening programme (not organised by the government). The implementation of a government-supported vaccination programme was delayed due to appeals from the pharmaceutical industry against the national procurement and the vaccination programme with the quadrivalent HPV vaccine started in 2012. HPV vaccination is offered free-of-charge to all girls aged 10-12 (with the first cohort born in 1999-2000) through a school-based vaccination programme. The first year coverage rate for one dose was about 80% with a slightly higher coverage of about 83% in 2014.<sup>32</sup> For the older girls born in 1993-1998, a catch-up vaccination programme is offered free-of-charge through the primary health care system<sup>32</sup> with substantial lower coverage of approximately 59% for one dose in 2014.<sup>32</sup> In addition, in two counties, Stockholm and Skåne, the vaccine is offered young women up to the age of 26. The coverage among this older age group is even lower, 20% in 2014.<sup>32</sup>

### **Vaccine hesitancy**

Globally, vaccine hesitancy is a growing challenge. Lower vaccination coverage can rapidly affect public health, and increase the number of deaths. Currently, 1.5 million children die annually due to insufficient vaccination, incidents that could be prevented by vaccinations. Vaccine hesitancy is a relatively new term. According to the WHO Strategic Advisory Group on Experts (SAGE) on Immunization:

“Vaccine hesitancy refers to a delay in acceptance or refusal of vaccination despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience and confidence”.<sup>45</sup>

Vaccine hesitancy is mainly found among sub-groups within a population for wide-ranging reasons, such as the fear of side-effects, distrust of the health care system, misinformation and myths, i.e. that vaccines cause infertility, and/or due to the opinion of influential leaders.<sup>46</sup> In Sweden, lower coverage is mainly found in the Anthroposophical community in Järna (Stockholm county), and among some migrant groups from northern Africa.<sup>47</sup>

An incident that caused intense debate in the Swedish media was the mass vaccination programme against swine flu in 2009-2010, which unfortunately caused narcolepsy in substantial numbers of the Swedish population, especially among children. This narcolepsy debate occurred just before the national HPV vaccination programme started.<sup>48-50</sup>

In Denmark, discussions are currently ongoing regarding HPV vaccine safety, after several girls reported side-effects after receiving the vaccination. In Japan, the discussions regarding vaccine safety and side-effects have progressed and the government no longer recommends vaccination against HPV, although the vaccine is still available for Japanese girls.<sup>51 52</sup> Nevertheless, WHO still recommends vaccination against HPV in order to save lives globally.<sup>53</sup>

## Cervical cancer screening

Secondary prevention includes early detection of cytological abnormalities. Usually it takes decades for an HPV infection to develop into cervical cancer thus cervical cancer screening programmes are an effective method for early detection.<sup>54</sup> It is recommended that women aged 20-60 attend cervical cancer screening every three to five years according to the European guidelines.<sup>55</sup> In Sweden women are invited to have a Pap smear taken every three years from the age of 23 and every five years between the ages of 50 and 60.<sup>56</sup> This summer (2015), the National Board of Health and Welfare has updated the recommendations to include HPV-based screening for women aged 30-49 every three years and women aged 50-64 every seven years.<sup>57</sup> The incidence of cervical cancer has decreased substantially in Sweden since the 1970s due to this well-functioning screening programme,<sup>58 59</sup> which reaches 62-93% (mean 79%) of the target population.<sup>60</sup> Of the number of women diagnosed annually with cervical cancer, and who die due to the disease,<sup>61</sup> the majority have not attended cervical cancer screening programmes.<sup>54</sup> In 2013, 468 women were diagnosed (incidents) and 140 died due to the disease. There has been concern that HPV vaccinated women would have lower attendance rates in the national cervical cancer screening programme. A recent Swedish study<sup>62</sup> found equal or higher attendance among HPV vaccinated (opportunistic vaccination programme) women, with most differences in attendance being related to socioeconomic differences.

## Public health perspectives on HPV vaccination: risk groups and arenas

The overarching aim of public health in Sweden is to create the social conditions for good health on equal terms for the entire population.<sup>63</sup>

According to Geoffrey Rose (1981), the definition of public health is “a preventive measure that brings large benefits to the community offers little to each participating individual”, which is known as, the preventive paradox.<sup>64</sup> Sweden has a long history and tradition of public health and the populations’ health has been improving for several decades.<sup>63</sup> In 1833, Esaias Tegnér stated that– “peace, vaccination and potatoes” were the factors important for improved public health. Access to healthcare and preventive programmes, improved education and knowledge about preventive strategies and improved financial resources, are the main factors related to the enhancement of public health.<sup>65</sup>

The first mass vaccination programme was initiated as early as 1820, when the Swedish government decided that the whole population should be inoculated against smallpox. Vaccination programmes have been controlled by the government ever since and are a substantial cause of the improvement in public health. The coverage rates for childhood vaccination in general are high, above 95%.<sup>66</sup> Screening programmes (mammography and cervical cancer screening) are other contributing factors to improved health among women.<sup>65</sup> Although the standard of public health is good, psychiatric disorders and self-destructive behaviours have increased, especially among adolescent girls and young people.<sup>67 68</sup>

## Adolescents and sexual health

Diseases related to behaviour, such as the STIs chlamydia and gonorrhoea, have increased among adolescents and young people as a result of more risk taking regarding sex, with more partners and less use of condoms.<sup>69-72</sup> The prevalence of chlamydia has increased substantially since 1997, from 13 905 cases to 36 125 new cases (incidents) in 2014. The majority of the documented cases occur in the age group 15-29 years, especially among young women (57%), though it should be noted that young men are underrepresented in STI testing. At the same time, gonorrhoea incidents also increased by 20% to 1 336 new cases, mainly among men who have sex with men. These are worrying trends in a public health perspective, since STIs can have a negative impact on overall health and future reproductive health.<sup>72 73</sup>

Adolescence is a time of major changes, in terms of both physical and cognitive development as well as changes in the relationships with the self and others. It is a time when social norms and peers are most important and a time when sexual interest and love relations commence. It is also a time of exploration and eventually a time for the first sexual intercourse. In Sweden, about half of adolescents aged 16 in the first year of upper secondary school have had vaginal intercourse.<sup>70 74</sup> Swedish adolescents and young people have increased risk-taking with more partners (one-night stands) and low condom use (15-27%) at the latest vaginal intercourse.<sup>70 74 75 72</sup> A recent

Swedish study by Sydsjö et al<sup>76</sup> emphasized that an innovative approach must be used in order to promote safe sex among adolescents.

## Immigrants' health

There are also disparities within the population. Health inequalities are related to socioeconomics and life conditions overall. Lower socioeconomic status is related to a poorer standard of health.<sup>65</sup> Sweden is a multicultural country, as of 31 December 2014, more than 1.6 million of the total population of 9.7 million were foreign born and this number is estimated to increase in the forthcoming years.<sup>77</sup> In the three biggest urban centres of: Stockholm, Gothenburg and Malmö, one-third of the inhabitants have an immigrant background and at the national level more than 30% of all children up to 18 years of age have an immigrant background.<sup>78</sup> The most common countries of origin outside the Nordic countries are Iraq, the former Yugoslavia, Poland, Iran, Turkey, Afghanistan, Syrian and Somalia.<sup>79</sup> Many of these people have emigrated from countries with no access to adequate or organized preventive healthcare. The migration can cause vulnerability due to difficult experiences and trauma. Socioeconomic factors such as educational levels, cultural norms and access to healthcare have an impact on health and health behavior.<sup>80</sup>

In order to promote integration into Swedish society, newly arrived immigrants are offered the opportunity to study Swedish for immigrants (SFI) free of charge. The majority of those offered language courses (about 60%) participate in this educational programme.<sup>81</sup>

Although immigrants constitute a heterogeneous group they have poorer health than the Swedish population in general.<sup>65 80</sup> In two register studies<sup>82 83</sup> immigrant women's participation in cervical cancer screening programmes and their risk of cervical cancer were examined. The results indicate that these women have lower attendance compared to Swedish-born women, and that women emigrating from some regions such as Sub-Saharan Africa and Central-America have a higher risk (excess RRs) for cervical cancer. There is also an increased risk for cervical cancer among women emigrating at the age of 40 and above compared to Swedish-born women.<sup>82 83</sup>

## School Health

According to Swedish law all students should have access to school health services providing medical, psychological and psychosocial support and also education for children with special needs. The school health services mandate is mainly preventive and based on The Convention on the Rights of the Child. The definition of a child is a person under the age of 18. The Convention on the Rights of the Child was adopted by the UN General Assembly in 1989 with the following promise to children:

“that we would do everything in our power to protect and promote their rights to survive and thrive, to learn and grow, to make their voices heard and to reach their full potential”.<sup>84</sup>

In the present thesis the definition of school health services is used for the medical support provided, which includes the school nurse and the school doctor. The school nurse is present on a daily basis, while the school doctor attends the school occasionally. All schoolchildren are offered regular health visits in primary school and in the 4<sup>th</sup> and the 7<sup>th</sup> grades as well as the 1<sup>st</sup> year of upper secondary school. The health visit includes a questionnaire about self-reported health and a health interview with the school nurse regarding the students overall health. The interview comprises different areas; psychosocial, physical, nutrition and sleep habits. In the 7<sup>th</sup> grade and in upper secondary school, alcohol, tobacco and drugs as well as sexual health and relationships are included.<sup>85</sup> In addition to the regular health visits, all pupils are welcome to visit the school nurse whenever they need to. Most school nurses have an open door policy, i.e. they offer an open reception/clinic several times a week.

The Swedish national childhood vaccination programme was implemented in the early 1950s. All childhood vaccinations in Sweden are controlled by the National Board of Health and Welfare. The vaccination programme is regulated legally by SOSFS 2006:22.<sup>87</sup> The county councils are responsible for vaccinating the youngest children aged 0-6 and also for the “catch-up” vaccinations against HPV for older girls born in 1993-1998. The municipalities are responsible for vaccinations distributed by the school health service for school children aged 6-16. Until recently the program included vaccinations against nine diseases, HPV vaccination being the tenth.<sup>86</sup> One of the school health services’ main mandates is consequently to conduct vaccinations according to the Swedish national vaccination programme. In order to assure high vaccine coverage, the school health services are responsible for vaccinations for recently arrived immigrant children and for children who missed the opportunity for school-based vaccinations. The HPV vaccine (and vaccine against pneumococcal) is not, however, included in this “second opportunity”, since HPV vaccination is a “one-time offer”.<sup>87</sup> Like all healthcare in Sweden, vaccination is non-compulsory.

School nurses are responsible for all aspects of vaccination in schools, the logistics, the administration as well as the information to parents and children. The information given is regulated by the government in order for all parents to receive equal and uniform information.<sup>88</sup> The child is most often given the information letter and consent form in school to bring home to the parents. The parents, i.e. the legal guardians, here called the parents have to consent to each vaccination in writing in order for the child to be vaccinated.<sup>88</sup> According to Swedish law parents who have shared custody,

must both agree on the decision to accept or decline the vaccination for the child.<sup>89</sup> For safety reasons, vaccinations require two vaccinators and this is often managed by two school nurses in neighbouring schools collaborating. Occasionally, the school doctor participates during the vaccinations. The children are monitored for at least 15 minutes afterwards and the vaccine is documented in the medical records. In addition, all vaccinations must be reported to the Public Health Agency of Sweden and the vaccinations are to be documented in the Vaccination Register.<sup>90</sup>

## Public health ethics and HPV vaccination

Vaccinations have played a vital role in preventing disease and reducing mortality over the last 50 years and are important reasons for children's improved health in a global perspective.<sup>91</sup> The aim of collective vaccination programmes is to protect the entire population from a severe disease, to maximize the benefits and to minimize the harm and inconvenience.<sup>92</sup> Primary public health ethics entail consideration of the proper relationship between benefits and risks when implementing vaccination programmes.<sup>93</sup> A high coverage rate is necessary in order to achieve herd immunity among the population. A non-vaccinated individual is not protected on an individual level although high vaccine coverage rates give herd protection on a collective level. Non-vaccinated individuals are at risk of contracting a disease, such as measles-mumps-rubella (MMR), if in contact with the virus, for example when travelling to areas where the disease is not extinguished. However, a small number of individuals cannot be vaccinated due to medical conditions such as allergy.<sup>47</sup>

Although collective vaccination programmes are in the best interests of the whole population in a public health perspective they do raise ethical questions; individual autonomy *versus* societal demand to achieve herd immunity, the parent's decision for the child *contra* the child's autonomy and the individual child's best interest *contra* what is best for the group.<sup>94 95</sup> To vaccinate can be comprehended as a moral obligation for the good of others, to protect those who cannot be vaccinated due to a medical condition. This raises the question of whether the obligation to vaccinate exceeds the decision of the individual and whether parents should have the right to decide about vaccinations for the child and also whether the vaccination should be compulsory.

