Assessing knowledge and awareness of sexually transmitted infections among school-going adolescents

Dissertation

For the academic grade of Doctor Public Health

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Submitted by

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March 2013

Defended on: 21st August, 2013

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Dedication

This dissertation is dedicated to my beloved late parents; first and foremost to my dad, Don Davidson Thompson Samkange, who told all his children that education is the most important asset in life. To my mother, Lillian Boniswa Samkange, whose love and blessings guided and accompanied me throughout my life, and to my step-mother Wilma Florence Samkange, who played an important role in my life.

‘It is well with my Soul’ and ‘To God be the Glory!’

Acknowledgements:

I would like to thank all those who contributed towards the completion of this doctoral dissertation. Firstly, I express my gratitude to my employer, the Leibniz Institute for Prevention Research and Epidemiology – BIPS, for giving me the opportunity to conduct the school-based survey which was central for this dissertation.

Secondly, I remain deeply indebted to my former colleague, Lena Spallek, whose support during the planning stages of the survey was invaluable. I would also like to take this opportunity to thank my colleagues, Beate Schütte, Svea Eichholz, Sinja Ernst, Stefanie Helmer, Kathi Liegmann, Natalya Makarova, Anna Muschalek, Julia Nürnberg, Saskia Pöttgen and Sandra Wegeng for their support during the conduction of the survey in the schools. I furthermore thank the following schools in which we conducted the survey for their co-operation: Gesamtschule Mitte Bremen, OS an der Schaumburger Str., OS Am Leibnizplatz, OS Findorff, SZ an der Lehmhorster Str., SZ Am Rübekamp II, Lloyd Gymnasium and Johann-Gutenberg-Schule.

I also extend my gratitude to my supervisors Professor Rafael Mikolajczyk and Professor Ansgar Gerhardus for their advice and support.

Special thanks to Tozi Nikelwa Theileis and Stefanie Helmer for proof-reading the thesis.

Last but not least, I would like to thank my family for their continuous loving support, moral and otherwise, over the last years and during the last few months.

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Abbreviations

BZgA: Bundeszentrale für gesundheitliche Aufklärung

CCDR: Canada Communicable Disease Report

CDC: Centers for Disease Control and Prevention

FAS: Family Affluence Scale

HAD: Health Development Agency

HBM: Health Belief Model

HSBC: Health Behaviour in School-aged Children

HPA: Health Protection Agency

HPV: Human papillomavirus

HIV/AIDS: Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome

HPSC: Health Protection Surveillance Centre

IMB: Information, Motivation, Behavioural Skills Model

IDEFICS: Identification and prevention of dietary and lifestyle induced health effects in children and infants

IPPF: International Planned Parenthood Federation

KIGGS: Kinder- und Jugendgesundheitsstudie

PATREC: Unified assessment strategy of physical activity data from German cohort studies

PHAST: Public Health Action Support Team

SES: Socioeconomic status

SOGC: Society of Obstetricians and Gynaecologists of Canada

STIKO: Ständige Impfkommission

STIs: Sexually Transmitted Infections

TRA/PA: Theory of Reasoned Action/Planned Action

WHO: World Health Organization

UNESCO: United Nations Educational, Scientific and Cultural Organization

Abstract

Background: Sexually transmitted infections (STIs) such as chlamydia, syphilis and gonorrhoea appear to be an increasing problem in several western European countries, especially among teenagers 16-19 years old. This may indicate that adolescents lack the necessary information and options which can help them lead healthy sexual and reproductive lives. In this dissertation basic STI knowledge and awareness and comprehensive HPV awareness of school-going adolescence aged 12-20 years was assessed using a systematic literature search and a multi-centric school-based survey.

Methods: The thesis comprises a systematic review of literature on knowledge and awareness of sexually transmitted infections among school-going adolescents in Europe, and a school-based cross-sectional survey, the results of which are presented in six publications. For the survey, questions on knowledge and awareness of sexually transmitted infections, as well as on risk perception on STI were evaluated using descriptive analyses and multivariable logistic regression analyses.

Results: Fifteen studies focusing on six STIs were included in the systematic review. Awareness and knowledge were assessed in depth mainly for HIV/AIDS and HPV and to some extent for chlamydia. A total of 1148 pupils (31% with a migrant background and 55% girls) participated in the school-based survey. In the studies included in the review as well as in the school-based survey, HIV/AIDS was the infection most pupils had heard of. In the latter, slightly more than half of the pupils correctly answered at least 2 of the four items used to assess knowledge of sexually transmitted infections. There was a clear difference in knowledge and awareness according to age, sex and migrant background, with better knowledge and awareness scores for girls, older pupils and those without a migrant background. The most common sources of information on sexuality and sexually transmitted infections mentioned by the pupils were the school (biology lessons) and the mother. 12% of the participating girls reported having been vaccinated against human papillomavirus, while 57% reported not knowing whether or not they were vaccinated.
Regarding the rating of risk of peers to get infected with HPV or chlamydia, the majority of pupils responded with ‘don’t know’. Those who did do the rating generally rated the risk for peers to get infected with HIV as being higher than that for chlamydia or HPV. Those reporting ever having sex also reported their own risk of getting infected with HIV to be higher than for HPV or chlamydia.

Conclusion: HIV/AIDS remains the only sexually transmitted infection most school-going adolescents are aware of. Sexuality education in schools needs to be broadened to encompass other STIs such as HPV and chlamydia whose numbers are reported to be increasing among adolescents in industrialised countries. Results of this thesis provide more evidence on the level of awareness and knowledge of STDs among school-attending adolescents, highlight gaps and contribute data to the discussion on improving sexuality education for adolescents.

Abstrakt

Hintergrund: Sexuell übertragbare Infektionen (STI) wie Chlamydien, Syphilis und Gonorrhö stellen in einigen europäischen Ländern ein an Bedeutung gewinnendes Gesundheitsproblem dar, insbesondere bei Jugendlichen im Alter von 16-19 Jahren. Diese Entwicklung kann auf einen Mangel an Informationen über STIs als auch auf begrenzte Möglichkeiten, eine gesunde Sexualität zu leben, zurückzuführen sein. In dieser Dissertation wurde die Bekanntheit von und das Wissen zu sexuell übertragbaren Infektionen bei Schülerinnen und Schülern im Alter von 12-20 Jahren anhand einer systematischen Literaturrecherche und einer multizentrischen schulbasierten Befragung untersucht.

Methoden: Diese Dissertation umfasst eine systematische Literaturrecherche zu Bekanntheit und Wissen über sexuell übertragbare Infektionen von Schülerinnen und Schülern in Europa und eine schulbasierte Querschnittsstudie. Die Ergebnisse wurden in sechs Publikationen zusammengefasst und veröffentlicht. In dem Survey wurden die Schüler zu ihrem Wissen über sexuell übertragbare Infektionen und zu ihrer Risikoeinschätzung bezüglich STI befragt. Die Daten wurden deskriptiv ausgewertet, zudem wurden multivariable logistische Regressionsanalysen durchgeführt.

Ergebnisse: Fünfzehn **S**tudien, die hauptsächlich auf HIV/AIDS und HPV und zum Teil auf Chlamydien fokussierten, wurden in die Literaturrecherche einbezogen. An der schulbasierten Querschnittsbefragung nahmen insgesamt 1148 Jugendliche (31% mit Migrationshintergrund, 55% Mädchen) teil. Sowohl in den Studien, die in die Literaturrecherche einbezogen wurden, als auch in der schulbasierten Befragung war HIV/AIDS unter den Jugendlichen die bekannteste Infektion. In der Querschnittsbefragung haben etwas mehr als die Hälfte der Teilnehmenden mindestens zwei der vier Fragen, die den Wissensstand über sexuell übertragbare Infektionen abbilden, richtig beantwortet. Ältere Jugendliche, Mädchen und Schülerinnen und Schüler ohne Migrationshintergrund wiesen einen höheren STI-Wissensstand als die jeweiligen Vergleichsgruppen auf. Die meist genannten Informationsquellen zu den Themen Sexualität und STI waren die Schule (Biologieunterricht) und die eigene Mutter. 12% der teilnehmenden Mädchen gaben an, gegen HPV geimpft worden zu sein, während 57% der Mädchen angaben, nicht zu wissen, ob sie geimpft wurden oder nicht.
Die Mehrheit der Jugendlichen beantwortete die Frage zum Risiko altersgleicher Peers, an einer STI zu erkranken, mit ‘weiß nicht’. Diejenigen, die eine Einschätzung vornahmen, schätzten das Risiko für Altersgleiche, an HIV zu erkranken, größtenteils höher ein als entsprechende Risiken für Chlamydien oder HPV. Auch die Teilnehmenden, die schon sexuell aktiv waren, schätzten ihr eigenes Risiko, sich mit HIV zu infizieren, höher ein als ihre Infektionsrisiken bezüglich Chlamydien oder HPV.

Zusammenfassung: HIV/AIDS ist auch weiterhin die einzige sexuell übertragbare Infektion, die den meisten Jugendlichen bekannt ist. Sexuelle Aufklärung in Schulen sollte auch auf weitere STI wie HPV und Chlamydien ausgeweitet werden, für die in Industrieländer ansteigende Zahlen berichtet werden. Die Ergebnisse dieser Arbeit leisten einen Beitrag zu der Diskussion über das Wissen zu sexuell übertragbaren Infektionen bei Jugendlichen, decken Wissenslücken auf und tragen zu der Debatte über die Verbesserung der Sexualkunde für Jugendliche bei.

Preface

The discussions on sexual and reproductive health of adolescents which have been held over the last years and the concern which was raised, that young people in industrialised countries are not well informed about sexually transmitted infections, led to my interest in the topic. Having read various epidemiological studies on knowledge and awareness of sexually transmitted infections among school-going adolescents conducted in the USA, Austria, Sweden and the United Kingdom, I searched for studies conducted in Germany. Not being able to find any such study, I conceived the idea of conducting a school-based cross-sectional survey to assess the knowledge and awareness of school-going adolescents in the federal state of Bremen on sexually transmitted infections. I wrote a project proposal which was submitted to the board of my institute 'Leibniz Institute for Prevention Research and Epidemiology – BIPS'. The board agreed that the survey could be conducted with funding from the institute. With the assistance of my former colleague Lena Spallek, I constructed the questionnaires for use in the survey and prepared applications for ethical, as well as data protection approval. Together we prepared study material, selected schools to be contacted for participation and visited some of the schools. We also conducted a systematic review of literature on knowledge and awareness of sexually transmitted infections among school-going adolescents in Europe, the results of which we used in preparation and as a comparison for the school-based survey we conducted.

I liaised with the participating schools and organized the actual conduction of the surveys. Together with colleagues from the institute, I went to each participating school on the day of the survey and supervised the completion of the questionnaires. I was also responsible for the analysis of the collected data.

Articles in Thesis

This cumulative dissertation thesis is based on the following articles which are printed in bold where they are referred to in the text and are to be found in the Appendix.

I **Samkange-Zeeb F**, Spallek L, Zeeb H. Awareness and knowledge of Sexually Transmitted Diseases (STDs) among school-going adolescents in Europe: A review of published literature. BMC Public Health 2011; 11:727 doi: 10.1186/1471-2458-11-727

II **Samkange-Zeeb F**, Mikolajczyk R, Zeeb H. (2012a) Awareness and knowledge of Sexually Transmitted Diseases (STDs) among secondary school students in two German cities. J Community Health. 2012 Sep 22. doi: 10.1007/s10900-012-9614-4.

III* **Samkange-Zeeb F,** Pöttgen S, Schütte B, Zeeb H. (2012b) Awareness of sexually transmitted diseases among adolescents with and without migrant backgrounds in Bremen, Germany (currently under publication in proceedings of the 2nd Conference on "Health, Culture and the Human Body" held from 14-15 September 2012, Istanbul, Turkey)

IV **Samkange-Zeeb F**, Spallek L, Klug SJ, Zeeb H. (2012c) HPV infection awareness and self-reported vaccination coverage in female adolescent students in two German cities. J Community Health. 2012 Dec;37(6):1151-6. doi: 10.1007/s10900-012-9589-1.

V **Samkange-Zeeb F**, Pöttgen S, Zeeb H. (2013) Higher risk perception of HIV than of chlamydia and HPV among secondary school students in two German cities. PLOS ONE 2013 Apr 24;8(4):e61636. doi: 10.1371/journal.pone.0061636.