There have been discussions about the decision to vaccinate girls only and concerns have been voiced that it might give a false sense of security and a belief that HPV vaccination protects against all STIs,<sup>96</sup> or that it will encourage an earlier sexual debut.<sup>97</sup> Another reason for concern is that HPV vaccination will result in decreased participation in future cervical cancer screening programmes.<sup>98</sup> The implementation of the vaccination programme

also raises questions regarding the public's trust in governmental recommendations<sup>99</sup> and concerns for vaccine safety and whether vaccination is needed for young girls who are not sexually active.<sup>100</sup>

## Gender perspectives – what about boys?

Gender is an increasingly studied aspect of health inequalities. Gender as a concept deals with the social construct of femininity and masculinity. Since HPV vaccinations are only offered to girls in Sweden, a gender perspective is relevant for this thesis.

According to gender norms<sup>101-103</sup> women are considered responsible for sexual and reproductive health. The majority of birth control methods are designed for women and women are by tradition responsible for the upbringing of children. Even though Sweden is viewed in an international perspective as having a long history of gender equality, women still undertake the main responsibilities in caring for children and other non-paid household work.<sup>104</sup>

When HPV vaccination was implemented, the focus was on the prevention of cervical cancer and, in addition, the vaccine was expensive. Consequently, the vaccine was offered only to girls. This could be seen as being out of concern for women's reproductive health (cervix), although there is a discrepancy in this. Boys are considered to be protected by herd immunity, thus, it was not felt necessary to protect boys individually against HPV. Still, they are carriers of the virus and are at risk of contracting an HPV-related disease.<sup>105</sup> One group not covered by herd immunity are men who have sex with men, reflecting the heteronormative view.<sup>101</sup> This raises the question whether the overall aim of public health – to create good health on equal terms for the entire population – is achieved in the HPV vaccination programme. Has society by excluding boys reinforced the tradition of women being responsible for sexual and reproductive health or is it truly concerned for women's health? There is an ongoing debate in Sweden as to whether boys should be vaccinated against HPV, and whether the vaccine should be distributed in a gender-neutral manner, such as in for example Australia.

Intersectionality is a common term nowadays to explain gender inequality in relation to other grounds of discrimination. The concept of intersectionality explains how societal inequality and injustice interact with various factors such as gender, age, ethnicity, socioeconomics and sexuality. These biological, social and cultural factors are interconnected and cannot be separated from one another. All individuals are part of societal and political constructs that have an impact on our life conditions and intersectionality can help us to understand the social processes.<sup>101 106 107</sup>

## Previous research related to HPV and HPV vaccination in school-based settings

### Parents' attitudes and factors related to acceptance versus non-acceptance of HPV vaccination for their daughters

Several factors are important for the decision concerning HPV vaccination, including individual beliefs as well as, behavioural, demographic and socioeconomic status. Studies of varied approaches regarding parents' decisions about HPV vaccination for their young daughters have been undertaken in the USA<sup>100 108</sup> and in school based settings mainly in Canada, Australia and the UK.<sup>99 109-111</sup> A population based cross-sectional Canadian study<sup>109</sup> found that parents who have accepted HPV vaccination are more in favour of the vaccine, believe in its effectiveness and are less worried about side-effects. Recommendations from a physician and previous acceptance of childhood vaccinations and trust in recommendations are other factors associated with acceptance.<sup>99 109</sup> Similar results are also found in qualitative studies.<sup>110 111</sup>

In contrast, factors related to parents' reasons for not consenting to the vaccine are concerns about the long-term safety of the vaccine, insufficient information to make informed consent, and the daughter's young age.<sup>109 112</sup> Moreover, qualitative studies have revealed that mistrust in authorities and previous personal experiences within the health system, negative media messages and concerns related to the daughter's sexual activity, are other factors for not accepting HPV vaccination.<sup>110 111</sup> According to a recent review based on European studies<sup>113</sup> belonging to an ethnic minority group and having lower socioeconomic status are associated with lower HPV vaccination uptake. A recent Norwegian register-based study<sup>114</sup> assessed demographic, socioeconomic and behavioural correlates of HPV vaccination. The results indicate that a school-based vaccination programme provides equitability although differences are found among some sub-groups. Lower socio-economics correlate with lower uptake, and Norwegian-born mothers with higher education are less likely of HPV vaccination initiation for their daughters. Similar results have been found in Danish registry studies<sup>115 116</sup> in a similar context (although the vaccine is not school-based).

A large Swedish population-based study<sup>117</sup> examined parents attitudes to HPV vaccination prior to implementation of the programme. Beliefs about vaccine safety and effectiveness were important factors for willingness to vaccinate. Parents born outside Europe and those with higher education were less willing to vaccinate. Dahlström et al<sup>117</sup> emphasize that information to parents should include facts about vaccine effectiveness and safety.

## Ethnical and cultural aspects regarding HPV vaccination and cervical cancer screening controls

Previous studies<sup>118-122</sup> indicate that ethnicity and cultural norms can have an influence on HPV vaccination uptake and cervical cancer screening. HPV vaccine uptake is lower in deprived areas and among ethnic minority groups.<sup>122 123</sup> Spencer et al<sup>124</sup> linked girls' vaccination records by addresses to cervical cancer screening records for their mothers and found that sociodemographic factors had an impact on vaccine uptake and completion of HPV vaccine doses and cervical cancer screening uptake. Marlow et al<sup>120</sup> examined HPV awareness and acceptability of HPV vaccine among ethnic minority women in the UK. After controlling for socioeconomic status, acceptability of HPV vaccine was still lower than in the ethnic majority group. Cultural and religious barriers were found. The most common reasons given for declining HPV vaccine was the need for more information, concerns about side-effects or concerns that it would promote promiscuity or premature sex<sup>120</sup>. In addition, Bowyer et al<sup>125</sup> found ethnicity independently associated with vaccine uptake among adolescent girls in the catch-up cohort. Participants from other ethnic backgrounds were less likely to have received the HPV vaccine compared to the majority ethnic group.<sup>125</sup>

A large cross-sectional Canadian study<sup>119</sup> found that immigrants who had lived in Canada for less than 10 years had lower attendance for cervical cancer screening compared to non-immigrants. Socioeconomic factors such as a higher level of education and higher household income were positively associated with cervical cancer screening.<sup>119</sup> Barriers to attendance at cervical cancer screening programmes among ethnic minority women in the UK are that there is no perceived need for screening and emotional barriers also exist, such as concerns about the examination and fear of the result. Furthermore low perceived risk and practical considerations such as the difficulty of getting an appointment, are reasons for non-attendance according to recent qualitative and cross-sectional studies.<sup>126 127</sup>

A Swedish focus group study<sup>128</sup> among Danish and Norwegian immigrants found several factors that could explain why the women did not attend the cervical cancer screening programme. These factors were mainly previous experiences, psychological and individual factors, childbearing-related factors, social support and social network, and risk perception.<sup>128</sup> By comparison, studies<sup>129 130</sup> among Swedish-born women show that the main reasons for non-attendance are feeling healthy, lack of time, and feelings of discomfort during the examination. While the women were in favour of cervical cancer screening, low self-esteem and anxiety about the result of the test were barriers to participation.<sup>129 130</sup>

## School nurses' beliefs and experiences of HPV vaccination programmes

Previous studies<sup>131-133</sup> have emphasized that health care professionals (HCPs) are important for HPV prevention in various settings. HCPs' attitudes and communication skills can affect HPV vaccination uptake<sup>131</sup> and the importance of educating HCPs has been emphasized.<sup>133</sup> Qualitative studies<sup>134-137</sup> from the UK and Sweden have examined school nurses' beliefs and experiences of the HPV vaccination programme. Gottvall et al<sup>137</sup> examined school nurses' beliefs about the vaccination programme before the implementation in Sweden. The school nurses were in favour of a school-based vaccination programme and believed it would balance out social inequalities.<sup>137</sup> Nevertheless, concerns were raised that the vaccinations would increase their already high workload.<sup>137</sup> These findings are in line with the studies undertaken in the UK.<sup>134-136</sup> Boyce and Holmes,<sup>136</sup> and Hilton et al<sup>135</sup> emphasize that the school nurse has a key role in the national HPV vaccination programme.

## School-based interventions to increase HPV prevention

Previous research indicates that interventions in various settings can be successful in increasing STI-prevention.<sup>138-143</sup> One intervention was conducted among high school students in the USA. The students were randomized to receive health education either by trained classroom teachers or by school nurses. The intervention had an effect on STI-prevention for both intervention groups, while the nurse-led group showed significant and sustainable effects.<sup>140</sup> Another intervention<sup>142</sup> was performed among senior vocational students in the Netherlands. The intervention consisted of educational sessions delivered by health educators or public health nurses and Internet based home-assignment and sexual health services. The intervention had an effect on STI-testing although it should be noted that the response rate was 52% at follow-up and 32% reported that they had received the full intervention. In addition, more students were involved in the follow-up measurement, with 1 903 students compared to 1 361 students at baseline. Thus, the reliability must be considered limited.<sup>142</sup>

Fu et al<sup>144</sup> conducted a review of educational interventions to increase HPV vaccination acceptance, with eight of the 18 papers reviewed comprising adolescents' or young adults' intention to vaccinate or receipt of vaccination. The interventions were of various kinds: web-based, classroom, video/DVD, slide presentation and fact-sheet. The interventions had significant effects on intention to vaccinate while only one study<sup>145</sup> had an effect on behaviour. In this study, young women were offered the vaccine at the time of the intervention. In conclusion, Fu et al<sup>144</sup> indicate no strong

evidence for any specific educational intervention for general implementation.

An educational intervention among college females recruited from a Gynaecology Clinic at University Health Services was conducted by Patel et al.<sup>146</sup> The intervention consisted of a HPV fact sheet discussed with the participants in detail by a study coordinator and a reminder letter (booster) emailed after two weeks, including another copy of the HPV fact sheet. The intervention had no significant effect on intention to vaccinate or vaccination rates. Patel et al emphasize that interventions should address personal beliefs and broader barriers to HPV vaccination uptake. The study had a response rate of 52%.<sup>146</sup> In comparison, a Chinese educational intervention<sup>147</sup> consisting of a one-hour informative group lecture among young females had a significant effect on intention to vaccinate, although the cross-sectional study design without a control group is a limitation.

Adolescents and young women have a low level of knowledge about HPV and there is a need for enhanced knowledge especially about the link between HPV and HPV-related cancer.<sup>70 148</sup> School-based educational interventions conducted in various settings aiming to promote HPV prevention among adolescents can successfully increase knowledge and awareness of HPV and have a positive impact on beliefs about HPV prevention in various settings.<sup>149-152</sup>

Kwan et al<sup>152</sup> conducted an educational intervention among adolescent girls in China and showed positive effects in knowledge and beliefs about HPV. The intervention consisted of a one-hour educational slide presentation followed by an interactive question-and-answer session to enhance understanding of the contents. The intervention was delivered in school by a gynaecologist (one of the researchers) among an audience ranging from 176 to 426 girls. The reliability must be seen as limited due to the absence of a control group (limiting the causality of the interventional effect) and the follow-up measurement undertaken on the same occasion as the intervention.<sup>152</sup>

A US study by Merzouk et al<sup>150</sup> conducted an educational intervention among high-school health students which included a 15-minute DVD presentation on HPV during the health class. There were significant effects on awareness of HPV. However, the non-standardization of the health classes involved and the lack of demographic information on the students included in the study are possible limitations. Moreover, the follow-up was after only 24-48 hours.<sup>150</sup> A Hungarian study<sup>151</sup> undertaken by Marek et al among adolescents, both boys and girls showed significant effects on awareness, knowledge and beliefs. The intervention was conducted by a trained health educator (the first author) during regular classes comprising 25-33 students in each class. The education was a 45-minute didactic presentation about HPV followed by a question-and-answer session and a hand-out of the key message with follow-up after three months.<sup>151</sup> However,

HPV vaccination is not implemented in the national vaccination programme in Hungary, thus the setting cannot fully be compared to the Swedish context.