VI Pöttgen S**, Samkange-Zeeb F.** Wissen zu sexuell übertragbaren Infektionen: Ein Vergleich von Schülern und Schülerinnen mit türkischem und ohne Migrationshintergrund Prävention und Gesundheitsförderung. 2013 Aug 28. doi: 10.1007/s11553-013-0403-4.

* Findings were initially presented at a conference and submitted for publication in a proceedings band and then later published in a peer-reviewed journal as article VI. Whereas article III compares all adolescents with a migrant background to those without a migrant background, article VI focuses on adolescents with a Turkish migrant background. The two articles however have strong similarities and are thus considered as one publication.

The findings of the study have also been presented at a number of national and international conferences as listed below:

- **Samkange-Zeeb F**, Spallek L. Awareness of HPV and of vaccination status among female school-going adolescents in Bremen und Bremerhaven. 6th Annual conference DGEpi Mainz, 2011 (poster presentation)
- Ernst S, Schütte B, Zeeb H, **Samkange-Zeeb F**. Gesundheitswissen und Informationsquellen zu sexuell übertragbaren Erkrankungen von Jugendlichen im Land Bremen - Ergebnisse des KAP-STD Schulsurveys 2011. 7th Annual Conference DGEpi Regensburg, 2012 (poster presentation)
- **Samkange-Zeeb F**, Spallek L, Schütte B, Klug SJ, Zeeb H. Awareness of HPV and of vaccination status among female school-going adolescents in Bremen und Bremerhaven. DGEpi Regensburg, 2012 and EUPHA Malta, 2012 (poster presentation)
- Zeeb H, Pöttgen S, Schütte B, **Samkange-Zeeb F**. Awareness of sexually transmitted diseases among adolescents with and without migrant background in Bremen, Germany. 2nd Conference on "Health, Culture and the Human Body" Istanbul, 2012 (invited oral presentation)
- **Samkange-Zeeb F**, Pöttgen S, Zeeb H. Was wissen Jugendliche mit und ohne Migrationshintergrund über sexuell übertragbaren Krankheiten? International Migrants' Day Hannover, 2012 (invited oral presentation)

Furthermore, a bachelor and master thesis were written based on the data collected during the school-based cross-sectional survey:

Raschdorf L (2012). Schulbasierte Befragung zu Wissen über sexuell übertragbare Erkrankungen: Entwicklung einer geeigneten Form der Ergebnispräsentation für die teilnehmenden Schülerinnen und Schüler (completed June 2012)

Pöttgen S (2012). Zum Wissen zu sexuell übertragbaren Krankheiten von Schülerinnen und Schülern mit und ohne Migrationshintergrund im Land Bremen, Deutschland (completed December 2012)

1 Introduction

High rates of teenage pregnancies and increasing numbers of sexually transmitted infections (STIs) in adolescents have led to more attention being paid to adolescent sexual and reproductive health worldwide (McKay 2004, Williams & Davidson 2004, World Health Organisation – WHO 2013a). Although the sexual and reproductive health of adolescents in industrialised countries is generally considered to be good, differences in outcomes such as teenage pregnancies, an indicator of unprotected sexual intercourse, have been observed within and between regions. Despite the fact that teenage birth and pregnancy rates in the United States have been on the decline since 1991, they are still considerably higher than in other industrialised countries and also said to be among the highest worldwide (Feijoo 2004, Santelli & Schalet 2009, Centers for Disease Control and Prevention - CDC 2012a). Within Western Europe, teenage pregnancies are a major problem in the United Kingdom, where the annual rate is 47 per 1000 15-19 year olds. In other countries in the same region the rate is reported to be between 12 and 25 per 1000 (WHO 2001). A comparison between Western and Eastern/Central Europe shows that rates of teenage pregnancies, induced abortions and STIs among adolescents are considerably higher in the latter region than in the former (WHO 2001, CDC 2003). Trends in teenage pregnancy rates are said to be an indicator for the sexual and reproductive health of adolescents and of the opportunities and capacity they have to control their sexual and reproductive health (McKay 2004). Reasons which have been given for the observed differences in outcomes include poverty, ethnicity or migrant background, parental level of education, family structure and functioning, societal influences such as family, friends and communities, cultural attitudes and access to education and health care services (Santelli & Schalet 2009).

Over the last decade, an increase in numbers of diagnosed STIs such as syphilis, gonorrhoea and chlamydia has been observed in several western European countries, especially among teenagers 16-19 years old (Panchaud et al. 2000, Berglund et al. 2001, Nicoll & Hamers 2002, Twisselmann 2002, Health Protection Surveillance Centre - HPSC 2005, Adler 2006). This has been taken as an indication that adolescents lack the necessary information and options which can help them lead healthy sexual and reproductive lives (WHO 2001).

To improve the sexual and reproductive health of adolescents and reduce inequalities between and within countries, the WHO drew up a strategy to meet the demands of sexual and reproductive health of adolescents in Europe (WHO 2001).

The objectives of the strategy are:

Objective 1: "To inform and educate adolescents on all aspects of sexuality and reproduction and assist them in developing the life skills needed to deal with these issues in a satisfactory and responsible manner."

Objective 2: "To ensure easy access to youth friendly SRH services."

Objective 3: "To reduce the levels of unwanted pregnancies, induced abortions and STIs among young people."(WHO 2001)

One of the suggestions put forward to attain the first objective was that education on sexuality and reproduction is included in curricula of all secondary schools. In most Western European countries, sexual health education was introduced in schools in the 1970s and 1980s when modern contraceptive methods such as the pill became available and abortion was legalized (WHO & Bundeszentrale für gesundheitliche Aufklärung - BZgA 2010). The onset of HIV/AIDs in the 1980s led to more attention being paid to adolescent sexuality and sexual health.

Although Germany, similar to other Western European countries such as Austria, the Netherlands and Switzerland, has a long history of sexual education (now generally termed sexuality education) in schools, it is surmised that the majority of adolescents lack information about STIs other than HIV/AIDS. The reason being that HIV/AIDS is the main topic addressed in most schools (Lengen et al. 2010). Results of surveys on adolescent sexuality conducted by the Federal Centre for Health Education (BZgA 2006a) confirm this assumption. Although 80% of the interviewed adolescents between 14 and 17 years old reported having sex education in school, 40% of the girls and 32% of the boys wished to have more information on STIs (BZgA 2006a). Among those with migrant backgrounds, 52% wished to have more information on HIV/AIDS and other STIs (BZgA 2010). Studies conducted in other industrialised countries have also shown that the knowledge of adolescents on STIs is limited to HIV/AIDS (Garside et al. 2001, Clark et al. 2002, Downs et al. 2006, Höglund et al. 2009, Nsuami et al. 2010).

1.1 Objectives

The aim of this thesis was to study the knowledge and awareness of (STIs) among adolescents of school-going age. To this end we conducted 1) a systematic literature review of studies conducted to assess the awareness and knowledge of STIs among school-going adolescents in Europe, and 2) a school-based cross-sectional survey among school-going adolescents in Bremen and Bremerhaven, two cities in Northern Germany.

The following questions were addressed in this thesis:

1 What is the level of knowledge and awareness of STIs among adolescents and are there differences between female and male adolescents?
2 Are there knowledge and awareness differences between same aged adolescents with and without a migrant background?
3 How high is the prevalence of HPV vaccination among female adolescents and are there differences between female adolescents with and without migrant background who are of the same age?
4 How do adolescents perceive the risk of peers to become infected with an STI? And how do adolescents reporting sexual activity perceive their own risk to become infected with an STI?

The work done in the context of this thesis is hereafter described in six sections and five manuscripts which are enclosed in the appendix. In section 2 the background for the thesis including definition of STIs, their prevalence in adolescents and the state of research are presented. Section 3 presents the concept of health behaviour and is followed by a short description of the materials and methods used to collect data for the thesis in the section 4. An overview of the results is provided in section 5, after which the research methods used and the main findings are discussed in section six. In the final section, the conclusions, together with implications of the study for public health are presented. The manuscripts comprising the dissertation are to be found in the Appendix. In the results and discussion sections, the systematic literature review will be referred to as Study I and the school-based survey as Study II.

2 Background

2.1 Definition of sexually transmitted infections

Sexually transmitted infections are infections which are mainly transmitted from one person to another through intimate contact (CDC 2010, WHO 2011a). The infection can be spread through oral, vaginal, or anal sex, or though contact with blood during sexual activity. Although uncommon, transmission can also occur through direct contact with affected body parts, tissue, or body fluids of infected persons. Some STIs such as hepatitis B can also be transmitted through sharing or using unsterilized needles (CDC 2010).

Vertical transmission, where the mother passes the infection to her child in utero or during childbirth, is also possible. HIV, hepatitis B and syphilis are infections which can be transmitted in this way (CDC 2010).

The term STIs describes infections caused by more than 30 different bacteria, viruses and parasites which are transmitted through sexual intercourse. The common feature of these infections is their mode of transmission and not their cause, origin, clinical features or consequences (Sasadeusz et al. 2008, WHO 2011a). The most common STIs are the bacterial infections: chlamydia, syphilis, gonorrhoea; and the viral infections: human papillomavirus (HPV), HIV and hepatitis B (CDC 2009) (table 1). If not detected on time or left untreated, these infections can have long-lasting adverse effects. STIs such as HIV and HPV can be asymptomatic over long periods of time while the signs and symptoms of others such as genital herpes can be mild and passing. As a result no attention is paid to them leading not only to delayed diagnosis and treatment, but also increasing the chances of infections being passed on unaware during unprotected sexual intercourse. If untreated, STIs can lead to complications such as pelvic inflammatory diseases, ectopic pregnancies or infertility in women, or epididymitis in men (Stamm et al. 1984, MacDonald & Brunham 1997, Simms & Stephenson 2000, Public Health Leadership Society - PHLS 2000). In its guidelines for surveillance of STIs published in 1999, the WHO described STIs as a major global health problem leading to acute illness, long-term disability and death, with serious medical and psychological consequences for millions of men, women and infants (WHO 1999).

Table 1 gives an overview of common STIs and their clinical manifestations. HIV and syphilis are life threatening, hepatitis B, HPV and HIV predispose to malignancy, and gonorrhoea and chlamydia affect fertility (CDC 2013a). Chlamydia, gonorrhoea and syphilis can be cured using

antibiotics, while HIV is treatable but not curable. Most Hepatitis B and HPV infections are cleared by the immune system within a few months (WHO 2011a, Kirwan & Herrington 2001). Chronic forms of Hepatitis B are however not well treatable and persistent HPV infections can cause cervical and other forms of cancer. Furthermore, HPV infection can cause genital warts, which can be treated using topical creams or cryotherapy, but may also disappear on their own (WHO 2011a, CDC 2013a).

Table 1: Examples of common STIs and their clinical manifestations

Infection	Clinical symptoms	Long-term sequelae
Gonorrhoea	Among men urethritis/discharge, among women mostly asymptomatic, but some may experience pain or burning sensation when urinating	In women pelvic inflammatory disease/infertility/ectopic pregnancy
Syphilis	Genital ulceration, latent infection also possible	Severe neurological and psychiatric conditions e.g. dementia
HIV	Asymptomatic over long periods of time; early signs can include fatigue, fever, night sweats	If untreated full-blown AIDS
HPV	Generally asymptomatic and clears on its own	Genital warts, penile cancer, cervical cancer
Chlamydia	Asymptomatic infection common among both men and women; women may experience abdominal pain or burning sensation when urinating	In women pelvic inflammatory disease/infertility/ectopic pregnancy; in men epididymitis
Hepatitis B	Partly asymptomatic or unspecific symptoms such as fever, abdominal pain	Acute liver failure, liver cancer
Genital herpes	Recurrent genital blister-like sores	Pregnancy complications, neonatal herpes
Trichomoniasis	Often asymptomatic, occasionally genital discharge	Pregnancy complications

Summarised from Workowski & Bermann 2006

2.2 Development in adolescence

Adolescence is a transition period between childhood and adulthood characterised not only by body changes but also by attributes such as increased independence from parents, the search for an own identity, building of friendships, and sexual interest (Spano 2004, San Antonio 2006). It is also a stage during which young people take risks to test and define themselves. The risk-taking behaviour is described as a normal and necessary part of adolescence which helps them to discover themselves and the larger world (Office for Population Affairs - OPA 2012). It can have positive outcomes such as learning new skills and experiences which can prepare young people for the future, while on the other hand making them vulnerable (Little & Wyver 2008, OPA 2012). Because they start distancing themselves from their parents and orient themselves on peers, young people in early adolescence have been shown to be more susceptible to antisocial peer influence. Furthermore, vulnerability to peer pressure is said to increase between early and mid-adolescence (Spano 2004, Steinberg 2004, San Antonio 2006).

Steinberg describes risk taking in adolescence as being governed by two competing networks in the brain: the socio-emotional and the cognitive-control network (Steinberg 2007). The former is especially responsive to social and emotional stimuli and the latter assists functions such as planning, thinking ahead, and self-regulation. During adolescence, the effect of social and emotional stimuli, which are important for reward processing, are more assertive than cognitive-control functions. The socio-emotional network is however not always in a state of high activation, and when individuals are not excited or alone, the cognitive-control is capable of controlling impulsive or risky behaviour, also during early adolescence. In the company of peers or when emotionally aroused, the socio-emotional network is strong enough to suppress the regulatory effectiveness of the cognitive-control network (Steinberg 2007). The fear of rejection, wish to belong, excitement of risk and anxiety of being caught, add to the difficulties adolescents have when thinking through possible consequences, understanding the significance of their decisions, or even using common sense (Benes 2001).

Up into the later teenage years, important structural changes take place in the brain and it takes time and experience until individuals are able to think deductively, synthesise and use information efficiently, focus on personal dignity and self-esteem, set goals and follow them through (Spano 2004, Hurd 2005, Steinberg 2007). With increasing age, cognitive-control functions mature such

that by adulthood, risk taking is better controlled even under conditions of heightened arousal (Steinberg 2007).

2.3 Prevalence of STIs among adolescents in industrialised countries

According to the CDC, 50% of all STIs diagnosed in the United States occur in people aged 25 years or younger, with one in four new STI cases occurring in teenagers (CDC 2011a). Between 2007 and 2011, steady increases in rates of chlamydia were observed among persons aged 10-24 years, in particular among females (CDC 2011a). In 2006, about 22 000 young people in this age-group were living with the HIV infection, and roughly one million had chlamydia, gonorrhoea or syphilis (Gavin et al. 2009). In 2004, 16 000 girls between 10 and 14 years were pregnant and in 2006, almost 18 000 boys and girls in the same age group had an STI. In England, data from 2010 show that young people aged 16-24 years accounted for 63% of chlamydia, 54% of genital warts, 47% of gonorrhoea, 41% of herpes and 16% of syphilis cases diagnosed in genitourinary medicine clinics (Health Protection Agency - HPA 2011).

The prevalence of STIs among adolescents in Germany is not fully known. However, about 14 000 minor girls fall pregnant every year, an indication that a considerable proportion of adolescents engage in unprotected sexual intercourse. For the age-group 15-19 years, some incidence data are available for HIV and syphilis, which are notifiable diseases, but not for HPV, chlamydia or gonorrhoea. According to data from the national health report, in 2009 the incidence of syphilis in this age-group was 1.1 per 100 000, and in 2010, the incidence of HIV was 1.4 per 100 000 inhabitants (Gesundheitsberichterstattung des Bundes 2011).

So far only a few epidemiological studies have focussed on this issue. In a survey conducted by Iftner and colleagues (Iftner et al. 2010) including 1692 women aged 10-30 years, 22% of the women tested positive for HPV. 57% of those testing positive were younger than 23 years of age. The lowest prevalence was observed in the age-group 10-16 years (11.6%) and the highest (28.3%) in the 20-22 years age group. Currently, the only published data on chlamydia prevalence are based on a prevalence survey conducted in a convenience sample of 266 minor girls in Berlin, in which girls reporting having had unprotected sexual intercourse were offered a chlamydia test (Gille & Klapp 2007). 5.4% of the study population had a chlamydia infection at the time of examination. The prevalence of the infection increased with age, and was 3.6% among 15 year olds, 4.0% among 16 year olds and 10% among 17 year olds. Girls who attended the lowest of the three forms of secondary school (Hauptschule), or those who did not have a school certificate, had

a higher prevalence than those who attended the higher forms of secondary school (Realschule/Gymnasium) (Gille & Klapp 2007).

2.4 Research on knowledge and awareness of STIs among adolescents

Over the last two decades, a large number of studies to assess the knowledge and awareness of STIs among adolescents in industrialised countries have been conducted. The majority of these studies, especially those conducted in the 1990s, focused on HIV/AIDS (Ford 1992, Lunin et al. 1995, Eriksson et al. 1997). With the advances made in research on the aetiology of cervical cancer, the focus of surveys has also turned to the awareness and knowledge of HPV (Agius et al. 2006, Das et al. 2009, Pelucchi et al. 2010). The studies were generally cross-sectional surveys conducted in schools. In some cases however participants were recruited in clinics or hospitals (Biro et al. 1994, DiClemente et al. 2002), or through household surveys (Woodhall et al. 2007). In most surveys participants completed self-administered questionnaires (Lunin et al. 1995, Eriksson et al. 1997, Macek & Matkovic 2005, Sachsenweger et al. 2010), while in others face-to-face interviews using standardised questionnaires or focus group interviews were conducted (Ford 1992, Goodwin et al. 2004).

2.4.1 Core findings: STI knowledge and awareness

Most of the literature on knowledge and awareness of STIs among adolescents in industrialised countries comes from the United States and the general consensus is that adolescents are poorly informed about STIs other than HIV/AIDS (Baer et al. 2000, Cohall et al. 2001, Clark et al. 2002, Downs et al. 2006, Nsuami et al. 2010). Results of a survey conducted among sexually active 14-18 year old girls in the United States indicate that the adolescents acquired basic information on STIs such as chlamydia, gonorrhoea and syphilis only after infection (Downs et al. 2006). In the last years, most of the surveys on STI knowledge and awareness among adolescents in a number of industrialised countries such as Australia, Canada and the United Kingdom have focused on HPV and chlamydia. In general, low proportions of adolescents (range 5-66%) were able to identify the two infections or knew that they were sexually transmitted (Garside et al. 2001, Trani et al. 2005, Agius et al. 2006, Marlow et al. 2007, Das et al. 2009, Höglund et al. 2009, Gottvall et al. 2009, Agius et al. 2010, Pelucchi et al. 2010). Recent studies on the knowledge and awareness of HPV and chlamydia among young people in two German cities, Berlin and Bonn, also reported low knowledge levels: in Bonn, 15 % of participants had heard of chlamydia (Lengen et al. 2010),

and in Berlin, less than a third were aware of the fact that HPV can be sexually transmitted (Blödt et al. 2012). In another study also conducted in Berlin however, comparatively higher levels of HPV awareness were observed, with more than 50% of participating adolescents correctly reporting that HPV infection can cause premalignant lesions and cancer of the cervix and penis (Stöcker et al. 2012). The reasons for this difference are not clear.

2.4.2 Attitudes of adolescents towards STIs

Three behaviours which contribute to the leading causes of death and illness in adolescents are injury and violence, alcohol and drug use, and risky sexual behaviour (CDC 2011b). When indulging in risky behaviour adolescents generally do not think about the negative health outcomes of such behaviour, but instead perceive the associated immediate positive effects such as enjoying themselves with their friends and peers (Senderowitz 1999, Millstein & Halpern-Felsher 2001, Currie et al. 2012). Although the proportion of adolescents reporting the use of condoms at first and at most recent sexual intercourse has increased over the last years (Häggström-Nordin et al. 2002, Robin et al. 2004, Currie et al. 2012), quite a number still report not using them at all (Currie et el. 2012). Reasons given for non-use are, for example, that they are difficult to use for sexually inexperienced, are embarrassing to suggest, and are too expensive to buy on a regular basis (Novak 2005, Larsson 2007, Geressu et al. 2009, Kirby et al. 2010). The prevalence of unprotected sex on the "first night" among young people in Sweden is reported to be steadily increasing, particularly among females aged 16-19 years: it went up from about 12% in 2000 to 22% in 2007 (Danielsson et al. 2012). When condoms are used, then this is done primarily as a protection against pregnancy and not STIs, and their use becomes irregular when other contraceptives are used (Editorial team-Eurosurveillance 2005, BZgA 2006b, Danielsson et al. 2012). In addition, many adolescents do not perceive themselves to be at risk of contracting an STI. A survey of young people in England aged 16-21 years found that although a large proportion was concerned about STIs, lower proportions thought themselves to be at risk (Editorial team-Eurosurveillance 2005).

2.4.3 Sources of STI information for adolescents

Across countries, the majority of adolescents report that they acquire their information on sexual health in general, and on STIs in particular, primarily through formal health education in schools (Clark et al. 2002, Editorial team-Eurosurveillance 2005, BZgA 2006b, Jones et al. 2011). While

sexually active adolescents might acquire (more) information on STIs through contact with their gynaecologist or physician, those not yet sexually active are less likely to have had in-depth STI discussions with health care professionals (Clark et al. 2002, Swenson 2010). Other sources of information which are frequently mentioned by the adolescents include parents, peers, and different media such as the radio, television or internet (WHO 2001, Health Protection Surveillance Centre - HPSC 2005, Adler 2006, Tucker et al. 2006).

2.5 Determinants of STI risks among adolescents

During adolescence a combination of several factors such as societal, biological, psychological and behavioural ones serve to increase the risk of contracting an STI (Biglan et al. 1990, Murphey & Nagy 2002).

2.5.1 Biological factors coupled with decreasing age at first sexual contact

The anatomical developmental changes which occur in girls from childhood through puberty into adulthood make them more vulnerable to STIs (Bozon & Kontula 1998, Panchaud 2000, CDC 2012a). Soon after birth, the squamous epithelium which lines the vagina and cervix of newborns is replaced by columnar epithelium which, with age, eventually slowly recedes to be replaced again with squamous epithelium. The replacement continues well into adulthood and a typical cervix in an adolescent still has columnar epithelium, the epithelium typically infected by C. trachomatis and also susceptible to other STIs such as gonorrhea (Cheng & Lo 2002). The average age at first sexual intercourse is reported to have gone down over the last three decades, further increasing the risk of infection for adolescent girls. According to data from different European countries, a considerable proportion of adolescents report sexual activity before the age of 16 years (Kangas et al. 2004, Ross et al. 2004, BZgA 2006a, Tucker et al. 2006, Godeau et al. 2008, BZgA 2010). The most recent results of the international Health Behaviour in School-Aged Children survey conducted from 2009-2010 confirm this observation (Currie et al. 2012). On average, one in four of 15 year olds who took part in the survey reported having had sexual intercourse, with a higher prevalence being observed for boys than for girls (29 vs. 23%). In addition to increasing the chances of contracting an STI, an early onset of sexual activity also increases the probability of having various sexual partners over a lifetime (Heinz 2001).

In Sweden, the percentage of 16-17 year old females reporting having had three or more sexual partners went up from 8% in 2000, to 17% in 2007, and in males from 11 to 17% during the same period (Danielsson 2012).

2.5.2 Migrant background/ethnicity

Societal factors such as poverty and having a migrant background or belonging to an ethnic minority have been shown to influence health outcomes (CDC 2012b). There is evidence that persons with migrant backgrounds have less access to health services than the general population. Barriers which have been identified include lack of information, cultural differences and language deficiencies (Zeeb et al. 2004, Adams et al. 2007, Fernandez & Morales 2007, Spallek & Razum 2007, Razum & Samkange-Zeeb 2008). Several reports suggest that sexual health programmes do not reach ethnic minorities, and that in comparison to adolescents belonging to the main population group, those belonging to an ethnic minority group have lower STI knowledge and a higher risk of acquiring an STI (Bradby & Williams 1999, Murphey & Nagy 2002, Swenson et al. 2010, CDC 2012c).

3 Concept of Health Behaviour

The framework of this thesis is based on the theory that knowledge and awareness are determinants of health-related behaviour as is suggested in various health behaviour theories such as the Theory of Reasoned/Planned Action (TRA/PA) (Fishbein & Ajzen 1975, Ajzen 1985), the Health Belief Model (HBM) (Rosenstock 1974) and the Information-Motivation-Behaviour Skills (IMB) model (Fisher & Fisher 1992, Fisher et al. 1996).

Health behaviour is one of the central elements of people's health and well-being, and an important component of public health. It incorporates actions, behaviour patterns and habits relating to the maintenance, attainment, improvement or restoration of health (Conner & Norman 1996, Gochman 1997, Conner 2002). Health behaviour also includes behavioural aspects such as use of medical services, compliance with medical regimens, and self-directed health behaviours (Conner 2002).