One Swedish class-room intervention<sup>149</sup> was conducted among adolescents aged 16 prior to the implementation of the HPV vaccination programme. The intervention consisted of one hour of class-room education about HPV, including practical training on condom use and presentation of the projects' web-site. Follow-up measurements were performed after two months. The intervention was delivered by the first author (registered nurse) and a trained student and had a significant effect on adolescents' knowledge and awareness of HPV, but no effect was found on beliefs or behaviour.<sup>149</sup>

In the systematic Cochrane review conducted by Shepherd et al<sup>148</sup> on interventions aiming to prevent HPV among young women, the authors emphasize that future research should focus on the knowledge gap on interventions among a diverse population and the need for studies based on theoretical frameworks conducted in other countries than the USA.<sup>148</sup> The need for interventions among a more diverse population is also emphasized by Fu et al.<sup>144</sup>

# Theoretical framework

The theoretical framework for this thesis is the Health Belief Model (HBM). HBM is a theoretical psychological model used since the 1950's to explain an individual's behaviour in a health perspective (see Figure 1).<sup>153</sup> The model has been modified and developed over the years and is centred on the following concepts: *perceived susceptibility*, *perceived severity*, *perceived benefits*, *perceived barriers* and *cues to action*. In the 1980s, *self-efficacy* was added to the model. *Perceived susceptibility* refers to an individual's belief as to the likelihood for a disease or a condition (i.e. HPV infection or HPV-related cancer), while *perceived severity* is a person's belief about the seriousness of a condition (i.e. HPV infection or HPV-related cancer). The concept *perceived benefits* comprises the individual's beliefs about the advantage of an action for reducing the disease or the threat. In addition, *perceived barriers* comprise a person's belief as to negative aspects of a recommended action (health action, i.e. HPV vaccination or cervical cancer screening). *Cues to action* are defined as triggers for the recommended health action, i.e. strategies that activate readiness for the health action, for example recommendations from HCPs to vaccinate or attend cervical cancer screening, while *self-efficacy* refers to an individual's belief as to his/her own ability to take action (health action, i.e. HPV vaccination or cervical cancer screening).<sup>153</sup>

Demographic and socio-psychological factors are modifying factors that can influence individual perceptions. Gender, age, cultural and socioeconomic aspects, personality and knowledge can have an indirect influence on the individual's health behaviour. As stated by Champion and Skinner, one limitation of HBM is that it is a cognitive model that does not consider emotional aspects of an individual's behaviour.<sup>153</sup>

According to HBM, it is important for a person with risk behaviour to recognize the risk in order to be able to change his or her behaviour. The benefits have to outweigh the barriers for a person to act upon the health promotion, for example participating in a screening (Pap smear) or vaccination programme.<sup>153</sup> HBM has previously been used in studies of sexual risk behaviour<sup>149 154</sup> and attitude to HPV and HPV vaccination among adolescents, young women and parents.<sup>155-157</sup>

Educational school-based interventions based on HBM can be effective in increasing adolescents beliefs, knowledge and health behaviour.<sup>149 151 158-160</sup> Painter et al<sup>158 159</sup> conducted a school-based intervention aiming to promote

influenza vaccination among multi-ethnic adolescents in the USA. The educational intervention lasted about 30 minutes and consisted of a skit and a brief presentation of facts about influenza presentation, guided by HBM and social norms. The intervention was effective in increasing the intention to vaccinate,<sup>158 159</sup> while a similar educational intervention by Gargano et al<sup>160</sup> also showed effectiveness in improving adolescents influenza vaccination rates.

Few school-based educational interventions based on HBM have been undertaken among adolescents aiming to promote HPV prevention. However, Gottvall et al<sup>149</sup> and Marek et al<sup>151</sup> have conducted educational interventions (see Previous research for further details about the studies) based on HBM.

In summary, school-based educational interventions guided by HBM can successfully promote favourable beliefs, knowledge and behaviour among adolescents in various settings.

HBM permeates this entire thesis and has been the map for both the qualitative and quantitative studies. The model is used in Study I and Study V, and the main findings are discussed according to HBM. The study specific questionnaires and the intervention are based on HBM. Using HBM is a systematic way to explain a person's health behaviour which clarifies the key concepts on which the thesis is based.

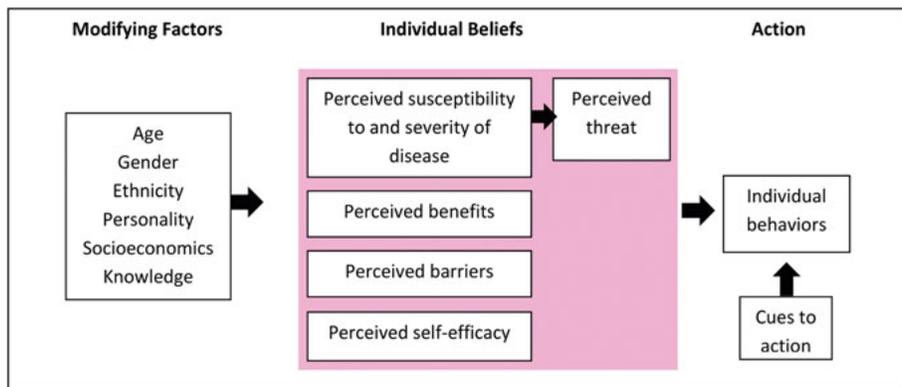


Figure 1. Health Belief Model (Champion and Skinner, 2008)

# Rationale for the present research project

To protect the population against HPV, HPV vaccine was implemented in the Swedish childhood vaccination programme in 2012 for girls aged 10-12.<sup>161</sup> The national aim is to attain a coverage rate of above 90% in order to achieve herd immunity.<sup>162</sup> Like all vaccinations, the vaccine is free of charge and parents have to consent. Since HPV vaccination was a new vaccine protecting against an STI, several questions were raised regarding the vaccines' acceptability among all parents.

We know from previous research<sup>109-116 118 120-125</sup> into various methods that the decision about HPV vaccination in a school-based setting is multifactorial; socioeconomic, demographic, cultural norms and behavioural factors have an impact. Insufficient information, fear of side-effects and the daughter's young age, are factors associated with non-acceptance.<sup>109 112</sup> Socio-demographic factors are influential, although ethnicity and education level seem to have varied effects on the decision.<sup>109 120-125</sup> Trust in the vaccine's effectiveness, having received recommendations from a physician and having accepted previous childhood vaccinations are factors associated with acceptance.<sup>109</sup> Migration and socioeconomic factors have an impact on attendance in cervical cancer screening programmes, with immigrants and those with a lower education level having lower attendant rates in screening tests.<sup>82 83 126-128</sup>

Qualitative studies<sup>135 136</sup> indicate that school nurses are in favour of a school-based vaccination programme and believe it balances out social inequalities, although the vaccinations increase their workload. The small number of school-based interventions<sup>149 151 152</sup> undertaken have been effective in increasing knowledge and awareness of HPV and have had a favourable effect on beliefs in HPV prevention. Although no effects have been found on behaviour in relation to HPV vaccination uptake. To date, no randomized controlled trial (RCT) has been performed promoting HPV prevention among a diverse population of adolescents.

In 2011, when I became a part of this project, few studies<sup>109 111 112</sup> had examined parents' active decisions about HPV vaccination in a school-based setting and no-one had focused on parents' reasons for not consenting to the vaccine. Moreover, school nurses' experiences and beliefs had been examined solely by qualitative studies.<sup>134 137</sup> There was also a knowledge gap regarding immigrant women's beliefs about HPV prevention and, to date, no

study has examined newly arrived immigrant women's beliefs about prevention of HPV.

There is a need for better knowledge about how parents reason when consenting to or declining HPV vaccination for their daughters. Moreover, it is important to examine school nurses' experiences of the implemented vaccination programme, since they are responsible for all aspects of the school-based HPV vaccination programme and their attitude can affect vaccination uptake.<sup>131 132</sup> In a public health perspective there is an urgent need to improve HPV prevention among adolescents, since knowledge and awareness of HPV is low and the highest HPV infection rates are found among young people.

Consequently, when implementing a national vaccination programme it is important to examine, at an early stage, the beliefs and experiences among the main groups involved in the vaccination programme. A better understanding can emphasize benefits and barriers that in the long term can lead to improvements in the vaccination programme that will benefit public health in Sweden and save lives.

# Aims

The overall aim of this thesis was to examine beliefs about HPV prevention, especially vaccination, among parents, immigrant women, adolescents and school nurses, and to promote primary prevention among adolescents.

## Specific aims

The aim of Study I was to explore immigrant women's experiences and views regarding the prevention of cervical cancer, screening, HPV vaccination and condom use.

The aim of Study II was to explore how parents reason when they accept HPV vaccination for their young daughter and also their views on HPV-related information.

The aim of Study III was to explore parents' reasons for not consenting to HPV vaccination for girls age 10-12 in the Swedish school-based vaccination program.

The aim of Study IV was to examine school nurses experiences of and attitudes to the national HPV vaccination programme one year after its implementation.

The aim of Study V was to improve primary prevention of human papillomavirus (HPV) infection by promoting HPV vaccination and increasing condom use among upper secondary school students.

# Methods

## Design

This thesis comprises both qualitative and quantitative methods. An overview of the included studies is presented in Table 1.

**Table 1.** Design, sample and analysis used in the studies

Study	Design	Data collection	Sample	Data analysis
I	Explorative	Focus group interviews	Immigrant women studying SFI (n=50)	Latent content analysis
II	Explorative	Individual interviews	Parents, accepted HPV vaccine (n=27)	Latent content analysis
III	Explorative	Individual interviews	Parents, declined HPV vaccine (n=25)	Latent content analysis
IV	Cross-sectional	Web-based questionnaire	Population-based, school nurses participating in the HPV vaccination programme (n=851)	Spearman's $\rho$ , Pearson's $\chi^2$ , Mann-Whitney $U$ test, Kruskal-Wallis test and analysis of variance, multinomial logistic regression analysis
V	Randomised controlled trial	Questionnaires, measurements at baseline and follow-up after three months	Upper secondary school students aged 16 (n=741) at the time of the regular health interview with the school nurse	Pearson's $\chi^2$ , Mann-Whitney $U$ test, Student's independent samples $t$ -test, Generalized Estimating Equations models

## Study setting

The first study was conducted at two schools teaching SFI in Uppsala, a university city in central Sweden. The second study was conducted in three municipalities in central Sweden (Uppsala, Gävle and Stockholm) with different socioeconomic levels, and rural and urban areas, as well as schools

centrally located and in areas with high numbers of immigrants. The third study was conducted in eleven municipalities in different geographic areas of Sweden; from the south to the central-northern region. The municipalities were of broad range, and different in size and geographic area, as well as being situated in low and high socioeconomic regions. The fourth study was a population-based study among all Swedish school nurses participating in the school-based HPV vaccination programme. The fifth and final study was carried out in a school-based setting in nine municipalities in five counties in the west and central regions of Sweden. The 18 schools were representative of Sweden, situated in a wide range of geographical areas, both central and rural, in large and small cities, and comprised different socioeconomics. The schools consisted of both vocational and theoretical programmes, ranging from primarily vocational to elitist academic programmes.

## Population and sample

### Study I

Women (n=50) aged 18-54 who studied Swedish for immigrants (SFI) and who mastered Swedish in speech and writing. They represented the most common immigrant countries in Sweden, such as Iraq, Somalia, Ethiopia, Thailand, Turkey and Iran. Most of them had been in Sweden between less than a year and five years. The majority was Muslims; other religions represented were Christian/Catholic and Buddhist, while one woman had no religious affiliation. The highest level of education of the women was; one third with primary school and one third with upper secondary school, while one third had a university degree.

### Study II

Twenty-seven parents who had accepted HPV vaccination for their daughter in the school-based vaccination programme participated in the study. The majority were Swedish born (n=24) and female (n=23) with a university degree (n=22). Ethnicity or sex was not an inclusion criterion although the intention was to include parents of different socioeconomic backgrounds, both mothers and fathers and also parents with an immigrant background.

### Study III

All together 25 parents who had declined HPV vaccination for their daughters in the school-based vaccination programme were included. Almost all were mothers (n=23) and Swedish-born (n=23), and the majority had a

university degree (n=17). An effort was made to include parents of different backgrounds as described above in Study II.

## Study IV

School nurses (n=851/1024) from all counties who worked actively in the school-based HPV vaccination programme participated. Almost all (98.7%) were female, aged 25-66, with 1-42 years as a school nurse.

## Study V

First year upper secondary students (n=832) were recruited by school nurses (n=20) at the time of the regular health interview in the autumn term in 2014. They attended both theoretical and vocational programmes of varied range. The mean age was 16.1 years and more than a quarter (27.8%) had an immigrant background. Over half (56%) of the girls, intervention group (IG) 52.5% and control group (CG) 60.9%, and one boy (CG) were vaccinated against HPV at baseline. There were differences among the groups, with more girls and more students with an immigrant background in the IG compared to the CG. The reasons for this are discussed under Methodological considerations. Schools were randomized to the IG or the CG and then students were included by randomizing the classes to be included or not (see Figure 2).

The power calculation was based on previous studies among the research group<sup>163</sup> and clinical experience. The sample size of 400 participants per study arm was based on assumptions of baseline; “Could imagine using condom if new partner” of 60%, with a power of 80% to detect differences of 10% between IG and CG, alpha 5% (356/study arm IG/CG1, a dropout of 10% and missing values=400).

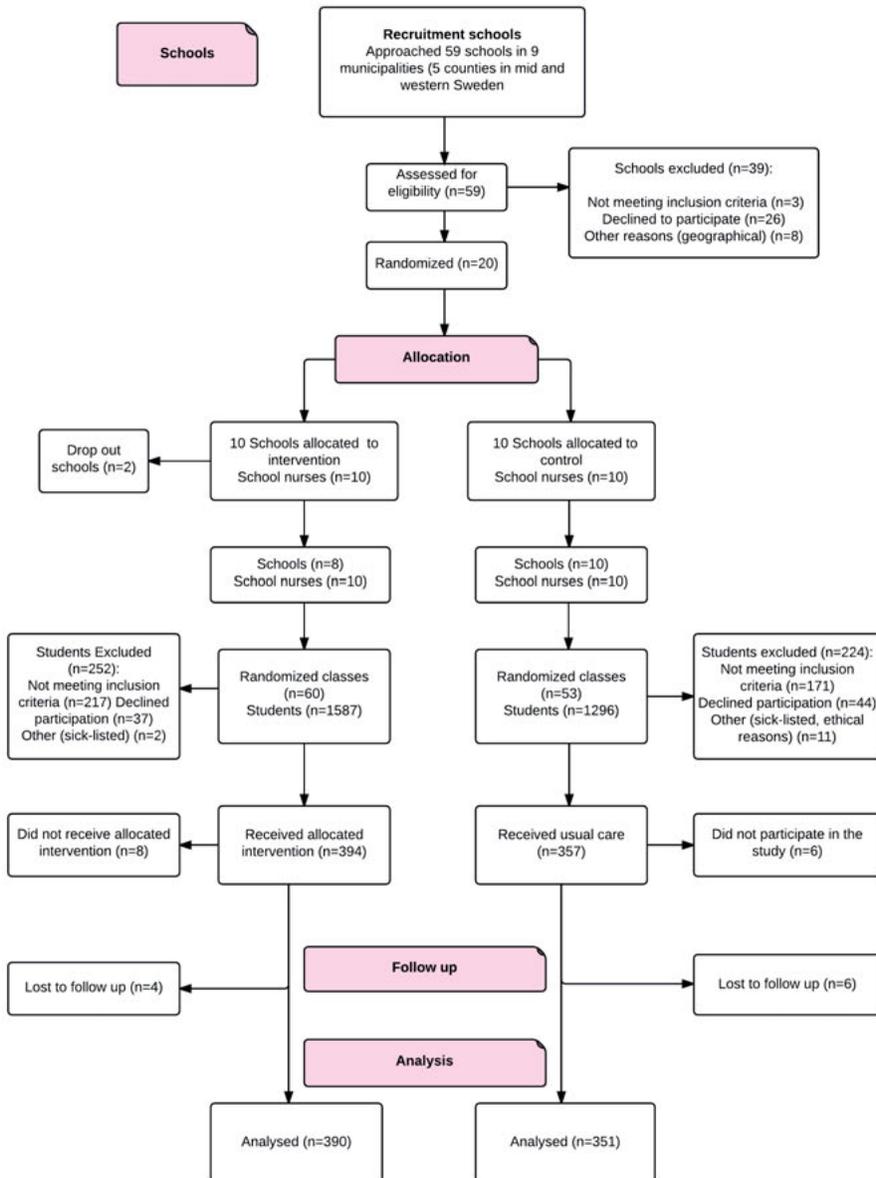


Figure 2. Flow of schools and students through study

## Procedure and materials

### Study I

The focus group interviews (n=8) were conducted in February – June 2011. First, the researcher (MG) contacted the director of SFI in Stockholm and Uppsala and received verbal and written approval for the study in Uppsala. Then the Heads of the Schools teaching SFI were contacted and received verbal and written information about the study. An agreement was made to only include women at the end of their education to assure that they mastered Swedish. Teachers were informed about the study by the Heads of the Schools and agreed to assist in the recruitment of women who mastered Swedish and who were willing to share their beliefs on the subject during a focus group interview. The teachers were asked to include a minimum of five and a maximum of eight women from various countries and regions in each group.<sup>164</sup> All interviews were undertaken in Swedish by the first author and one observer with 5-8 (mean 6.5) women in each focus group. They gave their verbal consent and filled in a demographic background questionnaire before the interview started.

An interview guide with open-ended questions was used. The questions were based on a previous study about prevention of cervical cancer by Oscarsson et al<sup>129</sup> and a pilot interview. The main questions were the following:

- 1) ‘What are your thoughts on cervical cancer?’
- 2) ‘What thoughts do you have on cervical cancer prevention?’
- 3) ‘What are your thoughts concerning prevention in your country of origin and prevention in Sweden?’
- 4) ‘What are your thoughts on cervical cancer as a sexually transmitted infection?’

An additional question about thoughts regarding HPV vaccination was asked, and when needed follow-up questions were asked to clarify the statements. All interviews except one were audio recorded, since in one group the women refused audio recording. All interviews lasted about 60 to 75 minutes and were transcribed verbatim by the authors. After the interview the women could ask questions and were provided with the researchers’ contact email addresses and phone numbers in case of questions arising later on. All the women received a cinema ticket in appreciation of their effort and time.

### Study II and Study III

The interviews were performed during the daytime at a place chosen by the parent, for example at their homes or the parent’s or the researcher’s

workplace. The parent was informed about the study and that participation was voluntary and was then asked to sign a consent form and fill in a brief background questionnaire. After the interview the parent was given a cinema ticket and was invited to ask questions. The interviewer made sure that the parent was provided with contact information to the researchers if any questions arose later. All interviews were audio recorded and transcribed verbatim. The transcriptions were validated by the first authors to make sure that all data were correctly transcribed.

## **Study II**

The study was performed in spring 2012 in three strategically chosen municipalities in central Sweden where the vaccination programme had started. In some other areas the vaccination programme started one term later. The heads of the school health services were contacted and gave their permission for the study. The school nurses in these municipalities received verbal and written information from the head of the school health services and from the researchers. The school nurses who agreed to assist with recruitment distributed invitation letters to all parents of 11–12 year old girls in their schools. The invitation letter was one of several papers regarding HPV vaccination distributed from the school health services. Parents interested in participating in an interview were asked to contact the researchers for more information and to make an appointment. The parents determined the time and place for the interview. All interviews were conducted after the parents had made their decision to accept HPV vaccination for their daughter. The school nurses distributed invitation letters to 1 888 parents in total, of whom 29 parents volunteered to participate; two parents were not interviewed for logistical reasons.

Two main open-ended questions were used during the interviews: 1) how did you (and your partner) reason before making a decision about the HPV vaccination for your daughter? 2) What did you think about the information you received from school? When necessary, the interviewer asked follow-up questions or asked for clarifications. Pilot interviews were conducted in February 2012; these interviews did not indicate any need for changes in the interview guide. The interviews were conducted by four of the authors and lasted about 30 minutes.

## **Study III**

The parents were recruited from different geographic areas in eleven Swedish municipalities between March 2012 and April 2013. The recruitment was done in three stages as described below. The first recruitment is described in Study II.

- 1) The second recruitment was done in autumn 2012 in three municipalities in south, central-north and central Sweden.
- 2) The third recruitment was performed in six municipalities in central Sweden in early 2013.

School nurses distributed invitation letters to a total of 3 010 parents who had been offered vaccination for their daughter aged 10-12. In all, 26 parents volunteered to participate. Among those, 20 contacted the researchers themselves and five were recruited through a snowball sample,<sup>165</sup> where one parent knew another eligible parent and asked if he/she wanted to participate. One parent was not interviewed for logistical reasons. All the included parents contacted the researchers themselves by e-mail or telephone.

The main open-ended question was: Can you tell me about how you reasoned when declining HPV vaccination for your daughter? Additional questions were asked in order to clarify the parents' statement. The interviews were conducted by MG, MO and CS and lasted about one hour.

## Study IV

School nurses were invited to the web-based survey at the national website of the Swedish school nurses between March and May 2013. An e-mail with information about the study's aim and procedure was sent to the local head of school health services. They were asked to inform their school nurses in each municipality about the study. At the website school nurses were provided with information about the study, and were told that participation was voluntary and confidential. Those who agreed to participate were asked to complete the web-based questionnaire. After completing the web-based questionnaire the nurses acquired access to educational material about HPV, created by the researchers (MG and CS).

## Study V

School nurses were recruited by heads of the school health services and at the national congress for school nurses. The students were asked about participation by the school nurse at the time of the general health interview. They received oral and written information about the study and those who agreed to participate gave informed consent. The students completed the baseline questionnaire at the school nurse's office before the health interview started and the follow-up questionnaire in class after three months. The study was undertaken during the school year in 2014-2015.

## The intervention

The intervention consisted of education about HPV and lasted about 30 minutes and was included in the regular health interview scheduled for about one hour. The intervention included information about HPV: facts about the virus (knowledge/awareness), transmission (*susceptibility*), what it can cause (*severity/susceptibility*), risk factors (*susceptibility*) and prevention, i.e. safe sex with condom use and HPV vaccination (*benefits*), facts about HPV vaccine and the importance of attending future cervical cancer screening controls (awareness/knowledge/*benefits*). Participants were informed about where they could vaccinate free of charge in their region (*cues to action*). The intervention also included a specially designed leaflet including similar information as the educational session; an HPV quiz and links to the national youth clinic online. The students were also provided with contact information to the authors if they had further questions.

### *Outcome measures*

Main outcomes: Intention to use condom if new partner and belief about prevention of HPV. Secondary outcomes: Behavioural outcomes, increased condom use and increased HPV vaccination.

In the trial registration, ClinicalTrials.gov Identifier: NCT02280967, knowledge and awareness of HPV are included in the secondary outcomes, although these results are not presented in this thesis.

## Questionnaires

The questionnaires used in the thesis are study-specific and based on the qualitative studies, Studies I-III and clinical experience. The questions regarding HPV and HPV vaccine are inspired by previous research in the field.<sup>109 166</sup> Both qualitative and quantitative methods were used when developing the questionnaires in order to achieve high validity and reliability of the instruments.<sup>167 168</sup> The qualitative components included discussions with experts regarding HPV and cervical cancer and adolescents' cognitive development. In addition we had discussions with a national expert regarding vaccinations as well as discussions within the multidisciplinary research group. Moreover, focus group discussions with adolescents and discussions with school nurses were undertaken when developing the questionnaires.

Reliability refers to the accuracy or the precision of an instrument and the repeatability of a study, i.e. how reproductive the results are in another condition. Although reliability is one cornerstone of quantitative research, we also need to examine the validity of an instrument in order to be able to find out *what* we are measuring, i.e. whether the instrument is measuring what it is intended to measure.<sup>165 167</sup>

## **Study IV**

The questionnaire consisted of demographic background questions: age, gender, years of experience as a school nurse, responsible school authority (public or private school) and geographical area (rural or urban). Furthermore the questionnaire consisted of questions regarding; support and education before the implementation, information distributed by school nurses to parents and schoolchildren, as well as school nurses' knowledge of and attitude to HPV and HPV vaccination. The questions had multiple choice alternatives and four-point verbal rating scales from "Totally agree" to "Totally disagree". In the two open-ended questions school nurses were asked to describe concerns expressed by parents and to declare their own perceived barriers regarding HPV vaccination. The open-ended questions were analysed by systematically organizing and categorizing the answers, based on the exact expressions used by the respondent.

The definition of a positive attitude to HPV vaccination was that the school nurse agreed totally or partly that it was adequate that HPV vaccination was introduced in the general childhood vaccination programme, and that it was appropriate that school nurses were responsible for the these vaccinations.

The face and content validity<sup>167</sup> was tested with ten school nurses who were asked to assess the questionnaire and indicate whether they felt difficulty or ambiguity in responding the questionnaire. Some revisions were made accordingly.

## **Study V**

### *Reliability*

To test the stability and reliability over time a test retest was undertaken with first year upper secondary school students (n=29). The class was randomly selected in a school situated in a university town in central Sweden in March 2014. The questionnaire consisted of multiple choice questions and five-point verbal rating scales ranging from "Totally Agree" to "Totally Disagree", including "Neither Agree or Disagree". It was distributed on two occasions separated by a time interval of two weeks. This time interval was considered appropriate and sufficiently short for the process to be unaffected.<sup>167</sup> Analysis was based on Cronbach's alpha and showed high reliability scores for the questions regarding behaviour and knowledge (scores 0.746-1.00) while the questions about beliefs and attitudes ranged from low to high (scores 0.331-0.918). The items regarding the decision-making process about HPV vaccine were high overall (scores 0.800-0.998), except for the single question "Do you want to be vaccinated at a later time" (0.436). Items regarding sexual behaviour were high (ranging from 0.814-1.00).

### *Validity*

A pilot study was undertaken in three schools in a city in central Sweden with a population of approximately 200 000 between January and April of 2014. The sample was stratified with different socioeconomics and character (both vocational and theoretical school programmes). Three school nurses performed the interventional education with first year upper secondary students (n=45) at the regular health interview. Before the pilot study started the school nurses received written and oral information about the study by MG and CS by email, telephone and at an information/education meeting. The education session lasted a minimum of 90 minutes. The school nurses were informed about the intervention study and received education about HPV. At this session they were asked about their views regarding the intervention and the material. During the pilot study the nurses were asked to be aware of anything that would not work out properly (i.e. any problems, practical or other difficulties) and were encouraged to take notes and to write down suggestions for improvement of the educational material and the questionnaire after each health interview.

The pilot study was performed in close collaboration (by telephone calls, emails, etc.) with the school nurses. After the baseline measurement a feedback session was scheduled. At this session (2 h) school nurses were asked to give their experiences and beliefs regarding the intervention, both the procedure and the material. In addition, all school nurses had taken notes and also gave written comments. Moreover, we tested the questionnaire on 230 adolescents aged 17 in a Master student thesis in spring 2014.<sup>169</sup>

The process evaluation of the pilot study resulted in some modifications. The questionnaire was revised, i.e. some questions were deleted (that were similar to other questions) or clarified and the response alternative “Don’t know” was added to the block of questions about beliefs (HBM) and knowledge. In the end the questionnaire consisted of 27 questions including: demographic questions, knowledge about HPV and HPV vaccine, and a block of questions about beliefs about HPV and HPV vaccine and sexual behaviour. The educational material was modified, i.e. shortened and more explicated. The procedure was revised since it was considered a logistical nightmare to perform the follow up after three months individually at the school nurses’ office. Follow-up in group (in class) was considered more feasible.