Some of the most common behavioural contributors: use of alcohol and tobacco, diet and activity patterns, as well as sexual behaviour and use of illicit drugs, are initiated during adolescence (CDC 2011b, WHO 2013b). Improving health-related behaviours is thus at the core of many public health activities targeting young people (WHO 2011b).

Interventions used to change behaviour include activities aimed at the following:

1) increasing knowledge and awareness of risks or of services to help prevent risks,
2) changing attitudes, motivations, beliefs and perceptions,
3) increasing physical or interpersonal skills,
4) changing public perceptions on issues such as secondary smoking (influencing social norms) and
5) influencing the availability and ease of access to health services (Health Development Agency - HDA 2004).

3.1 Theories and models on health behaviour

Health behaviour or health-related behaviour is a complex concept incorporating interpersonal, community, and structural and environmental factors (Conner 2002). In an attempt to understand the nature and causes of different health behaviours, a number of theories and models addressing the various perspectives have been developed (Public Health Action Support Team - PHAST –

Principles and practice of health promotion 2011). Examples of factors associated with health behaviours include perceived symptoms, access to medical care services, personality factors, as well as cognitive factors (Conner 2002). Cognitive variables which have been investigated include perceptions of health risk, efficacy of behaviours in influencing the risk, social pressure to perform the behaviour, and control over performance of the behaviour (self-efficacy) (Conner 2002, Brewer & Rimer 2008). Theories such as the HBM (Rosenstock 1974) and the TRA/PA (Fishbein & Ajzen 1975, Ajzen 1985) have been criticised for their focus on individuals and their health-related beliefs, the argument being that individual actions are generally influenced by other factors occurring at higher levels (Brewer & Rimer 2008). For example, the decision to take part in a screening programme can be strongly influenced by policy or social context (Brewer & Rimer 2008).

Over the last years, several interventions aiming at inducing changes in health behaviour, particular in STI prevention programmes, have based their work on the information-motivation-behavioural skills model (IMB model) (Fisher & Fisher 1992, Fisher et al. 1996). The model which incorporates elements from other theories such as the HBM and the TRA/PA has been described as being a simple construct to explain complex health behaviours (WHO 2003). According to the model which is presented in figure 1, information (knowledge), motivation and behavioural skills are the fundamental determinants of STI prevention behaviour (Fisher et al. 2002). It postulates that although knowledge on its own can directly influence health behaviour, it however often joins with motivation to influence behaviour through behavioural skills (Jaworski & Carey 2007). The suggestion is that individuals are more likely to initiate and maintain health-promoting behaviour if they are well-informed, motivated to act, and they have the skills and confidence to take action (Fisher et al. 2003). The model is said to be suitable for sexuality education in the school setting as it can be easily translated into theoretically-based, behaviourally focused sexual and reproductive health programmes (McKay & Bissel 2010, Society of Obstetricians and Gynaecologists of Canada - SOGC 2012). It furthermore foresees different elements such as the provision of accessible and convenient adolescent preventive health services and social support from parents and others in the community (SOGC 2004).

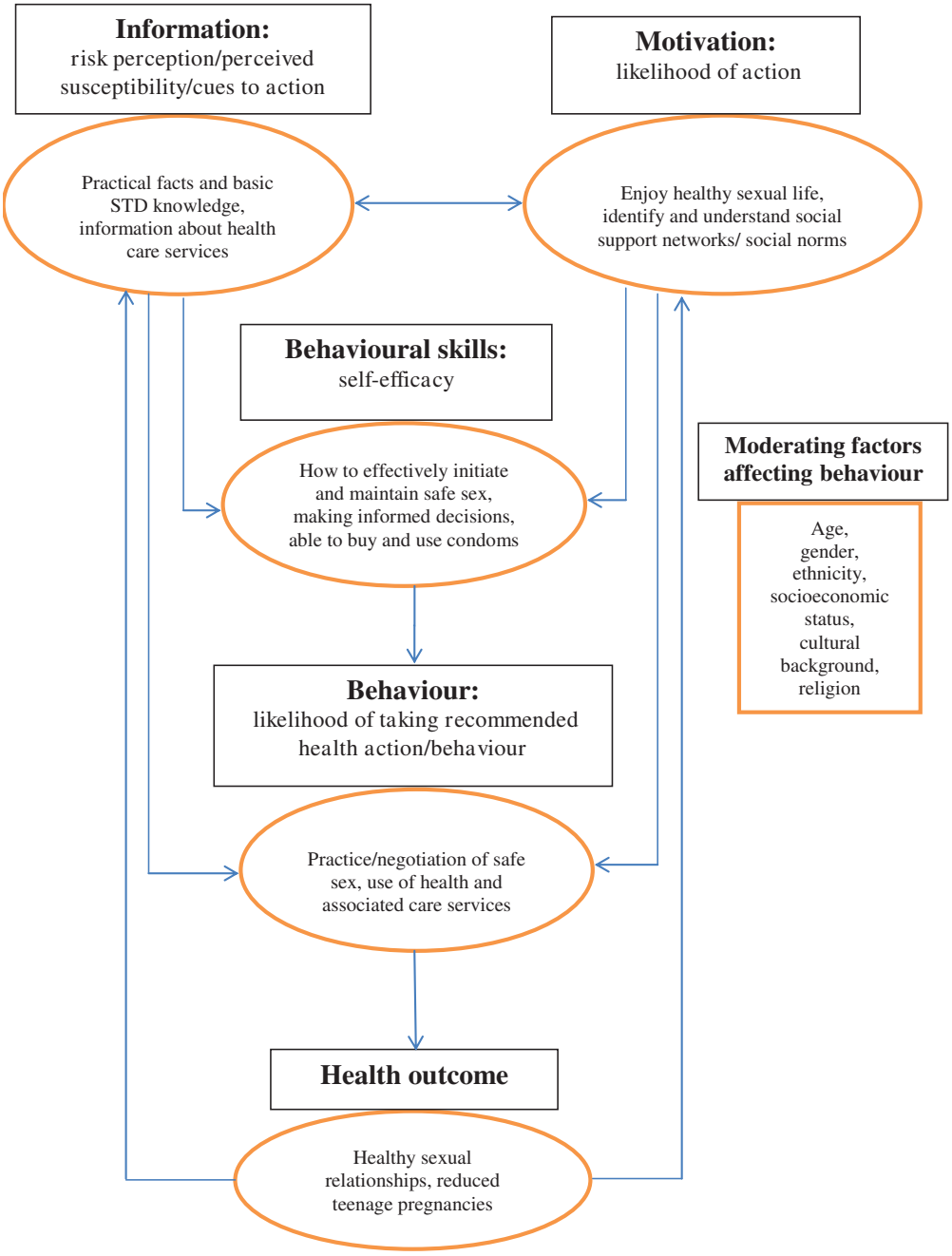

Figure 1: Schematic presentation of a possible application of the Information-Motivation-Behavioural Skills Model (IMB) in STI prevention, adapted from Fisher et al. 1996

4 Materials and Methods

The materials and methods used for the systematic literature review and the school-based survey are briefly described below.

4.1 Systematic literature review (Study I)

In preparation for Study II a systematic literature review on awareness and knowledge of STIs among school-going adolescents in Europe was conducted (Study I) so that we could have comparative data for the reflection of our own findings. Details of the search and the findings are presented in the manuscript **Samkange-Zeeb et al. 2011**. In brief, a total of 15 studies published in Pub Med between 01.01.1990 and 31.12.2010 fulfilling our inclusion criteria were included in the review. For the purpose of this review studies were said to have assessed awareness whether participants were merely required to identify an STI from a given list or name an STI in response to an open question. Knowledge assessment was when further questions such as on modes of transmission and protection were posed (**Samkange-Zeeb et al. 2011**). The methodology, including its strengths and weaknesses, is discussed in section 5.

4.2 School-based cross-sectional survey (Study II)

Between October and December 2011, we conducted a questionnaire-based cross-sectional survey to assess the knowledge and awareness of STIs among adolescents attending the 8th grade and above in 8 secondary schools, 6 in Bremen and 2 in Bremerhaven. The study was approved by the ethics committee of the University of Bremen, the Senator for Education and Science, and the Data Protection Officer for the State of Bremen.

Students with signed consent completed an anonymous, self-administered questionnaire at their school during normal school time. The questionnaire covered issues on knowledge and awareness of STIs, and on HPV vaccination among girls as well as demographic variables. Questions on knowledge and awareness of STIs were constructed based on questionnaires used in other studies which were included in the systematic literature review (Garside et al. 2001, Das et al. 2009, Gottvall et al. 2009). The questionnaires (one for girls and one for boys) were pre-tested on a sample of school-going adolescents aged 13-15 years. The participants were recruited from a school in Bielefeld, a city about 180 km from Bremen. The completed questionnaires were

assessed for ambiguity, clarity, comprehensibility, and completion times required, and were thereafter modified accordingly.

4.2.1 Operationalising awareness and knowledge

Awareness of STIs

To assess awareness of STIs, the students were asked to indicate which of the following diseases they had ever heard of: HIV/AIDS, HPV, chlamydia, herpes, syphilis, gonorrhea and hepatitis B. They were also asked to indicate their sources of information regarding sexual issues and STIs.

Knowledge of STIs

The following items were used to assess students' knowledge of STIs:

- knowing that using a condom protects against getting an STI,
- knowing that STIs can be passed on unaware,
- knowing that chlamydia, syphilis, gonorrhea are curable, but not HIV/AIDS, and
- knowing that there is no vaccine for HIV/AIDS, chlamydia, syphilis and gonorrhea

A summary variable describing knowledge of STIs was built based on the number of items the students had correctly answered, and ranged from 0-4.

Comprehensive awareness of HPV

Comprehensive awareness of HPV was assessed based on the following items:

- ever heard of HPV,
- aware that HPV can cause cervical cancer, and
- being aware that it is possible to be vaccinated against HPV.

As for STI knowledge, a new variable 'awareness of HPV' was built based on the number of items the students had positively responded to, and ranged from 0-3. Girls were also asked if they had been vaccinated against HPV.

Risk perception

To assess risk perception, pupils were asked to rate the risk of peers to get infected with HIV, HPV or chlamydia. They could choose one of the following responses: 'high', 'medium', 'low' or 'don't know'. Those reporting ever having sex were also asked to rate their own risk of getting infected with any of the three infections.

4.2.2 Data analysis

Cross-sectional data from Study II were analysed using different statistical methods summarized below.

Descriptive analyses were performed and frequencies for all variables calculated with the data stratified by sex (**Samkange-Zeeb et al. 2012a**, **Samkange-Zeeb et al. 2013**) and by migrant background (**Samkange-Zeeb et al. 2012b**). In addition, specific analyses were conducted for pupils with a Turkish migrant background, who comprised the largest group of pupils with a migrant background (**Pöttgen & Samkange-Zeeb 2013**). Similar descriptive analyses were also performed for the assessment of HPV vaccine prevalence (**Samkange-Zeeb et al. 20 12c**)

Chi-square test was used to assess bivariate relations between the independent variables age (in categories), sex, migrant background, school education of mother, ever had sex, type of school (offering up to the 10^{th} or up to the $12^{th}/13^{th}$ grade) and the following outcome variables: "knowledge of STIs" and "comprehensive awareness of HPV" (**Samkange-Zeeb et al. 2012a**, **2012b**, **Pöttgen & Samkange-Zeeb 2013**); "awareness of own vaccinations status" and "self-reported vaccine uptake" (**Samkange-Zeeb et al. 2012c**); and "peer and own risk perception for HIV, HPV and for chlamydia" (**Samkange-Zeeb et al. 2013**).

In all multivariable analyses, the demographic variables age, sex, migrant background and school education of mother were maintained in the models as they have been shown to be associated with knowledge and awareness of STIs among adolescents in other studies (**Samkange-Zeeb et al. 2012a, 2012b, 2012c, Pöttgen & Samkange-Zeeb 2013**). In analyses for the article **Samkange-Zeeb et al. 2012a**, a random effects ordinal regression model (PROC GLIMMIX) was initially applied to account for clustering of individual observations by school, and the COVTEST statement was used to test for differences by school. Where the covariance parameter was not significant, standard ordinal regression analysis (PROC LOGISTIC) was conducted. In each case, the proportional odds assumption was tested to assess the appropriateness of the ordinal regression model.