# Data analysis

## Qualitative data

### Study I

The researcher and the observer made a brief summary after each interview. The focus group interviews were analysed using latent content analysis, as described by Graneheim and Lundman,<sup>170</sup> and the interviews should be transcribed verbatim and be read repeatedly. In inductive methods the data should be interpreted with no preconception. The transcriptions were read several times over in order for the researcher to gain an overview of the interviews. After several readings the analytical process began with the highlighting of sentences of importance for the research questions. These highlighted sentences were then divided into meaning units which were condensed and coded. Subsequently, the codes were analysed and interpreted and divided into sub-themes and themes. When the structure analyses were performed, the researcher returned to the interviews for verification.<sup>170</sup>

Two researchers (MG and MO) conducted the analysis and additional researchers dealt with the analytical process in order to reach consensus.<sup>170</sup> A broad variation of experiences and views was expressed during the focus groups; four themes were revealed by the interviews.<sup>170</sup>

### Study II and Study III

The individual interviews undertaken with parents in Study II and Study III were analysed by content analysis according to Burnard.<sup>171</sup> A summary of what was said during the interview was made at the end of all the interviews, and the informants were asked to correct it if anything in the summary was misinterpreted or anything of importance was left out. After the interview, the researcher listened to the recorded interview several times and the interview was then transcribed verbatim by the first authors or a professional transcription company. The transcribed interviews were read through and compared to the recorded interview in order to validate the transcription. The intention was to identify categories and themes that emerged from the interviews (data). This was done in several steps:<sup>171</sup>

- 1) Open coding: Interviews are transcribed verbatim and read through; notes are made in the margin of words or short phrases that sum up what has been said according to the aim of the study.
- 2) Final coding (primarily categories): Duplicates are removed, resulting in a shorter list of categories.
- 3) Categories are worked through and reorganized and grouped together, resulting in final categories.

- 4) Each category is colour-coded, cut out, pasted into a Word document and labelled. The results are gathered from this organised data folder. This process is repeated with the aim of searching through for categories and themes.

### *Study II*

The initial analysis was made by MGo and MG as described above (steps 1-4). After step 4 the co-authors were invited to participate in the analysis. All of them read 3-6 transcripts each and coded the interviews; these codes were compared to the initial coding. Categories were discussed, rearranged and renamed. In the final step the colour-marked data were grouped together into categories. Three themes emerged from the data.<sup>171</sup>

### *Study III*

The initial analysis was made by MG and MO. The analysis process was conducted as described above. The co-authors read and coded 1-3 transcripts each. The categories were thoroughly discussed among the authors. The categories were reorganized and renamed until consensus was reached. In this study five themes were identified from the interviews.<sup>171</sup>

## Quantitative data

In all the statistical analyses, categorical and ordinal data are presented by frequencies and percentages,  $n$  (%), whereas continuous data are given as means and standard deviations (SD). Correlations between ordinal variables are calculated using Spearman's  $\rho$ . All statistical analyses were performed using IBM SPSS Statistics version 20.0 and 22.0. In all analyses, two-sided  $p$ -values  $<0.05$  were considered statistically significant.

Before the start of the analyses, all data were thoroughly checked for errors, i.e. scores that were out of range. This process was completed by MG and a research assistant. The findings were corrected by checking the answer in the specific questionnaire involved. Ten percent of all the questionnaires were double-checked in order to confirm the data input in SPSS, and the questionnaires were randomly selected by a computer system.

### **Study IV**

Univariate tests for differences between the three groups “positive”, “ambivalent”, and “negative” attitudes to HPV vaccination were performed using Pearson's Chi-square test for categorical and ordinal variables, while ANOVA was used for continuous variables. In analyses using the total score of the variable attitude to HPV vaccination, differences in attitude between two categories were tested using the Mann-Whitney  $U$  test, while the Kruskal-Wallis test was used to test for differences between more than two categories.

Regression analyses are appropriate when the aim is to examine associations between variables. Multinomial logistic regression analysis was used to study the extent of the association between the three main predictors and the outcome. In the regression models, “negative attitude” was used as reference category for the outcome “attitude to HPV vaccination”. We performed the regression analyses in two steps. The univariate logistic regression analyses were first performed for variables with  $p < 0.2$  from the univariate tests for differences between “positive”, “ambivalent” and “negative attitude”. To obtain the adjusted odds ratios (OR) of the included variables “positive” or “ambivalent” attitude compared to negative attitude all variables with  $p < 0.2$  in the univariate logistic regression analyses were then simultaneously used in multivariate logistic regression analysis. OR are presented with 95% confidence intervals and accompanying p-values.

### **Study V**

The analysis was focused on estimating the size of the difference in predefined outcomes between IG and CG. Differences between the IG and CG at baseline and follow-up, respectively, were tested using Pearson’s Chi-square test and the McNemar test for categorical data, the Mann-Whitney  $U$  test for ordinal and discrete data, and Student’s independent samples  $t$ -test for continuous data. The effects of the intervention were measured from baseline at follow-up by measuring the differences between baseline and at follow-up for each HBM question. The questions were grouped together according to the HBM constructs of *susceptibility*, *severity*, *benefits* and *barriers*. In the end, the total HBM index was calculated by adding all the HBM constructs together.

Generalized Estimating Equations models were used for examining the results of the intervention on the outcome measures, in order to take into account the dependence between students who were informed by the same school nurse. The differences between the outcome variables at baseline and follow-up were used as dependent variables in the Generalized Estimating Equations models, while treatment group (intervention or control) was used as a predictor together with the socioeconomic and demographic variables of sex and immigrant background, which differed significantly between the two groups at baseline. OR is not presented due to the data being handled as continuous level (index), while OR is suitable for data at categorical level (binary).

## Ethical considerations

The studies were performed in accordance with the medical research ethical standards laid down in the Declaration of Helsinki<sup>172</sup> and the rules and guidelines for research in humans as described in Codex (The Swedish Research Council).<sup>173</sup> The Regional Ethical Review Board in Linköping, Sweden, D.nr. M 214-08 and the Regional Ethical Review Board in Uppsala, Sweden, D.nr. 2012/48; 2012/455 and D.nr. 2013/324 approved the studies.

When performing research, it is particularly important to consider vulnerable groups such as children and immigrants. Thus, the participants' welfare was prioritized. Before the studies were undertaken, the participants were thoroughly informed that participation was voluntary and that they could withdraw at any time without any negative consequences. All the participants gave their informed consent. Permission to record the interviews was obtained before each interview. All the data are presented at group level in order to protect the participants' confidentiality. No names, addresses or national registration numbers were collected. Only the researchers have access to the data, which is kept under lock and key according to the rules and guidelines for research.<sup>172</sup> All the participants were provided with contact information for the researchers in case of questions later. Consent was not obtained from the parents since children from the age of 15 who are aware of what participation means, have the right to decide about participation in research according to Swedish law.<sup>174</sup>

Immigrant women constitute a vulnerable group and the subject might be sensitive to discuss. The interviewer and the observer in the focus group interviews were both nurses and familiar with discussions about sensitive subjects. The interviews were performed in an empathic and non-judgmental atmosphere with the focus on the women's autonomy, integrity and beliefs concerning the subject. The women were recruited by the teachers at the schools; this might conceivably have made them feel obliged to participate. The teachers and the Head of education at SFI, however, gave positive feedback regarding the focus group interviews: the women had appreciated participating and thought it was informative and an interesting subject to discuss. Several of the participants asked for help to get in touch with a midwife and to make an appointment for a gynaecological examination. After the recorded interview the researchers assisted the women and also made arrangements to receive additional help from the contact person at SFI.

All the parents contacted the researchers themselves and could decide the time and place for the interview. The researcher (MG) was contacted by parents before as well as after the interview. They asked for information regarding the progress of the study and wondered when they could read about it. One mother wanted to add some things she forgot to say during the interview. Some parents said that they participated in order to express their opinion on the subject and that they wished to contribute to a change especially regarding information about HPV and HPV vaccination.

The adolescents could return to the school nurse if they needed to ask any additional questions regarding HPV (or they could contact MG). At one school, one girl returned to the school nurse and was very sad. After she had received the intervention she wanted to be vaccinated, but her parents would not consent. The school nurse was also deeply affected by this incident.

# Results

## Study I

Four themes emerged from the interviews; 1) Deprioritization of women's health in home countries, 2) Positive attitude towards the availability of women's health in Sweden, 3) Positive and negative attitudes towards HPV vaccination and 4) Communication barriers limit health care access. The women participating in the focus groups were overall in favour of prevention against HPV and cervical cancer. However, several barriers were identified: difficulties in contacting healthcare providers, limited knowledge of the relationship between STI and HPV, cultural aspects and not being used to having regular health check-ups in the country of origin.

Though the women were in favour of the HPV vaccine, some concerns about the vaccine's safety and effectiveness were expressed. The provision of adequate information about HPV and HPV vaccine was important in order for the women to be able to make an informed decision. It was also revealed that the women wanted more information and knowledge about STIs in general. They had no moral concerns about cervical cancer as an STI; on the contrary, they spoke openly about STIs and emphasized the responsibility of both genders for prevention.

Cultural norms had an impact on beliefs about prevention; according to some women only married women could undergo gynaecological examinations. If an unmarried woman attended a gynaecological examination people would speculate about why she went. The women also expressed gender differences with women having lower value than men and a woman's health not being as important.

## Study II

Three themes emerged from the analysed data: 1) Trust versus concern, 2) Responsibility to protect from severe disease and 3) Information about HPV and HPV vaccination is important. The parents in this study had consented to the vaccination against HPV for their daughter. This decision was based on several factors. Cervical cancer was considered a severe disease and they trusted the recommendations from the authorities. A school-based programme was considered an advantage as the parents did not have to take

time off from work. It was also supportive for the daughter since the school nurse was familiar with the girls and the vaccination procedures. It was also believed to be important for the vaccination coverage as it reached all children regardless of socioeconomic situation. Overall a school-based vaccination programme facilitated the parent's decision-making process.

Though most parents believed the information from the school about HPV vaccination was sufficient to enable them to make an informed choice, they also requested more adequate and transparent information about the virus and the vaccine.

Even though they had consented to the vaccination, concerns about unknown side-effects were revealed during the interviews. Most parents mentioned the mass vaccination against H1N1 (the so-called swine flu) in Sweden in 2009–2010, which caused narcolepsy in many children. The risks for unknown side-effects were, however, considered lower for the HPV vaccination. There was also a concern regarding which sources of information to trust. Furthermore, the parents wanted a dialogue with a competent school nurse or other health care personnel, in order to overcome information gaps.

### Study III

Five themes emerged from the analysed interviews: 1) She is just a little girl, 2) Not compatible with our way of life, 3) Not enough adequate information, 4) Scepticism against vaccination, and 5) Who can you trust? The complexity in parents' decision-making regarding HPV was revealed during the interviews. The main findings were that the parents in this study believed that HPV vaccination was inappropriate at this time; the daughter was too fragile as she was still growing and it would be several years until she would be sexually active. She was neither considered psychosocially or physically matures enough for the vaccine at this time. Some parents believed she should make her own decision later on.

The HPV vaccine was considered different, since it is a vaccine protecting against an STI; it was not needed because the family had high moral standard and their way of life only included one lifetime partner. Other findings were that HPV vaccination was assumed to give a false sense of security as protection against STIs in general, and it was considered important to inform the daughter of other preventive methods. Scepticism towards the vaccine and mistrust of the government, mainly due to the mass vaccination against H1N1, were expressed and a strong belief that the individual knows what is good for him/her. Another important factor was information, as inadequate information from the school health services contributed to the decision to decline HPV vaccination. Some parents also requested more individual treatment, especially for the girls who were afraid of needles.

## Study IV

In total 851/1024 nurses (83.1%) completed the web-based questionnaire. There were no differences in attitude to or experiences of the HPV vaccination programme depending on background characteristics. Our hypotheses were confirmed: there were strong associations between the nurses' received education about the HPV vaccine and perceived knowledge about the HPV vaccine and a favourable attitude towards vaccination (both  $p < 0.001$ ). A school nurse with a high level of received education was 9.8 times more likely to have a positive attitude to HPV vaccination compared to a nurse with a low level of received education ( $p < 0.001$ ). Nurses with high perceived knowledge were 2.5 times more likely to have a positive attitude compared to those with a low level of perceived knowledge ( $p = 0.006$ ). There was also an association between nurses' positive attitudes and having received financial support from the government to compensate for the additional expenditure of conducting the vaccinations. School nurses working in schools where the governmental support had been used for an extra school nurse had more favourable attitude ( $p = 0.014$ ) compared to those who worked in schools where the financial support not had been used for HPV vaccinations. The majority of the participants, 652 (76.6%), reported that as far as they knew, the financial support had not been used to cover the extra expenses incurred by HPV vaccinations. Less than a quarter, 199 (23.4%), had received financial support, 183 (21.5%) for an additional nurse, and 16 (1.9%) for extra working time.

The majority (88.9%,  $n = 756$ ) agreed that HPV vaccinations should be the school nurses' responsibility, and most also agreed (81.5%,  $n = 693$ ) that boys should also be offered the vaccine. Two thirds, 66.9% ( $n = 570$ ), stated that they had experienced difficulties with the vaccination and of these 59.1% ( $n = 337$ ) considered the task time-consuming. Three out of four nurses, 76.1% ( $n = 648$ ), had been contacted by parents who raised questions regarding the vaccine. The most common questions were related to side effects or the daughters' young age.

## Study V

A total of 741/832 (89.1%) completed the follow-up questionnaire. The intervention had a significant effect on beliefs about HPV according to HBM. The HBM total score ( $p = 0.003$ ), was 2.559 points higher for the IG compared to the CG. The effect was substantially high among adolescents with an immigrant background, scoring 3.291 higher than the CG ( $p = 0.003$ ).

The intervention had no effect on barriers ( $p = 0.262$ ) for the whole groups, although there were differences among boys ( $p = 0.015$ ). The intervention

decreased the barriers among boys, with a 0.469 higher score ( $p=0.015$ ) for the IG compared to the CG.

Moreover, the intervention had significant effects on susceptibility and severity, the IG scoring 1.675 and 0.409 higher than the CG ( $p<0.001$  for both variables). Susceptibility was again higher among those with an immigrant background, 1.770 higher score ( $p<0.001$ ) compared to the CG.

In addition, the intervention had an effect on the 'intention to use condom if new partner' by 1.751 higher points score for the IG than the CG ( $p=0.004$ ). The intervention had no effect on behaviour involving actual condom use, however ( $p=0.377$ ).

There was also a slight effect on HPV vaccination uptake ( $p=0.02$ ), with 59% of the girls being vaccinated at follow-up compared to 52.5% at baseline. Also, one boy in the IG had chosen to be vaccinated after the intervention. One girl who wanted to be vaccinated was not vaccinated because her parents did not consent.

# Discussion

## Summary of findings

The findings of this thesis are characterised by *benefits* and *barriers* for prevention of HPV from the perspectives of parents, immigrant women, adolescents and school nurses. The decision concerning HPV vaccination was complex and several factors had an impact. Parents accepting and declining the vaccine had in equal measure made the decision they believed was in the best interests of their daughter. The school nurse has a key role in providing information about HPV and HPV vaccine, and adolescents' favourable attitude towards the prevention of HPV can be increased by an educational intervention delivered at the time of the regular health interview with the school nurse.

HPV vaccination is the first vaccine with the potential to prevent HPV-related cancer and thus save lives. The overall vaccination coverage of 83%<sup>32</sup> in the Swedish school-based vaccination programme is high in an international perspective, nevertheless it is substantially lower compared to other childhood vaccinations of >95%<sup>90</sup> coverage. This raises the question of why HPV vaccination rates are lower than other childhood vaccinations and also how parents reason when declining the vaccine. Moreover, what can be done to increase the coverage rates? These questions will be discussed as well as the ethical and equality aspect of HPV vaccination.

## Discussion of key findings

### Benefits and barriers for HPV vaccination

The decision concerning the HPV vaccine is complex and many factors are involved, which is supported in studies of various approaches to the issue.<sup>109-112</sup> Parents had considered the risk versus benefits. The *benefits* outweighed the risks for parents accepting the vaccine while parents declining the vaccine believed the opposite. The main *barriers* for vaccinating were related to this not being the right time, the daughter was considered a little girl not at risk for an HPV-related disease and therefore the parents preferred to wait. The reasons for this might be that for some parents it can be hard to

realize that their little girl within a few years will become a big girl who will eventually be sexually active.<sup>110 111</sup> To postpone vaccinations to the right time for the individual family involves other challenges. It might be difficult to predict timing for the sexual debut as discussed by Perkins et al<sup>175</sup> and it might affect the national vaccination programme negatively. Similar findings regarding the daughter's young age have been reported in various studies.<sup>108 109 111 112</sup> Moral views and the expectation that the daughter would only have one partner have been previously discussed in qualitative studies undertaken in Australia by Robbins et al<sup>109</sup> and in the UK by Gordon et al.<sup>111</sup>

## Adequate information about HPV and HPV vaccination

The findings of Studies I, II and III highlight the importance of providing adequate information to parents about HPV. Inadequate information is common, with *barriers* previously reported in different settings, such as Canada, the UK and the USA.<sup>108-112</sup> The desire for adequate information among immigrant women is supported by the study<sup>120</sup> among ethnic minority women in the UK. Adequate and transparent information about HPV and HPV vaccine might be one way to assist some parents to make an informed decision about the vaccine. The information to parents should include more facts about HPV, such as the characteristics of HPV and how the virus is transmitted and preferably that one or few life time partners are no guarantee for not being affected by an HPV-related disease. The importance of vaccinating at an early age before exposure to an HPV infection needs to be emphasized. The parents declining the vaccine had made a well-considered decision with the best interests of the child in mind, based on the information they had at the time.

Nevertheless, even if parents receive adequate information and gain more knowledge about HPV, the emotional barriers are harder to overcome. This individual perspective, to make a decision in best interests of the child, might be seen as being in contrast to the public health perspective of herd immunity. This raises the ethical questions of whether parents should make the decision in the best interests of their child or in the best interests of the group<sup>94 95</sup> and whether parents have a moral obligation to vaccinate for the good of others, i.e. to protect those who cannot vaccinate because of a medical condition. Moreover, parents declining the vaccine had considered the girl's autonomy, they believed she should make her own decision later on. This raises the question of how long parents should be the decision-makers about vaccinations. According to Swedish law parents should give consent for children under the age of 18, while the new Patient Act from January 2015 (SFS 2014:821) and the Convention on the Rights of the Child<sup>84</sup> emphasize that the child's autonomy and individual view should be considered. In comparison, children over the age of 15 have the right to

make their own decisions regarding their sexual and reproductive health, i.e. prevention of unintended pregnancy.

## Cultural norms and HPV prevention

While a school-based vaccination programme balances out inequities,<sup>137</sup> differences are still found. Studies<sup>112 114 115</sup> conducted in similar context show that socioeconomic and cultural factors are associated with HPV vaccination uptake. Lower socioeconomic status is correlated with lower HPV vaccine uptake.<sup>113 114 116</sup> In Sweden there is limited knowledge about how socioeconomic and cultural factors correlate to HPV vaccination uptake. Cultural norms and gender aspects had an impact on the participating immigrant women's beliefs about HPV prevention. Although they were in favour of the vaccine concerns were raised about the vaccine's safety and effectiveness. Similar findings have been reported among ethnic minority women in the UK.<sup>120</sup> The immigrant women in Study I expressed no concerns regarding whether the vaccine would affect their daughter's sexual health negatively and promote promiscuity or premature sex. This finding is in contrast to the ethnic minority women in the UK,<sup>120</sup> and the reason for this difference is unknown.

Furthermore, *barriers* to immigrant women's attendance at cervical cancer screening tests have also been revealed among ethnic minority women, as in the UK, with practical concerns as well as emotional barriers being revealed.<sup>126 127</sup> The practical concerns, i.e. how to book an appointment, can be easier to overcome, while emotional barriers, cultural norms and gender differences can be harder to overcome and need to be considered and addressed by HCPs and, in particular, midwives. These barriers can be understood through intersectionality; societal inequality and injustice can interact with gender, age, ethnicity, socioeconomics and sexuality. HCPs need to recognize cultural and socioeconomic aspects and address concerns and fears from biological, social and cultural perspectives.<sup>106 119 120 123 126</sup>

## Increasing school nurses' knowledge and self-efficacy in HPV communication

The findings in Studies II, III and IV indicate that school nurses have a key role to play in disseminating information about HPV in the national vaccination programme. This has also been emphasized by qualitative studies from the UK.<sup>135 136</sup> HCPs need education, knowledge and the time to be able to address parents' concerns and questions about HPV and HPV vaccine. The importance of HCPs' communication skills and the need for education about HPV has previously been discussed in studies conducted in

various settings.<sup>131 176 177</sup> Tafuri et al<sup>131</sup> emphasize that HCPs need ongoing education in order to promote HPV vaccination uptake. In addition, Hofstetter and Rosenthal<sup>176</sup> underline the importance of improved education about STI vaccine communication related to adolescents' health and sexuality. HCPs and school nurses are important for the acceptance of HPV vaccinations,<sup>131 134 178</sup> thus improving providers' *self-efficacy* to address parents' concerns, and hesitancy may be important for improving vaccination rates.<sup>179 177</sup> Almost eight out of ten school nurses in Study IV were contacted by parents who raised questions and concerns about the vaccine. It is therefore not difficult to understand that the discussions with parents regarding the vaccine contributed to school nurses increased workload. This finding is supported by previous research among school nurses' in the UK<sup>135 136</sup> and HCPs in the USA.<sup>177</sup> Since HPV vaccination is time-consuming and increases the workload, it is important that the governmental funding provided is used as intended, for managing HPV vaccinations.

## Scepticism against HPV vaccination

Scepticism towards vaccinations and a lack of trust in the governmental recommendations were *barriers* to acceptance of HPV vaccination. This scepticism can be explained by an increased vaccine hesitancy found in various settings.<sup>46 52 180 181</sup> One reason for vaccine hesitancy might be that many individuals have not experienced the diseases that the vaccinations protect against. Since most common children's diseases have been extinguished, people are not aware of the severity of the diseases and the effects they can cause. In addition, in Sweden the national HPV vaccination programme was implemented shortly after the mass vaccination against H1N1, the so-called swine flu. This vaccination programme has been intensely discussed in the media due to the side-effects that occurred.<sup>48-50</sup> According to the findings of this thesis, the vaccinations against swine flu have contributed to parental scepticism towards HPV vaccination. Vaccine hesitancy is multifactorial, with socioeconomic, cultural and geographical factors as possible influences. There is no single strategy that can address vaccine hesitancy.<sup>182 183</sup> A recent systematic review<sup>182</sup> has shown that there is limited evidence as to how best to address vaccine hesitancy, although interventions with a dialogue-based approach seem to have some effect. Moreover, Jarrett et al<sup>182</sup> emphasize that strategies should be carefully tailored according to the specific context, the target population and their reasons for hesitancy.

Lack of trust in governmental recommendations is quite a new phenomenon in Sweden and HCPs have a central role to play in maintaining public trust, as discussed by Leask et al.<sup>132</sup> Therefore, it is important that school nurses receive ongoing education and are updated regarding vaccine

safety and effectiveness so that they can address parents' concerns, since myths and misinformation can contribute to parents' beliefs, causing them to decline HPV vaccination, as discussed by Zimet et al.<sup>133</sup>

## Public health and ethical aspects on HPV vaccination

The national public health goal is to create good health on equal terms for the entire population. Therefore, it is not surprising that school nurses are in favour of including boys, as has also been found among Italian HCPs.<sup>131</sup> According to a recent Swedish study,<sup>184</sup> it would be beneficial to include boys in the national HPV vaccination programme. This raises the question of whether the overall aim of public health is being achieved or whether boys are being discriminated against. This could be seen as society having reinforced the traditional notion of women being responsible for sexual and reproductive health. Since boys are excluded from HPV vaccinations they do not receive information about HPV on a regular basis even if they also are at risk for an HPV-related disease and are carriers of the virus. This also reinforces the heteronormative view.<sup>101</sup>

Consequently, it is important that boys as well as girls receive adequate and age appropriate information about HPV. This would be equitable according to the basic bioethical principles (respect for autonomy, nonmaleficence, beneficence and justice)<sup>185 186</sup> and in line with public health goals and would also be one way to balance out gender differences regarding sexual and reproductive health.<sup>42 103</sup>

## What can we do to increase HPV vaccinations?

What can we do to increase HPV vaccination? As discussed earlier, parents need adequate information and this raises the question - what is adequate information? Parents wished for more information and the possibility to discuss HPV and the HPV vaccine with the school nurse and HCPs. Thus, to only receive a piece of paper is not sufficient information. According to the Patient Act (SFS 2014:821), information shall be adjusted for the recipient's age, maturity, experience, language, background and other individual assumptions. This places higher demands on the communication skills of HCPs and school nurses in particular.

The educational intervention (Study V) had significant effects in terms of increasing favourable beliefs in HPV prevention, as well as slight effects in terms of increasing HPV vaccination rates. By comparison, educational interventions conducted in various settings show an effect in terms of increased knowledge about HPV<sup>149</sup> and favourable beliefs<sup>151 152</sup> concerning HPV prevention. Knowledge is a modifying factor for an individual's health behaviour, nevertheless having knowledge about HPV is not associated with behaviour change.<sup>153</sup>

It must be mentioned that comparing educational interventions aimed at promoting HPV prevention is problematic, due to the studies<sup>144 146 147 149-152</sup> having been undertaken in different settings with different target groups (samples) and including different components (although common components are facts about HPV; risk factors and prevention). Furthermore, the interventions have been delivered through different sources.<sup>144 146 147 149-152</sup>

The intervention (Study V) had an effect on beliefs and also on behaviour change among a diverse population which is encouraging and in contrast to previously conducted educational interventions among adolescents.<sup>149 151 152</sup> The effect was considerably higher among adolescents with an immigrant background which is in line with the favourable beliefs about HPV prevention among the immigrant women in Study I. The findings might indicate that the one-on-one meeting with the school nurse is more favourable for increasing HPV prevention among adolescents compared to interventions delivered in class.<sup>149 151 152</sup> The favourable effects of the intervention are not surprising, since the school nurse has been pointed out as a key person for HPV vaccinations.<sup>135 136 178</sup> Furthermore, school nurses and HCPs have previously been pointed out as important for HPV vaccination rates, i.e. a *cues to action*, and the entire intervention (Study V) can be seen as a *cues to action*, a trigger for HPV prevention.<sup>135 136 153</sup>

Previous educational interventions<sup>144 146-148 151 152</sup> aiming to promote HPV prevention have mainly been conducted among homogeny groups, indicating the importance of conducting interventions in multicultural settings.