5 Results

In this section, the main findings of Study I and Study II are presented in relation to the four research questions. Study questions 1 and 4 are addressed using data from both the systematic literature review and the school-based survey, while questions 2 and 3 are addressed based on data from the school-based survey only.

Seven of the 15 studies included in Study I specifically focussed on HIV/AIDS only, four on STIs in general, one on STIs in general with focus on HPV, and three on HPV only. Although six STIs were focussed on in the studies, awareness and knowledge were assessed in depth for HIV/AIDS and HPV, and to some extent for chlamydia.

The study population for Study II comprised of 1148 pupils (participation rate 28%), 31% of whom had a migrant background. 55% of the pupils were girls, 45% were aged 12-14 years (median age 15 years and range 12-20 years), and 54% attended the 8^{th} and 9^{th} grade. Among those with a migrant background, 90 (25%) had a Turkish background, thereby comprising the largest group of pupils with a migrant background.

5.1 Study question 1: What is the level of knowledge and awareness of STIs among adolescents and are there differences between female and male adolescents?

This study question was addressed in both Study I (**Samkange-Zeeb et al. 2011**) and Study II (Article II) (**Samkange-Zeeb et al. 2012a**). In short, in the studies included in Study I and in Study II, high awareness levels of HIV/AIDS were observed, with more than 90% of adolescents reporting having heard of the infection. In contrast, lower proportions of adolescents had heard of HPV (range 5-66% in Study I and 13% in Study II). In the survey we conducted in Bremen and Bremerhaven (**Samkange-Zeeb et al. 2012a**) the level of awareness of chlamydia, at 23%, was lower than in the studies included in the systematic literature review (range 34-96%) (**Samkange-Zeeb et al. 2011**). Findings of both studies show that more girls than boys had heard of HPV and chlamydia. Surveys included in Study I which assessed general STI knowledge observed that all surveyed adolescents knew that using condoms can protect against the contraction of STIs and almost two-thirds knew that STIs in general can be symptom-free. Similar observations were made in Study II, with 94% of the students knowing that using a condom protects against contracting an STI, and 66% correctly responding that STIs in general can be passed on unaware

as they can be symptom-free. However, generally low levels of STD knowledge and comprehensive HPV awareness were observed in Study II, with higher levels of knowledge being observed among girls than boys.

5.2 Study question 2: Are there knowledge and awareness differences between same aged adolescents with and without a migrant background?

None of the studies included in Study I addressed this question. The analysis and the corresponding results based on Study II are described in the manuscripts **Samkange-Zeeb et al. 2012b** and **Pöttgen & Samkange-Zeeb 2013**. Differences in STI knowledge and awareness were generally observed between pupils with and without a migrant background. Statistically significant lower proportions of pupils with a migrant background reported having heard of six of the seven listed STIs, with larger differences being observed for syphilis (21 vs. 56%) and chlamydia (9 vs. 26%). Awareness of HPV was equally low within both groups. With regards to STI knowledge, a significantly lower proportion of pupils with a migrant background correctly answered at least two of the four items on STI knowledge (45 vs. 60%). Results of univariate and multivariable analyses stratified by migrant background showed that age, sex, and ever having sex were associated in a similar way with STI knowledge in both groups, with older pupils, girls and those reporting ever having sex having better knowledge (**Samkange-Zeeb et al. 2012b**). Similar results were observed for analysis comparing pupils with a Turkish migrant background to those without a migrant background (**Pöttgen & Samkange-Zeeb 2013**).

5.3 Study question 3: How high is the prevalence of HPV vaccination among female adolescents and are there differences between female adolescents with and without a migrant background who are of the same age?

As was the case in question 2, this question was not addressed in the studies included in the systematic literature review. This analysis was based on data from Study II and the results are presented in **Samkange-Zeeb et al. 2012c**.

The self-reported prevalence of HPV vaccination was 12%, with 57% of the 632 participating girls reporting not knowing whether or not they were vaccinated against HPV. The proportion of girls who did not know whether or not they were vaccinated against HPV was significantly higher among those with a migrant background (129/201 = 64%) than those without a migrant background (230/424 = 54%), p=0.03. 31% of the girls who said they had been vaccinated against

HPV had a migrant background, a proportion similar to the distribution of girls with a migrant population in the study sample. The variable ever having been to a gynaecologist was associated with both awareness of own vaccination status and self-reported vaccination uptake in univariate analyses, but only with awareness of own vaccination status in multivariable analyses.

5.4 Study question 4: How do adolescents perceive the risk of peers to get infected with an STI? And how do adolescents reporting ever having sex perceive their own risk of getting infected with an STI?

Detailed results of this analysis are presented in **Samkange-Zeeb et al. 2013**. The majority of pupils responded with 'don't know' or did not answer the question on risk perception for peers to get infected with HPV (65%) and chlamydia (60%). In comparison, only 4% responded with 'don't know' for HIV risk perception. Among the 310 pupils who reported ever having sex, 35% and 29% could not rate their own risk of getting infected with HPV and chlamydia respectively. Those who did not report ever having sex were not asked to rate their own risk of getting infected with an STI.

Generally, the risk of peers to get infected with HIV was perceived as being higher than that of getting infected with chlamydia or HPV. A similar tendency was observed among those who reported ever having sex, with the risk of getting infected with HIV being perceived to be higher than that of getting infected with HPV or chlamydia. Furthermore, the own risk of getting infected with HIV, chlamydia or HPV was generally perceived to be lower than that of peers.

6 Discussion

In this dissertation basic STI knowledge and awareness, as well as comprehensive HPV awareness of school-going adolescence aged 12-20 years was assessed using a systematic literature review and a multi-centric school-based survey.

The discussion is divided into two parts dealing with the materials and methods used for the thesis and the main findings.

6.1 Materials and methods

The thesis incorporates two methodologies: a systematic literature review and a school-based cross-sectional survey. To start with, the relevance of the systematic literature review and its strengths and weaknesses will be described. The emphasis of the methodological discussion is however on the cross-sectional survey as it is the core of the thesis. Attention is paid to various factors pertaining to school-based survey, beginning with issues surrounding the use of the school as a study setting and the associated challenges. The latter are discussed in detail as they have been observed to directly influence the success or failure of school-based surveys (Harrington et al. 1997, Blinn-Pike et al. 2000). Thereafter, other issues including the use of a questionnaire to collect data, questions used to assess knowledge and awareness of STIs, and self-reporting bias will be discussed. The conduction process of the survey will be reflected upon, and the strengths and limitations, as well as ways in which the survey could have been improved, will be discussed.

6.1.1 Systematic literature review

A systematic literature review identifies, evaluates and interprets empirical evidence relevant to a particular research question or topic area using clearly defined systematic methods which minimise bias (Kitchenham 2004, Higgins & Green 2011). Systematic reviews can be conducted to summarise known information about a certain topic, treatment or technology, to identify gaps in research and suggest areas for further investigation, or to provide a background against which new research activities or policies can be positioned (Kitchenham 2004).

We conducted a systematic review on knowledge and awareness of STIs among school-going adolescents in Europe to get a clear picture of research activities in this area and so that we could relate our findings to the European context.

In accordance with the recommendations of the Cochrane's Handbook on systematic reviews (Higgins 2011) we explicitly stated the objectives and pre-defined the eligibility criteria for studies. The methodology we used, including the search protocol, was published as a supplementary document to the corresponding manuscript, **Samkange-Zeeb et al. 2011**. To assess the methodology of the studies included in the review, a modified version of the Critical Appraisal Form from the Stanford School of Medicine was used (Stanford school of medicine 2010). We however were not able to assess the risk of bias in the included studies as most of them did not provide the necessary information. For example, in some studies it was not clear how many schools participated in the survey (Andersson-Ellström et al. 1996, Goodwin et al. 2004, Sachsenweger et al. 2010), how the schools were selected (Eriksson et al. 1997, Gottvall et al. 2009), or what the participation rate was (Garside et al. 2001, Macek & Matkovic 2005). A further limitation is that we could not conduct a meta-analysis of the data as the wording of the questions used to assess awareness and knowledge varied between studies, as did the age of participants included in the studies. As we restricted our search to original, peer-reviewed studies clearly assessing knowledge and awareness among school-attending adolescents, it cannot be ruled out that we missed some relevant grey-zone literature. Including the latter would however have made the quality assessment of included literature even more difficult as these are generally not based on original, systematically conducted surveys. Finally, as the search was limited to German and English literature, this precluded the inclusion of studies in other European languages.

6.1.2 School-based cross-sectional survey

As we were interested in surveying adolescents aged 12-19 years old, an age at which the majority attends school, we decided to use the school as a place for recruiting and conducting the survey.

6.1.2.1 The school as a study setting

Schools are ideal locations to conduct surveys on adolescents as they offer the opportunity to access young people of different social and ethnic backgrounds under similar circumstances (Abraham 1996, L'Engle et al. 2004). This is especially the case in countries such as Germany and other industrialised countries, where formal school education is compulsory for at least 10 years. Conducting surveys in schools however presents the problem that the surveys have to be accommodated during school time, meaning that lesson time has to be set aside for this. Schools are not always able or willing to sacrifice instructional time, and are even more reluctant when the research involves collection of sensitive health and sexuality data (L'Engle et al. 2004).

The success or failure of school-based surveys, in particular those on sensitive topics, is said to be directly influenced by factors concerning recruitment (Blinn-Pike et al. 2000). Unfortunately, as Blinn-Pike and colleagues noted (Blinn-Pike et al. 2000), there is a lack of published analyses on recruitment issues, especially concerning acquiring permission from the educational administrative authorities and the recruitment of schools and of pupils. The authors argue that researchers should publish their recruitment experiences so that other school-based researchers benefit from these experiences, regardless of whether they were positive or negative. We present our experiences in section 6.1.2.3. Although there are differences in procedures between and within countries, there are some common hurdles which have to be overcome, such as getting in touch with the schools and getting them interested in the research. In the federal state of Bremen where we conducted our school-based survey, researchers are advised to have a preliminary agreement with schools before submitting a written application to the education administrative authorities, the Senator for education and science (Senatorin für Bildung und Wissenschaft 2010). The school principals have to inform the school board about the request from the researchers and get their acquiescence before reaching a final co-operation agreement with the research institute.

6.1.2.2 Selecting schools for participation

The advantages of the school as a setting for research which have been mentioned in the foregoing section are closely linked to the challenges of selecting schools such that representative samples of adolescents are included (Harrington 1997, Aarons 2001, L'Engle et al. 2004). Cluster sampling is the method generally used in school-based research, with individual pupils being grouped into clusters at the level of classrooms, which in turn are grouped at the level of schools (Ross 2005, Ahmed 2009). Using this approach, we randomly selected 18 of the 67 state secondary schools which were registered in Bremen and Bremerhaven in the school year 2009/2010. At this time, the school system in the state of Bremen was restructured from the traditional 3-tier system (Hauptschule, Realschule and Gymnasium) to the current 2-tier system (Oberschule and Gymnasium). For reasons of simplicity, we divided the schools into two groups: those offering up to the 10^{th} grade only, and those offering up to the 12^{th} /13^{th} grade. Eight of the 18 contacted schools (44%) agreed to participate in the survey.

6.1.2.3 Reasons for refusal on part of schools

Thirteen of the 18 principals we contacted responded to the first postal or follow-up telephone contact whereby nine expressed their interest, three were not interested and one school could not take part as it was closing down. We were not able to reach the principals of the remaining five

schools despite contacting the school secretaries on several occasions. The most common reason given for non-participation was work overload. It has been observed that schools are receiving requests to take part in surveys on a regular basis and have begun to decline to participate in research which they might consider to be of great benefit as they have no time to differentiate between the many requests they receive (Brettfeld et al. 2005, Sturgis et al. 2006). In addition, schools are increasingly under pressure to obtain good grades and have difficulties fitting in extra-curriculum activities (L'Engle et al. 2004). Over the last few years, the educational system in Germany has been reformed with the number of school years leading to the high school certificate being reduced from 13 to 12 years. In Bremen, the reformation was done the same year the school system was restructured as described in the foregoing passage. The school principals received our letters of request at a time when they were pre-occupied with the planning of the implementation of these changes. It is thus understandable that some of them were not prepared to take on extra responsibilities. Furthermore, the fact that we intended to include all grades and classes from the 8th grade and above might have contributed to some of the schools deciding not to take part in the survey.

It also cannot be ruled out that the topic of research was the actual reason for refusal. Reluctance on the part of schools to participate in research on sensitive issues such as sexual health and sexuality has been reported in other studies (L'Engle et al. 2004). In Bonn, a city in North Rhine Westphalia, researchers experienced difficulties finding schools willing to participate in a survey on knowledge of chlamydia trachomatis (Lengen et al. 2010), stating that they could not find a high-level secondary school (Gymnasium) in their chosen study region willing to participate in their survey and hence approached a comprehensive school. For the Health Behaviour of School Children survey carried out in 35 countries and regions, four countries did not include questions on sexual health in their questionnaires as they felt that this would negatively affect school participation rates (Ross et al. 2004).

6.1.2.4 Informing parents and pupils about the survey

The principals of the 8 participating schools informed the school board about the study and also provided them with study information. In turn, the parent representatives informed the other parents. In some schools class teachers also informed parents during class meetings. We have no evidence whether or not the lack of direct personal contact to parents affected the acceptability of the survey among them. In retrospect, we could have requested permission to personally present the survey to the parents, as was done in two surveys conducted by our BIPS colleagues. For the

IDEFICS and PATREC studies which focused on nutrition and physical activity respectively, members of the institute informed parents about the study during parents' meetings and were able to discuss and answer questions which were raised by parents (personal communication: Ahrens W 2012, Herrmann D 2013). The direct communication probably led to the relatively high participation rates observed for both surveys. However, as the topic of our survey is of a more sensitive nature, we cannot be sure that the parents would have reacted in the same manner had we presented our survey during a parents' meeting.

Similar to the approach used for informing parents, class teachers also informed the pupils about the survey. Here again, it might have been better if we had done this, especially as we do not know whether all pupils were informed or, respectively, what the pupils were told. Given the large number of classes and schools and the limited resources, the choice not to aim for direct personal contact was a pragmatic one.

6.1.2.5 Distribution of study material including consent forms to parents and pupils

As was done in other school-based surveys (Fletcher & Hunter 2003, Ji et al. 2004, 2006, Heitmeyer et al. 2006), class teachers distributed information flyers and other study material to the pupils, who then gave it to their parents. Some pupils might not have given their parents the information because they were not interested in participating and did not want to risk that their parents might sign for them to participate. On the other hand it is possible that some signed consent forms, whether for or against the survey, were not returned to the schools because the pupils forgot. A further point to consider is that we cannot be sure that all teachers distributed the study material to the pupils. In a longitudinal study conducted in schools in North Rhine-Westphalia, the researchers noted that the teachers did not equally distribute study material to pupils (Babka von Gostomski et al. 2001). Similar to the discussion on the presentation of the survey to parents and pupils, a way of ensuring that the pupils get the study material would have been to distribute it to them ourselves, as was done for the PATREC study (personal communication: Herrmann D, 2013).

6.1.2.6 Overall participation rate and differences between schools

At 28%, the overall participation rate in our survey (based on the total number of pupils attending the 8th grade and above in the participating schools) was low in comparison to rates observed in other school-based surveys on STIs. We believe that the low participation rate was mainly due to two factors: the requirement of active consent and the topic of the survey.

The effect of active or passive consent on participation rates has been discussed in the literature. Whereas active consent stipulates that pupils can participate in a survey only when there is signed consent from the parents, passive consent foresees that parents actively refuse to let their children participate by signing a form or writing a letter to this effect. If no response is received, this is taken as acquiescence. Hence passive consent is generally associated with higher participation rates (Eaton et al. 2004). For our survey active parental or own consent was required. A number of surveys included in Study I (**Samkange-Zeeb et al. 2011**) which reported high participation rates did not clearly state whether active or passive consent was required (Das et al. 2009, Höglund et al. 2009, Pelucchi et al. 2010, Sachsenweger et al. 2010). In others, pupils were informed shortly before completion of the questionnaire that participation was voluntary (Gottvall et al. 2009). This method could have contributed to higher participation rates as pupils might have found it difficult to decide against participation, especially if the rest of the class was participating and/or the teacher was supportive of the survey. We also believe that the subject of our survey also contributed to the low participation rate we observed, particularly as some parents are not willing to let their children participate in surveys related to sexual health and sexuality (Blinn-Pike et al. 2000).

Furthermore, we observed different participation rates between the eight participating schools varying from 10-60%. As has been reported in other surveys (Ji et al. 2004, L'Engle et al. 2004), the interest of teachers in the survey positively influenced participation rates in individual schools. In our survey, schools with higher rates were those where teachers actively reminded and encouraged pupils to return consent forms. In two of the schools, the secretaries also helped organise the survey and reminded teachers and pupils about the arranged dates. Contrary to general opinion in Germany on participation of school pupils in surveys and to our own expectations, the lowest participation rate observed in our study was achieved in a typical Gymnasium (high-level school) located in the middle of town, and the highest in a lower level secondary school located in a socially disadvantaged area. Looking back, we believe that the method of collecting consent forms was the main underlying cause for the extremely low participation rate in this school. Whereas in other schools the class teachers or course teachers collected the consent forms from the pupils directly, we later discovered that in this school, pupils attending the upper secondary school (grade 10 and above) were expected to return the consent forms to the school office. The pupils were not reminded to return consent forms and as a result only 84 from a possible 840 pupils (10%) participated in the survey.

We received a total of 290 active refusals of participation from parents from all schools, 20% of all returned consent forms. The proportion varied from 2-51% in the individual schools. In the school with the highest proportion of refusals, more than a third of these were from migrant families, mostly with a Russian background. In general we view the refusals in a positive light, as this is evidence that the pupils had given their parents the study material.

6.1.2.7 Using a self-completion questionnaire as assessment instrument

Self-completion paper-based questionnaires are generally used in surveys as they are easy to implement and the data collected are easy to analyse. They are ideal for use in school-based surveys as they can be completed by pupils in different classes at the same time with relatively low manpower requirements (L'Engle et al. 2004). The main advantage of self-completion questionnaires, especially when data on sensitive issues such as sexual health and/or sexuality are being collected, is that they provide anonymity for the respondent. A questionnaire for own completion offers a semblance of privacy and anonymity and is said to reduce potential social conformity or desirability bias (Dariotis et al. 2009, Phellas et al. 2011). To enhance the feeling of anonymity we did not print identification numbers on the questionnaires before the adolescents completed them. The numbering of questionnaires was done after they had been completed and after returning to the institute. Whereas there is consensus on the positive effect of not numbering questionnaires on anonymity, its effect on honesty of responses is controversially discussed. While in some studies not numbering or marking questionnaires has been reported to increase the feeling of privacy and anonymity among participants and to also lead to more honest responses, (Colton & Covert 2007, Evans & Rooney 2008, Mitchell & Jolley 2010) other studies have observed that anonymity does not necessarily affect responses, but might instead lead to decreased accountability and less motivation to answer thoughtfully and precisely (Lelkes et al. 2012). Our main objective was to enhance the feeling of anonymity among the pupils, which we hoped would encourage them to complete the questionnaire honestly.

6.1.2.8 Assessing knowledge and awareness of STIs

Knowledge of STIs is defined as encompassing the following aspects: aetiology, transmission/non-transmission, consequences of infection, testing and detection, risk reduction/prevention, and treatment/cure (Jaworski & Carey 2007).

The majority of studies with a similar goal to that of this thesis, namely to identify knowledge and awareness deficits, use a combination of the following items to determine basic knowledge of

STIs: a) being able to identify or having heard of a given STI, b) identifying curable and non-curable STIs, c) understanding that STIs can be asymptomatic, d) knowing that using condoms can protect against infection, e) knowing that there is no vaccine for HIV/AIDS, chlamydia, syphilis and gonorrhoea, and f) being able to identify the most prevalent STI in one's country (Temin et al. 1999, Clark et al. 2002, **Samkange-Zeeb et al. 2011**). For our survey we differentiated between STI knowledge and STI awareness. We defined ever having heard of a given STI as awareness, and used items b), c), d) and e) to assess STI knowledge. Studies focusing on knowledge and/or awareness of HPV generally use one or more of the following to determine the outcome: a) ever heard of HPV, b) awareness that HPV can cause cancer, c) identifying HPV as an STI, and d) awareness of HPV vaccine (Blödt et al. 2012, Stöcker et al. 2012). Whereas in the majority of studies 'ever heard of HPV', 'awareness that HPV can cause cervical cancer and 'awareness of HPV vaccine' were assessed as separate variables (Göttvall et al. 2009, Höglund et al. 2009, Pelucchi et al. 2010), we combined the three to form a more comprehensive awareness outcome (**Samkange-Zeeb et al. 2012c**).

6.1.2.9 Assessing risk perception of adolescents

Knowledge and awareness of STIs is closely linked to risk perception, and, together with other influencing factors such as perceived severity, as well as perceived benefits or barriers, assumed to shape health behaviour (Leval et al. 2011). To assess risk perception of adolescents in our survey, initially all participating adolescents were asked to rate the risk of same-aged adolescents to be infected with HIV/AIDS, HPV or chlamydia as high, medium, low or don't know (**Samkange-Zeeb et al. 2013**). Thereafter, those reporting ever having sex were asked to rate their own risk of being infected with the forenamed diseases. These three infections were included in the analyses as HPV and chlamydia are reported to be the most common STIs among adolescents in industrialised countries and HIV is the STI most adolescents have heard of (BZgA 2006a, **Samkange-Zeeb et al. 2011**). Other than in studies in which risk perception is assessed as a dichotomous item (yes/no) (Bobrova et al. 2005, Pelucchi et al. 2010), we offered the adolescents four categories as noted above to choose from. Although other researchers have also used at least three categories to assess risk perception (Ellen et al. 2002, Woodhall et al. 2007, Buzi et al. 2013), none of them used the 'don't know' category. It was important for us that the adolescents have the option to choose 'don't know', especially in light of the fact that the majority of adolescents are reported not to have any knowledge or awareness of HPV and chlamydia (**Samkange-Zeeb et al. 2011**).

6.1.2.10 Self-reporting bias

A phenomenon well known in research involving self-reported information is information bias (Stone et al. 2000, Razum et al. 2009). In surveys on STIs, it has been observed to play a role where participants are asked to report on previous or current infections. Participants' responses are affected by various factors such as memory failure, not understanding the question or social conformity (Dariotis et al. 2009). Studies which have compared self-reported STI infection and medical records have shown that participants, especially adolescents, generally under-report infection (Clark et al. 1997, Dariotis et al. 2009). The focus of this survey was not on diagnosed infections, but on knowledge and awareness. Self-reporting bias should thus not have played a major role in our study. It could however have played a major role on the question on sexual activity. It cannot be ruled out that some adolescents reported not having had sex although they had had, possibly because they were afraid their school mates or teachers would find out what they had answered. On the other hand, pupils who had never had sexual contact might have reported that they had just to impress their mates. Some adolescents have been reported to falsely report sexual activity so as to bolster their status with friends, while others do not admit their experience due to fears of stigma or embarrassment (Palen et al. 2008). Self-reported sexual activity honesty has been reported to be higher for older than for younger adolescents as sexual experience may not have as much relevance for positive or negative social status for them (Siegel et al. 1998). Use of contraceptives could also have been over-reported to suit social desirability.

Studies which have assessed reliability of self-reported sexual activity among adolescents have observed that the information is generally reliable, especially where lifetime activity is assessed using a single item "ever having sex" (Romer et al. 1997). Information becomes less reliable when adolescents are asked how often they have had sex (Sieving et al. 2005). In our survey pupils were asked if they had ever had sex, their age at sexual debut, and how many sexual partners they had had. Reporting of the latter two has been observed to be consistent in adolescents surveyed in other studies (Brener et al. 2002, Hearn et al. 2003, Vanable et al. 2009), so we can assume that participants of our survey honestly answered these questions. Studies reporting less reliability generally relied on face-to-face interviews and not on self-completed questionnaires, probably leading to adolescents changing their responses, depending on who was interviewing them (Des Jarlais et al. 1999).