## Methodological considerations

There is no such thing as a perfect study, and the studies included here contain strengths as well as limitations, which should be taken into account.

”There is more rejoicing in heaven when one person is honest about something that doesn’t work than when 99 say that more research is needed”.<sup>187</sup>

First, the overall strengths and limitations of this thesis are discussed, followed by the methodological considerations regarding the qualitative studies. This is followed by a discussion of the methodological considerations regarding the quantitative studies.

## Strengths

The overall strength of this thesis is its timing; the studies were undertaken at the start of the national HPV vaccination programme. Different methods have been used and the studies were performed in “real life” situations, with

an insider perspective among relevant groups regarding HPV vaccinations in Sweden: the parents, the school nurses and the adolescents, as well as the sub-group of immigrant women.

Generalizability refers to the degree to which the findings can be correct to a broader group than the included sample, i.e. the inference that the results can be generalized to the population.<sup>165</sup> The samples in Studies IV and V were representative for the population and the response rates high (83.1% and 89.1%), and the results can most likely be generalized to the population in general. To the best of my knowledge, Study IV is the first population-based study among school nurses or HCPs and Study V is the first RCT aiming to promote HPV vaccination among a diverse population of adolescent boys and girls. The intervention was delivered by school nurses at the time of the general health interview (regular treatment), which might facilitate implementation of the intervention nationally. In contrast, other educational interventions aiming to promote HPV prevention were delivered by the researchers.<sup>147 149 151 152</sup>

The well-established contact with the heads of the school health services and the school nurses in several municipalities has been extremely valuable. The possibility of attending school nurses educational days and presenting the project at the national association of school nurses' conferences has provided opportunities to discuss the project with the key persons involved, which has improved the validity and feasibility of this project. Moreover, the SFI schools were very helpful, which facilitated recruitment in Study 1.

## Limitations

It was challenging to conduct empirical studies within the school health services, since the setting is rather fragile. This became evident when it came to recruiting school nurses to Study V, since school nurses change workplace, and in some schools the school nurse only attends school on an occasional basis (one day per week) and in other cases there is no school nurse employed for the time being. Moreover, the students move, change school or change programme. Reorganisation and reduced resources for the school health services are other factors that have an impact and contribute to increased workload for the school nurses, so that they have less opportunity to participate in research studies. Furthermore, in some schools the head teacher decided that the school should not participate in the research at all.

## Qualitative studies (Studies I-III)

Qualitative methods with an explorative approach were used in the interview studies, since there was no previous knowledge about immigrant women's experiences and their views on the prevention of cervical cancer or about

parents' reasons for consenting or not consenting to HPV vaccination for their daughter in Sweden.

The qualitative method is an art that requires the researcher to tread carefully when conducting interviews and interpreting data.<sup>170</sup> The interviewer is his/her own research tool and the quality of the research is no better than the quality of the interviews.<sup>188</sup> The researcher needs an awareness of factors that influence the results, such as preconceptions.<sup>170</sup> The criteria for assessing the quality and trustworthiness of the conducted studies as described by Guba and Lincoln,<sup>189</sup> were considered: credibility, dependability, conformability and transferability. Credibility (internal validity), was obtained by continuously analysing the data, preliminary categories and the interpretations of others (stakeholders).<sup>189</sup> Confirmability refers to objectivity or neutrality aiming to measure the degree of interpretation from the data and not from the researcher's interpretations and biases. In order to avoid lone researcher bias several authors individually read the transcripts and identified the categories that were compared to those of the initial analysis.<sup>171</sup> In order to gain dependability, the analytical process was rigorous and systematic; the researchers returned to the transcripts to make sure that all the data were thoroughly analysed. Transferability refers to the extent to which the results can be transferred to other settings.<sup>190</sup> The results have been presented as closely to the original interviews as possible, with quotations included for trustworthiness of the analysed data,<sup>170</sup> as representative quotations strengthen transferability. Nevertheless the aim was not to generalize, but to provide a better understanding of the informants' perspective. Data collection continued until no new data were revealed in the focus group interviews and in the individual interviews.<sup>170</sup>

## **Study I**

Focus groups are specific types of groups in terms of purpose, size, and composition, used with the intention to better understand people's views on a subject. A focus group creates a non-judgemental environment and can encourage participants to share their views without the need for consensus, as described by Krueger and Casey.<sup>164</sup> An asset of the study was the inclusion in the focus groups of women of different ages, cultures and from many different parts of the world. This brought a wide perspective to bear on the subject.<sup>164</sup>

Focus group interviews were undertaken during the daytime at the schools in a well-known location, which also facilitated recruitment. Close cooperation with the heads of the schools and with the teachers was another important facilitating factor. Teachers were asked to recruit eligible women. Women not suitable for participation for personal reasons, or because of inadequate language skills etc., were not in any way to be made to feel that they were expected to participate.

The researcher's role in the focus group is multifunctional: moderator, listener, observer and, later, analyst.<sup>164</sup> Both the interviewer and the observer were females and nurses. At the time of the first six interviews, the observer was eight-nine months pregnant, and this also facilitated and introduced the women to the subject. The women believed that they would not have been able to speak as openly with a man present. As argued by Krueger and Casey,<sup>164</sup> focus group interviews create a more natural environment than individual interviews. There are advantages to discussing this subject in a group, since the participants gave one another mutual support and everyone could choose when to speak.<sup>164</sup>

The main limitation of the study was the language barrier. Even though the women could communicate in Swedish, it was not their maternal language, and sometimes they had difficulties finding the right words or expressing themselves clearly. The women helped each other to find the correct words or expressions. Some women also brought along a dictionary. Since only women who mastered Swedish were included, the results could have been different with other women. Interpreters were not used, as it would have required several interpreters in each group and this could have influenced the openness of the discussion.

### **Studies II and III**

In order to acquire an insider perspective on the subject, individual interviews were conducted with parents who had been offered HPV vaccination for their young daughter in the school-based vaccination programme.

The main limitations of these studies are the demographic background characteristics of the included parents. Almost all were women born in Sweden, and the majority had a university degree. The results could have been different with more immigrants, fathers or parents with a lower level of education. The education level in Sweden is generally high, with almost half of the adult population having at least a three-year post-secondary education and 38% having attained a post-secondary degree.<sup>191</sup> In a Swedish study by Leval et al<sup>25</sup> parents with higher education were more likely to vaccinate their daughters while the Canadian study by Ogilvie et al<sup>109</sup> found that parents with a higher education level were less likely to accept HPV vaccination. Similar findings are reported in the Norwegian register study by Hansen et al.<sup>114</sup> On the other hand, the review by Brewer and Fazekas<sup>97</sup> found that lower education level was related to parents' acceptance of HPV vaccination.<sup>97</sup> Up until now there has been no knowledge about the association between parents' education level and the decision about HPV vaccination in the school-based programme for girls aged 10-12 in Sweden. It is not surprising that the majority of the participating parents were mothers; previous studies<sup>192 193</sup> have found that mothers are the decision makers regarding HPV vaccination for their daughters. This can also be

viewed from the gender perspective of women traditionally being responsible for the reproductive health and care of the children.<sup>101 104</sup>

The informants were recruited by means of mass distribution of information letters from the school health services. Mass distributions have many limitations as the researchers are not in control of the process and do not know whether eligible parents have received the information letters. Information given directly to parents has a higher rate of return than information distributed to children in the classroom.<sup>194</sup> The recruitment process for Study III continued over the course of a year in close cooperation with the school health services in different parts of Sweden. It was a challenge to recruit parents, as the majority of the Swedish parents had accepted HPV vaccination<sup>32</sup> and few contacted the researchers and volunteered to participate. The same challenge of recruiting eligible participants has previously been found in studies of cervical cancer screening, for example women not participating.<sup>130</sup>

## Quantitative studies (Studies IV and V)

The studies were carefully developed and the design and instruments were tested for validity and reliability.<sup>167</sup>

### **Study IV**

The study was observational with cross-sectional design. This means that no experiment was involved and measurement was undertaken at one time, i.e. a snapshot of the school nurses experiences and attitudes.<sup>165</sup> The design was considered appropriate since a large number of school nurses could participate in a short period of time, and it was also cost-effective. The response rate was high; nevertheless one limitation was the lack of information about the non-responders. Moreover, the questionnaire was self-reported and, like all self-reported data, there is a risk of over and/or underreporting and recall bias.<sup>167</sup> In addition, the school nurses were not provided with personal identification to answer the questionnaire (this was not possible for logistical reasons). The national official web-page that was used is solely for school nurses and it is unlikely that non eligible nurses would have completed the web-based questionnaire about the implemented HPV vaccination programme. Nevertheless, in order to overcome this limitation we checked all the demographic data to ensure that no school nurses had responded twice. We allotted ten hooded sweaters (with the National school nurses' association's logotype) as "prizes" and most school nurses wanted to participate and therefore sent in their emails. In this way we were able to double-check all the respondents' demographic data.

## Study V

The reliability of the instrument was high overall, although for some questions the scores were lower, probably due to increased awareness about HPV at the second test.

The study was a RCT, which is considered the most rigorous way to find out whether a treatment has an effect on the outcome. The golden standard is double-blind studies, although this is not always feasible or appropriate.<sup>165</sup> In this trial performed in a normal adolescent environment, it was not feasible to do a double-blind study due to the character of the intervention (treatment), and it was obvious whether the adolescent had received the intervention or not.<sup>195-197</sup>

The participants were randomised to either IG or CG (regular health interview). First, the schools were randomised, to avoid a spill-over effect, and then the classes were randomised in order to be included. It would have been better if randomisation had been done on an individual level, but this was not possible for the following reasons:

- 1) The school nurse performs the health interviews class by class.
- 2) This was a doctoral project; even if individual randomisation would have been possible it would have required a minimum of two years' data collection and this was not possible for the time being.
- 3) The differences between the groups at baseline would have been less if three of the included school nurses at two schools (IG) had not dropped out after randomisation (for example, one class had 98% boys). To compensate for this, the other school nurses were offered the opportunity to include an additional class. Several of these classes comprised mostly girls. Consequently, the groups differ at baseline.

Before the start of the intervention, I was recommended to monitor the health interviews in order to be aware of how the school nurses delivered the intervention, i.e. to check that school nurses performed the intervention according to the instructions they were given. This was not possible or considered appropriate for ethical reasons. The health interview is often the first time an adolescent meets the school nurse face-to-face and the participation of an observer could have affected the interview negatively. Moreover, monitoring the health interviews would have been a study in itself, i.e. an observational study. This would have required additional methodological preparations, such as how to monitor the health interviews, by recording and/or by having an observer present. Even had this been possible, it raises questions as to whether the school nurses, the Head teachers and the Heads of the school health services in each municipality would have approved. And even if they had approved, it would have been difficult for logistical reasons since the schools are located in five different counties. Therefore, the health interviews were not monitored, but to

compensate for this, the intervention was highly structured. School nurses were well-informed before the intervention started and were provided with checklists and had close contact with MG and CS. The school nurses called after the first health interview and gave feed-back. In addition, MG and CS called the school nurses weekly to check how things were going during the intervention. Moreover, the school nurses were encouraged to call and ask questions at any time, factors that contributed to a well-functioning intervention.

## Conclusion

Trust in governmental recommendations and information about HPV or the lack thereof, are important factors influencing the complex decision of whether or not to accept HPV vaccination. The attention given to specific needs and cultural norms, as well as the possibility to discuss HPV vaccination with the school nurse and the provision of extra vaccination opportunities at a later time, are strategies that might facilitate participation and could increase the coverage rate in the school-based HPV vaccination programme.

School nurses need sufficient resources, knowledge and the time to deal with parents' questions and concerns regarding HPV. The vaccinations are time-consuming and the governmental financial support needs to be used as intended, i.e. for the school-based HPV vaccination programme.

A school-based intervention can successfully improve adolescents' beliefs regarding HPV prevention, especially among those with an immigrant background. Furthermore, HPV vaccination rates among girls can be increased as well as the intention to use condom.

## Implications

The low level of knowledge and awareness of HPV and difficulties in contacting the health care services among the newly arrived immigrant women, indicate that they should receive information about prevention of HPV at SFI, preferably delivered by HCP, such as midwives, and/or trained teachers.

Parents should have the possibility to discuss HPV vaccination with school nurses or HCPs, for example at parental meetings. Parents declining HPV vaccination in the school-based vaccination programme need to be informed about where and how they can vaccinate at a later time.

Even though information is important, it must be emphasized that it is not only knowledge that is needed to increase participation. People's behaviour is governed by social norms and by the cultural context within which they

find themselves. Therefore, we should listen to those who say no and hear their reasons for declining and meet them there. Frequently, it is not a lack of knowledge that causes them to do that; in western countries it is often the people with high incomes and who are well-informed who decline the offer of vaccinations.

School nurses were in favour of the educational material and asked if they could be allowed to use the HPV-information also during the health interviews with non-allotted students in other classes. This is encouraging and indicates that the educational material was easy-to-use, and might be a valuable tool for school nurses in Sweden, with the potential for implementation in the national health-interviews in first-year upper secondary classes.

Moreover, information about HPV and HPV-prevention should start at an early age and be given repeatedly, preferably at the time of the “girl-talk” and the individual health interviews with the school nurse in the 4<sup>th</sup> and 7<sup>th</sup> grades. In addition, girls and boys alike should receive age-adjusted information about HPV and HPV vaccine at the time of the school-based HPV vaccinations in 5<sup>th</sup> (and 6<sup>th</sup>) grade.

## Unanswered questions and future research

Epidemiologic studies are needed in order to identify the associations between parents’ decisions about HPV vaccination and socio-economic factors in Sweden.

Interventions with a larger sample and longer term follow-up measurements are required to be able to conduct sub-group analyses and to ensure that a school-based intervention promoting HPV prevention is effective also in the long run. It is important to carry out a process evaluation of the intervention, including in-depth interviews with school nurses and their experiences of participation. Moreover, it would be interesting to follow a larger cohort of adolescents and examine whether the intervention has an effect on future sexual behaviour and attendance at future cervical cancer screening programmes, i.e. a longitudinal cohort study from the time they are offered HPV vaccinations.

There is currently an intense debate regarding HPV vaccination for boys, consequently it is important to investigate parents’ attitudes to vaccinating boys. It would also be interesting to replicate the study with the immigrant women using immigrant men and to examine their beliefs about HPV prevention.

Moreover, studies among immigrants and especially adolescents with an immigrant background are important to undertake since this group is increasing and many migrate from countries with limited access to national screening programmes and low public health resources. Interventions should

also focus on increasing immigrant women's attendance at cervical cancer screening programmes, since they have lower attendant rates and higher risk of cervical cancer.

It is also important to have a holistic view of sexual and reproductive health among adolescents and to provide age appropriate information. Thus, interventions should focus on including boys and girls from an earlier age, in order to promote sexual and reproductive health, as described in the WHO guidelines.<sup>198</sup>

# Svensk sammanfattning (Swedish summary)

## Bakgrund

Det är allmänt känt att vaccinationer räddar liv. Införandet av nationella vaccinationsprogram har i hög grad bidragit till förbättrad folkhälsa i Sverige och i världen. Sverige har generellt en hög täckningsgrad för barnvaccinationer. På senare tid har dock vaccinationer blivit mer omdiskuterat med lägre acceptans inom vissa grupper.

Humant Papillomvirus (HPV) är en mycket vanlig sexuellt överförbar infektion. Det finns cirka 200 olika typer av HPV varav de flesta är harmlösa och läker spontant, men vissa är onkoga. HPV nr 16 och 18 beräknas orsaka 70% av all livmoderhalscancer och har även samband med cancer i mun och hals, ändtarm, vagina och penis. HPV 6 och 11 orsakar de flesta fall av kondylom. En HPV-infektion är så vanlig att de flesta sexuellt aktiva någon gång i livet drabbas av en infektion. HPV-infektioner är vanligast bland ungdomar och unga vuxna. Studier har visat att ungdomar har mycket låg kunskap om sambandet mellan sexualvanor, HPV och cancer och det har framhållits att ungdomar behöver få kunskap om detta samband.

I Sverige infördes år 2012 vaccin mot HPV i det allmänna barnvaccinationsprogrammet för flickor 10-12 år. Äldre flickor (födda 1993-1998) erbjuds vaccinet inom primärvården i det s.k. catch-up-programmet. Vaccinet ger bäst skydd hos personer som inte utsatts för viruset och det ska därför helst ges innan sexuell debut. Som alla barnvaccinationer är det gratis, men vårdnadshavare behöver ge sitt samtycke för barn under 18 år. Tidigare internationella studier har visat att flera faktorer har betydelse för vårdnadshavares beslut om HPV-vaccination för sin dotter. Vaccinets säkerhet och oro för biverkningar samt flickans unga ålder har bidragit till att vårdnadshavare avstått HPV-vaccination. Det finns även kulturella skillnader som påverkar beslutet. Kvalitativa internationella studier har visat att skolsköterskan har en viktig roll avseende HPV-vaccination. I Sverige är skolsköterskor ansvariga för alla delar av vaccinationen; information till barn och vårdnadshavare, logistik och administration av vaccinet. Skolbaserade utbildande interventioner har tidigare haft positiv effekt på ungdomars inställning till och kunskap om HPV, men ingen effekt har påvisats på beteendet med ökad vaccinationstäckning.

En hög täckningsgrad behövs för "flockimmunitet" och det är därför mycket angeläget att undersöka inställning till HPV-vaccin bland

vårdnadshavare och skolsköterskor. Att tidigt upptäcka faktorer som hindrar respektive främjar det nationella HPV-vaccinationsprogrammet kan på sikt öka vaccinationstäckningen och därmed minska förstadier till HPV-relaterad cancer och rädda liv.

## Syfte

Det övergripande syftet med denna avhandling är att undersöka inställning till HPV och HPV-vaccination bland de grupper som särskilt berörs av det nationella vaccinationsprogrammet, vårdnadshavare och skolsköterskor. Syftet är dessutom att undersöka invandrarkvinnors inställning till prevention av HPV och öka primär prevention av HPV bland ungdomar.

## Metod

*Delarbete I:* Fokusgruppintervjuer genomfördes med 50 kvinnor som studerade svenska för invandrare med syftet att undersöka deras intällning till prevention av HPV och livmoderhalscancer, dvs. HPV-vaccination, gynekologisk cellprovskontroll och kondomanvändning.

*Delarbete II och III:* Individuella djupintervjuer genomfördes med vårdnadshavare för att undersöka orsaker till att de tackat ja respektive nej till HPV-vaccination för sin dotter vid starten av det nationella vaccinationsprogrammet. Totalt intervjuades 27 respektive 25 vårdnadshavare från olika geografiska områden. Majoriteten av deltagarna var högtbildade mammor.

*Delarbete IV:* Skolsköterskors erfarenhet av och inställning till det implementerade HPV-vaccinationsprogrammet undersöktes våren 2013. En webenkät bevarades av 851/1024 (83.1%) av samtliga skolsköterskor som vaccinerade mot HPV i det skolbaserade vaccinationsprogrammet.

*Delarbete V:* En randomiserad kontrollerad studie med syftet att öka positiv inställning till och förebyggande åtgärder av HPV bland gymnasieelever i samband med det generella hälsosamtalet med skolsköterskan i årkurs 1. Eleverna lottades till intervention eller kontrollgrupp (vanligt hälsosamtal). Interventionen utfördes av skolsköterskan och innehöll strukturerad information om HPV och en specialdesignad broschyr. Effekten av interventionen mättes genom enkäter som eleverna besvarade före hälsosamtalet och efter tre månader. Den uppföljande enkäten besvarades av 741 elever (89.1%).

## Resultat

*Delarbete 1:* Kvinnorna representerade de vanligaste invandrarländerna, främst från mellanöstern och Nordafrika. De flesta hade bott i Sverige mellan 1-5 år. Fokusgrupperna var heterogena med kvinnor från olika socio-ekonomisk och kulturell bakgrund, majoriteten var muslimer. Även om kvinnorna var positiva till att förebygga HPV och cervixcancer framkom flera barriärer: svårigheter i kontakten med sjukvården och låg kunskap om sambandet mellan sexuell överförbar infektion och HPV, kulturella aspekter och ojämlikhet mellan könen samt att de inte var vana vid att gå på hälsokontroller i hemlandet.

*Delarbete II och III:* Resultatet från intervjuerna visar två sidor av samma mynt. Vårdnadshavare som tackat ja till vaccinet hade förtroende för myndigheternas rekommendation och samtyckte för att skydda sin dotter mot en svår sjukdom. Beslutet att tacka nej var mer komplext och flera faktorer hade betydelse. Vårdnadshavarna föredrog att vänta eftersom de ansåg att flickan var för ung både psykosocialt och fysiskt. Hon var bara en liten flicka och det ansågs inte nödvändigt att vaccinera henne nu. Det skulle även dröja många år innan hon var sexuellt aktiv. Livsåskådning med en hög moral i familjen var en annan anledning. Bristande information om HPV och HPV-vaccin och en misstro både till myndigheterna och till vaccinet var en vanlig orsak. Samtliga föräldrar drog en parallell till svininfluensan. Andra orsaker var flickans spruträdsla och en önskan om ett mer individuellt bemötande än det som erbjöds genom massvaccination i skolan.

*Delarbete IV:* Majoriteten (88.8%) var positiva till att vaccinationerna ingick i det skolbaserade vaccinationsprogrammet. Det fanns ett starkt samband mellan skolsköterskors kunskap och utbildning om HPV innan implementeringen och positiv attityd till vaccinationen. Det statliga ekonomiska stödet hade inte använts för omkostnader till HPV-vaccinationerna enligt 76.6%. De skolsköterskor som arbetade på skolor där det ekonomiska stödet använts i samband med vaccinationen, till en extra skolsköterska eller mer arbetstid hade en mer positiv attityd. Majoriteten (67%) hade upplevt svårigheter med vaccinationerna. De var tidskrävande och arbetsbördan hade ökat. Nästan åtta av tio (76%) hade kontaktats av föräldrar som hade frågor och funderingar. De flesta frågorna handlade om flickans unga ålder och vaccinets säkerhet och effekt. Majoriteten (81.5%) ansåg att pojkar också skulle erbjudas HPV-vaccination.

*Delarbete V:* Syftet var att skapa en utbildningsinsats i samband med hälsosamtalet, för att öka ungdomars kunskap om HPV och förbättra deras inställning till förebyggande åtgärder avseende HPV, dvs. HPV-vaccination och kondomanvändning. Elever från både yrkes och studieförberedande program deltog. Medelåldern var 16 år och drygt en fjärdedel (27.8%) hade en invandrarbakgrund. Interventionen hade positiv effekt på inställningen till prevention av HPV. Effekten var särskilt stor bland de elever som hade

invandrarbakgrund. Det fanns ingen skillnad mellan grupperna (intervention eller kontroll) avseende upplevda barriärer, men interventionen minskade de upplevda barriärerna för pojkar. Interventionen hade också effekt i fråga om upplevd risk att drabbas av HPV och hur allvarligt eleverna ansåg att det skulle vara att drabbas av HPV. Interventionen hade även effekt på avsikten att använda kondom med ny partner. Dessutom hade interventionen effekt på HPV-vaccination, 59% av flickorna hade vaccinerat sig efter interventionen jämfört med 52.5% vid baslinjemätningen, men det fanns inga skillnader i kontrollgruppen.

## Slutsats och klinisk implikation

Det svenska HPV-vaccinationsprogrammet är till stor del en framgångssaga, men trots det är täckningsgraden betydligt lägre än för övriga barnvaccinationer.

Vårdnadshavare har många funderingar kring vaccinet och vill ha mer adekvat och transparent fakta om viruset och hur det smittar. De behöver därför erbjudas möjligheten att diskutera HPV och HPV-vaccination med skolsköterskan eller annan hälso- och sjukvårdspersonal, t.ex. vid föräldramöten. Vårdnadshavare behöver också möjligheten att erbjudas vaccinationen vid ytterligare tillfälle samt information om vem de ska kontakta för en senare vaccination. Det är viktigt att skolsköterskor och vårdnadshavare har kunskap om varför flickor bör vaccineras i så ung ålder och att informationen avseende vaccinets säkerhet uppdateras enligt gällande forskningsresultat.

Resultaten i avhandlingen visar att införandet av en ny vaccination i det allmänna barnvaccinationsprogrammet kräver adekvata förutsättningar med tydlig fortbildning av skolsköterskor innan implementering. Det är även viktigt att bevaka att de statliga ekonomiska bidragen används för dess syfte, dvs. att främja ett välfungerande vaccinationsprogram.

Åldersanpassad information om HPV bör ges till både flickor och pojkar och starta tidigt, lämpligtvis i samband med de skolbaserade HPV-vaccinationerna. HPV-information bör även rutinmässigt ingå i de hälsosamtal som samtliga elever erbjuds i gymnasiet åk 1 med skolsköterskan, då det har positiva effekter på inställning till prevention av HPV och på beteende. Eftersom täckningsgraden är betydligt lägre för de äldre flickorna (ca 59%) i catch-up-programmet jämfört med för de yngre flickorna (ca 83%) och det nationella målet på minst 90% ej ännu har uppnåtts, är det viktigt att beakta föräldrars och skolsköterskors inställning till och erfarenheter av HPV-vaccinationsprogrammet. Det är därför viktigt att även beakta kulturella och socio-ekonomiska skillnader avseende prevention för att säkerställa en hög täckningsgrad och minska HPV-relaterad cancer.

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