6.1.2.11 Detail of information collected

Although standardised questionnaires have the advantage that the information collected can be easily compared and analysed, there is the disadvantage that the data collected might not be detailed enough. Particularly when personal issues are being surveyed, a standardised questionnaire might not leave enough room for in-depth information to be reported (Milne 1999). A possible way of compensating for this is to conduct qualitative interviews with a number of participants. For this survey, details on sources of information and the experiences of adolescents when trying to or accessing health care services, as well as risk perception could have been discussed in depth during qualitative interviews, providing insights beyond those from the quantitative survey. Other surveys on knowledge of STIs among school-going adolescents successfully combined quantitative and qualitative methods (Temin et al. 1999, Garside et al. 2001). As we experienced difficulties getting permission from the school authorities to conduct the quantitative survey in schools, no attempt was made to conduct qualitative interviews in the schools or to recruit participants for yet another primary data collection endeavor through schools. A separate research project would have to be initiated, potentially in another setting such as in youth centres.

6.1.2.12 Assessing socioeconomic status of adolescents

In most studies, the socioeconomic status (SES) of parents is used as proxy for adolescent SES (Currie et al. 1997, Wardle et al. 2002, Currie et al. 2008). We assessed SES of adolescents based on self-reported data from the adolescents themselves on parental education and occupation, as was done in other studies, including the early surveys of the Health Behaviour in School-aged Children (HSBC) (Bartley et al. 1995, Currie et al. 1997, West 1997, Tuinstra et al. 1998, Lien et al. 2001). However, we could not use the indicators maternal occupation and paternal education and occupation in the analyses as most of the information reported was either incomplete or missing. Similar difficulties have been experienced in other studies which have used this approach (Tuinstra et al. 1998, Lien et al. 2001). To combat this problem, it has been suggested that non-occupationally based indicators such as household telephone, car and computer ownership, having own unshared bedroom and spending or pocket money, and own possession of a computer or television, in short the Family Affluence Scale (FAS), be used to assess SES of adolescents (Currie et al. 1997, Wardle et al. 2002). The FAS has been observed to be more reliable and valid than collecting data on parental education and occupation (Wardle et al. 2002, Currie et al. 2008) and has been used in the HSBC survey since 1993/1994 and in other surveys involving, or

conducted on, adolescents (Wardle et al. 2002, Currie et al. 2008). Unfortunately we did not apply this concept. In retrospect, we would probably have collected more useable data had we included two or three of the FAS indicators in our questionnaire.

6.1.2.13 Assessing migrant background

As one of the aims of the study was to investigate whether differences in knowledge and awareness exist between pupils with and without migrant background, it was important not only to have a precise definition of the term, but also to take the heterogeneity of the migrant population into consideration when constructing the questionnaire. Up to not so long ago, research involving migrant populations in Germany predominantly defined the populations based on nationality. This was found not to be adequate as it failed to mirror the diversity of the German citizens, a result of the naturalisation of foreign nationals residing in the country. Similar to the approach used in the German National Health Interview and Examination Survey for Children and Adolescents (KIGGS), we used the concept of international migration rather than of ethnicity or race (Schenk et al. 2007). The recommended basic set of indicators required to assess migrant background are parental country of birth, nationality and mother language (Schenk et al. 2006). We did not use nationality as an indicator as it was felt that some adolescents might not know which nationality they or their parents possess. Instead we used the following indicators: pupil's country of birth, parental country of birth and the main language spoken at home.

6.1.2.14 Dealing with cluster-correlated data

Cluster-correlated data occur when there is a grouped or clustered structure to the data such as the case in school-based surveys. The data can also be regarded as hierarchical or multilevel, with individual pupils forming the first level which is nested in the second level, the class, which in turn is nested in the third level, the school (Siddiqui et al. 1996, Fitzmaurice 2005, Desai & Begg 2008). An important effect of clustering is that measurements on units within a cluster are more similar than measurements on units in different clusters. For school-based surveys this would mean that pupils attending the same class would be expected to have similar levels of STI knowledge and awareness. To enhance and preserve anonymity, we did not collect information on the classes the pupils attended; therefore our data has two levels, the individual (pupil) and the school level.

To avoid biased estimates of standard errors and consequently misinterpretation of results, the intra-cluster correlation at each level has to be accounted for in statistical models (Begg & Parides 2003, Fitzmaurice 2005, Desai & Begg 2008). We used a random effects ordinal regression model

(PROC GLIMMIX in SAS) to test for the effects of clustering. Standard ordinal regression analysis (PROC LOGISTIC) was conducted where the covariance parameter was not significant.

6.2 Discussion of results

In this second part of the discussion, first the main findings of both Study I and Study II will be discussed under the aspect of the four research questions and in view of current literature. This is then followed by a discussion of factors which were observed to influence knowledge and awareness of STIs such as age and sexual activity, and of the sources of information mentioned by the adolescents. The discussion then closes with a brief debate on the interaction between knowledge, risk perception and health behaviour.

> **Study question 1**: What is the level of knowledge and awareness of sexually transmitted infections among adolescents and are there differences between female and male adolescents?

The high levels of HIV/AIDS awareness observed in both Study I **(Samkange-Zeeb et al. 2011**) and Study II (**Samkange-Zeeb et al. 2012a**) have been observed in other studies and are most likely a direct result of the attention paid to the disease globally. Furthermore, HIV is reported to be the infection generally focused on in sexual health education in schools in Germany (BZgA 2006a) and in other countries (CDC 2003, Jaworski & Carey 2007). As observed in studies included in Study I which compared STI knowledge between boys and girls (**Samkange-Zeeb et al. 2011**), girls participating in Study II had better general STI knowledge and awareness than boys (**Samkange-Zeeb et al. 2012a**). Similar observations have been made in other surveys on adolescents (Agius et al. 2006, Bretas et al. 2009, Saewyc 2012), especially those focusing on knowledge of HPV and chlamydia (Lengen et al. 2010, Stöcker et al. 2012). A possible explanation for this difference which has been put forward is that most STI prevention programmes are targeted more at females than at males (Agius et al. 2010). This has become more apparent in the last few years, where HPV awareness campaigns such as the "Mädchen checken das" initiative from the Deutsche Krebshilfe (German cancer aid) (Deutsche Krebshilfe 2007) have focused on female adolescents. This disparity in knowledge and awareness is cause for concern, as male adolescents are equally at risk of contracting and transmitting HPV and chlamydia (Smith et al. 2011, Saewyc 2012). In addition, in some countries the vaccination of male adolescent against HPV is now recommended (CDC 2011c, Canada Communicable Disease Report - CCDR) or the issue is being discussed (Forster et al. 2012, Georgousakis et al. 2012).

Although 84% of the pupils who participated in Study II reported that they had heard of cervical cancer, 62% did not positively respond to any of the items on HPV awareness (**Samkange-Zeeb et al. 2012a**). This discrepancy, which was also observed by Stöcker et al. 2012, is a possible indication of the dissociation of cervical cancer and HPV. It cannot be ruled out that had the pupils been required to indicate if they are aware that there is a vaccine against cervical cancer, more would have answered in the affirmative. This observation was made in the survey by Blödt et al., in which 95% of female students and 80% of males were aware of the 'vaccine against cervical cancer', but only 50% of females and 25% of males had heard of HPV (Blödt et al. 2012).

Linked to the association with familiar terms is the methodological issue of the wording and formulation of questions used to assess knowledge and awareness. This is one of the main factors which appeared to have influenced knowledge and awareness levels reported in the 15 studies included in the literature review in Study I. Higher STI awareness was observed when adolescents were required to identify STIs from a given list, or were asked if they had ever heard of a particular STI, than when they had to respond to the open question 'Which STIs have you ever heard of?' (**Samkange-Zeeb et al. 2011**). Closed questions, as in the first two examples, although easier to analyse, are said to have the inherent disadvantage that they encourage guesswork and thus do not really depict awareness (Vinten 1995, Krosnick & Presser 2010). Thus it cannot be ruled out that although low, the proportion of pupils reporting having heard of HPV and chlamydia in the school-based survey we conducted is still overestimated. The adolescents were asked to identify STIs they had heard of from a given list, hence the risk of guesswork cannot be ruled out.

> **Study question 2**: Are there knowledge and awareness differences between same aged adolescents with and without a migrant background?

In several studies, adolescents belonging to ethnic minorities, respectively having a migrant background, have been reported to have less knowledge and awareness of STIs in general (Kann et al. 1995, CDC 2012c) and of HPV in particular (Walsh et al. 2008, Marlow et al. 2009, Das et al. 2010, Blödt et al. 2011, Gelman et al. 2011). Results of analyses in Study II on STI knowledge in models adjusting for migrant background, as well as of bivariate analyses in which data were stratified by migrant background support these findings (**Samkange-Zeeb et al. 2012b**, **Pöttgen & Samkange-Zeeb 2013**). The differences in STI knowledge have been attributed to different cultural and religious approaches towards sexuality. In some cultures to which migrant

populations belong, it is not custom to discuss sexual issues. Although sexuality education is compulsory in Germany, it has been observed that some fundamental Christian and Muslim parents try to keep their children from participating in sexual health education activities in school (International Planned Parenthood Federation - IPPF 2006)

Regarding comprehensive HPV awareness, in Study II, both pupils with and without a migrant background had similar low levels of awareness. This observation is most likely a reflection of the general low awareness of HPV which has been observed in the general population (Klug et al. 2008) and of the fact that in our survey comprehensive HPV awareness was assessed using items specific to the infection. However, as we conducted the survey 4 years after the recommendation of the HPV vaccine for 12-17 year olds girls in Germany (Ständige Impfkommission - STIKO 2007), we would have expected that the majority of participating pupils, in particular girls, would at least have heard of the infection. This is especially so as the introduction of the vaccines was not only accompanied by relatively extensive marketing campaigns, but was also controversially discussed by scientists (Gerhardus et al. 2009) as well as in the general population. The fact that only a small proportion of the adolescents participating in our survey had heard of HPV despite the public attention paid to the vaccine may indicate, as postulated in the concept of adolescence, that adolescents do not necessarily take notice of ongoing discussions in their environment unless this is of direct interest to them or is directly addressed to them (Spano 2004, San Antonio 2006). Similar to the information campaigns on HPV vaccination in the media which were targeted at mothers, the debate on the vaccines was targeted more at parents (mothers) as decision-makers, than at adolescents (Blum 2008).

Interestingly, when analysed separately, sex was observed to have similar effects in the group of adolescents without a migrant background as well as in those with a migrant background, with girls having better STI knowledge and awareness than boys. Furthermore, girls with a migrant background had better STI knowledge and awareness than boys without a migrant background, a possible indication that migrant background is not the only decisive factor. A factor which could have also influenced STI knowledge is SES. As mentioned in section 6.1.2.12, we did not collect enough information to assess SES and were thus not able to investigate its possible effect on STI knowledge. The association between the two variables is discussed in more detail in section 6.2.1.

Study question 3: How high is the prevalence of HPV vaccination among female adolescents and are there differences between female adolescents with and without migrant background who are of the same age?

12% of the 632 girls aged 12-20 years who participated in the school-based surveys reported having been vaccinated against HPV (**Samkange-Zeeb et al. 2012c**). The proportion of girls reporting having been vaccinated against HPV increased with age, from 8% in the age-group 12-14 years old to 22% among those at least 18 years old. In a similar survey carried out among 10th graders in Berlin aged 14-18 years, participating girls provided their vaccination cards for assessment. 41% of the participating girls had received all three doses of the vaccine (Stöcker et al. 2012). There were no differences in proportions of pupils with and without migrant background reported having been vaccinated against HPV. In their survey, Stöcker and colleagues also did not observe difference in vaccine uptake by migrant background (Stöcker et al. 2012).

As the HPV vaccine is still controversially discussed in Germany, it is possible that the 12% prevalence we observed is a reflection of this debate. Stöcker and colleagues reported that some of the girls who were not vaccinated against HPV reported that they had been dissuaded by their parents and/or their physicians (Stöcker et al. 2012). In the federal state of Bremen, the introduction of the vaccines was discussed for a long time particularly at the political level. An official information flyer on HPV and HPV vaccine prepared by the "Nationale Netzwerk Frauen und Gesundheit" (National network women and health) and targeted at girls attending the 8th grade and above was distributed to schools at the beginning of 2011, 4 years after the vaccine was recommended in Germany. Some parents may have decided against vaccinating their daughters while the discussion was still on-going. According to data from the federal state of Brandenburg, the proportion of girls attending the 10th grade who had received all three doses of the HPV vaccine was 24% in 2009, 33% in 2010 and 40% in 2011 and 2012 (Landesamt für Umwelt, Gesundheit und Verbraucherschutz, Brandenburg 2013). It is thus possible that the vaccine prevalence in the state of Bremen has since increased.

Results of the analysis on the prevalence of HPV vaccination, with almost two thirds not knowing their vaccination status, were unexpected and worrying. We cannot explain this finding and presume that it could be due to either or both of the following factors. Firstly, the adolescents might have had difficulties differentiating between the HPV vaccination and other routine vaccinations. A further explanation could be that the girls were vaccinated without being informed. It is possible that some parents, faced with the dilemma of vaccinating their daughters and the fear that this might lead to sexual activity on the part of the girl, had their daughters

vaccinated without informing them. Our finding of the survey that significantly more pupils with a migrant background reported not knowing whether or not they were vaccinated against HPV could be related to the issue of parental dilemma. It is known that cultural and religious backgrounds influence attitudes towards the subject of sexuality and whether or not the issue is discussed within families or in the community (Reis et al. 2011). This may to some extent explain the observation we made.

The issue of whether or not girls have been vaccinated might have been minimised had we asked the participants to bring their vaccination cards along on the day of the survey, as was done by Stöcker and colleagues (Stöcker et al. 2012). Another possible option to clarify the issue would be to analyse health care data from health insurance companies to find out how many adolescents have been vaccinated, for example by working with insurance data available at the BIPS. However, as the data from the health insurance companies is provided in lagged time periods, it would not have been possible to get an up-to-date impression of the vaccine prevalence. Furthermore, it is not possible to analyse the data by migrant background as this information is not available in the dataset. Finally, the endeavor would entail data protection procedures and contract elements which can prove to be bureaucratic and complicated, as for example individual consent from parents to retrieve this information would have been necessary.

> **Study question 4**: How do adolescents perceive the risk of peers to get infected with an STI? And how do adolescents reporting ever having sex perceive their own risk of getting infected with an STI?

The observed higher proportion of adolescents responding with ‘don’t know’ to the question on risk peer and own risk perception for HPV and chlamydia than for HIV (**Samkange-Zeeb et al. 2013**), corresponds to the low awareness of the two infections among the adolescents. We could not find similar studies on STI risk perception among adolescents which also provided the category ‘don’t know’ and hence are not able to compare our results with those of other studies. We also believe that the fact that more than two-thirds of the adolescents rated the risk of peers to become infected with HIV as high/medium, and less than a third rated the risk to become infected with HPV or chlamydia as high/medium is linked to the fact that only a small proportion of the adolescents reported having heard of the latter two infections. As has been mentioned before, HIV/AIDS is the STI most commonly dealt with in sexual health education in schools.

We would have expected current use of condoms or at sexual debut to be associated with low own risk perception. We however did not observe any statistically significant differences based on

current use of condoms or at sexual debut. This could occur in one of two ways. On the one hand, adolescents who use condoms might feel confident that they are protected against infection and thus rate their own risk of getting infected as low. On the other hand, adolescents might rate their own risk of getting infected as high/medium, and as a consequence decide to use condoms. Results of the comparison of perceived risk for peers and own perceived risk showing that the students, irrespective of sex, generally perceived their own risk to become infected as lower than that of their peers is in accordance with literature on risk perception. This says that individuals generally perceive themselves to be less at risk than others, particularly when the risk is controllable or behaviour related (Klein & Helweg-Larsen 2002, Harris et al. 2008). This phenomenon has also been observed among adolescents who, during the change from childhood to adulthood, believe that negative effects of risky behaviour only happen to others (Busen et al. 2006).

6.2.1 Further factors affecting STI knowledge and awareness

In the following part of the discussion of the findings of the thesis, several factors which have been identified as influencing STI knowledge and awareness will be briefly discussed. Two of these (sex and migrant background), have already been discussed under the aspect of the research questions. A further factor which has been observed to be associated with knowledge and awareness is age. As has been observed in other studies, (Clark et al. 2002, Trajman et al. 2003, Agius et al. 2006, Voisin et al. 2012), in Study II, older pupils had better knowledge and awareness than younger ones (Samkange-Zeeb et al. 2012a). Furthermore, in comparison to younger girls, higher proportions of older girls knew whether or not they were vaccinated against HPV (Samkange-Zeeb et al. 2012c). These associations are in line with the observations made in the literature on adolescence. As adolescents get older, their cognitive capabilities develop and they are better able to think deductively, synthesise and use information, including that on sexual health education efficiently (Spano 2004, Hurd 2005). Furthermore, with increasing age, the interest in sexual issues, coupled with the likelihood of getting involved in relationships which might culminate in sexual intercourse, also increases (Spano 2004). This to some extent explains the association which has been observed between increasing age, sexual activity and STI knowledge (Trani et al. 2005, Silver & Bauman 2006, Lengen et al. 2010, Swenson et al. 2010, Lauszus et al. 2012).

The effect of sexual activity is surmised to be linked to the fact that sexually active adolescents are more likely to have contact to health professionals or advisory centers than those not yet

sexually active, thereby acquiring more information (Clark et al. 2002, Trani et al. 2005, Swenson et al. 2010).

Other factors which have been shown to be associated with STI knowledge among adolescents are level of education and SES. Young people with higher school certificates and belonging to higher socioeconomic groups have been observed to have better knowledge than those with lower or no school certificate and belonging to a lower socioeconomic group (Trajman et al. 2003, DiClemente et al. 2007, Swenson et al. 2010, Voisin et al. 2012). In Study II, we observed that pupils attending schools offering up to the 12^{th} /13^{th} grade had better STI knowledge than those attending schools offering up to the 10^{th} grade only. The latter schools were former low level schools (Haupt- und Realschule). Furthermore, adolescents with a low level of education and belonging to a lower socioeconomic group have been observed to engage in sexual activity earlier than those with a higher education, putting them at a higher risk of STI infection (Swenson et al. 2010, Van Rossem et al. 2010).

Regarding comprehensive HPV awareness, we did not observe any differences between the two school types. This could be due to the generally low levels of comprehensive awareness of HPV in our study population. In other surveys focusing on HPV awareness and knowledge conducted in Germany, pupils attending high-level schools, respectively adolescents with higher education levels, had better knowledge than those attending low-level schools or with a lower level of education (Blödt et al. 2012, Stöcker et al. 2012). The differences we observed for STI knowledge are probably due to the fact that this was assessed based on general items dealing with protection and transmission, which are integrated in school-based sex education programmes. Our results generally do not show any association between maternal school education, the variable we used to assess SES, and knowledge and awareness of STIs. This finding should be viewed with caution as there was a considerable number of unknown and missing data for the variable. Furthermore, as discussed in the methodology section, maternal school education alone is not sufficient to assess SES.

6.2.2 Sources of STI information reported by adolescents

To conclude the discussion of the findings of the thesis, the sources of information reported by adolescents will be discoursed.

As has been reported in various other studies in which adolescents have been asked to state their sources of STI information (Mellanby 1992, Persson et al. 1992, Clark et al. 2002, Editorial team-Eurosurveillance 2005, BZgA 2006a, 2010, Fronteira et al. 2009, Lengen et al. 2010) the school,

respectively biology lessons, were the most commonly cited source of information in our survey. The mother was the second most common cited source among all adolescents, though females cited her more often than males. Pupils without a migrant background also cited the mother as a source of information more often than those with a migrant background. Whereas in other studies electronic media (Brook 1999, Okonta & Oseji 2006, Özcebe et al. 2007) and friends (Özcebe et al. 2007, Bleakley et al. 2009) have been observed to be the more common sources of information, this was not the case in our survey. The fact that the internet was not the source most commonly cited in our survey should not be interpreted as meaning that adolescents who participated in our survey do not use the internet. It is probably just an indication that the internet is used for other things, but not as a source of sexual health information.

Although the school is often cited as a source of information, adolescents participating in regular surveys conducted by the BZgA reported that they talk openly about sex with their friends and mothers and least with teachers or their physician (BZgA 2006a, 2010). Similarly, about 91% of the adolescents participating in a survey conducted in Spain reported that they were able to talk openly about sexual issues with their friends and least with teachers (18.7%) and parents (17.4%). When asked from whom they would prefer getting information, the most frequently named sources were parents (34%) and physicians (33%) (Romero-de-Castilla-Gil et al. 2001). In another survey adolescents reported that sex education is often taught by teachers with whom they do not feel at ease discussing sexual issues (DiCenso et al. 2001). This needs further consideration especially in schools where sexual health education is taught by teachers and not by school nurses or professionals from outside schools.

6.3 Interaction between knowledge, risk perception and health behaviour

As stated in section 3, knowledge is identified as a determinant of health-related behaviour in several health behaviour models: TRA/PA (Fishbein & Ajzen 1975, Ajzen 1985), HBM (Rosenstock 1974), IMB (Fisher & Fisher 1992, Fisher et al. 1996). It has been recognized that to have a more meaningful impact on sexual health of adolescents, sexual health education has to go beyond just increasing knowledge (SOGC 2012). In addition to knowledge, young people need to be provided with skills and tools that enable them to identify and reduce sexual health problems and enhance sexual health.

The interaction between knowledge, risk perception and health behaviour can be depicted as follows: knowing that STIs can be transmitted unaware, or not wanting to get pregnant, might

lead to the decision to use condoms during sexual intercourse, or not to have sex. On the other hand, knowledge, coupled with the motivation of enjoying a healthy sexual life, might lead to the initiation of safe sex and use of preventive measures. Motivation can also independently influence behaviour. For instance, realising that sexual activity among friends and peers is not as common as assumed can take the pressure 'to conform' away and lead to delayed sexual activity. This in turn can result in sexual activity being initiated at a stage when the individual is more mature and has acquired the necessary skills required to make healthy choices. In the same sense, social support, for example, being able to talk openly to parents or other trusted persons about intimate issues, can lead to positive health behaviour and to positive health outcomes.

It is not within the scope of this thesis to test the applicability of the IMB model for assessing the interaction between knowledge, risk perception and health behaviour as we conducted a cross-sectional survey at one point in time. Some of the anecdotal remarks made in the space provided for comments in the questionnaire by participating adolescents however support the concept postulated by the model. For example, a number of adolescents mentioned that taking part in the survey had made them realize how limited their information on STIs was, and that they intended to inform themselves more. In the IMB model, the latter aspect is translated into ‘motivation’, which in turns leads to the acquisition of knowledge (information). It is recommended that general sexual health knowledge of adolescents, including STI knowledge, be assessed at regular intervals as this stimulates the adolescents to reflect on and assess their own knowledge level, while at the same time improving their understanding of the subject (McCall 2012).

7 Conclusion and perspectives

7.1 Conclusion

According to the International Planned Parenthood Federation European Network and WHO regional guidelines, "All young people have the right to comprehensive sexual and reproductive health information, education and services, to be active citizens, to have pleasure and confidence in their sexuality, and to be able to make their own informed choices" (IPPF 2006).

Adolescent sexual behaviour across industrialised countries has been influenced by a series of dramatic historical events such as the development and availability of the pill and the legalization of abortion in the 1970s and 1980s, as well as the onset of the HIV/AIDS epidemic (Santelli & Schalet 2009, WHO & BZgA 2010). The latter led to more focus being put on prevention and, in the following years, other factors such as the publicizing of sexual abuse and violence, and the increased sexual connotations in the media and advertising contributed to more attention being paid to adolescent sexuality and sexual health, culminating in the call for sexuality education in schools (WHO & BZgA 2010).

This thesis was conducted at a time when several activities to improve sexual health of adolescents in the WHO European Region have been and are being initiated, including the SAFE project (IPPF 2006), the development of standards for sexuality education (WHO & BZgA 2010), and the symposium on 'Young people and sexual health' which was recently held in Brussels (Public Policy exchange 2012).

The results of the thesis on the one hand confirm the importance of the role played by schools in sexuality education, but on the other hand indicate that the focus of STI information in this context is on HIV/AIDS. Adolescents lack information on other infections such as chlamydia, which are reported to have increased in numbers in the last 10 years, particularly affecting adolescent girls (WHO 2012). Furthermore, we observed that there were some misconceptions concerning STI transmission, with a considerable number of participating adolescents not being aware that all STIs, and not only HIV, can be passed on unaware. A minority also indicated that showering after sexual contact protects against infection.

Germany has a long history of sexuality education which, similar to other European countries, is mandatory in schools. However, as the Federal states set their own minimum standards, there are no uniform sexuality education curricula in the country, and the sexuality education offered in

schools varies in quality and intensity (IFFP 2006). In its report published in 2004, The Federal Center of Health Education noted that whereas in some federal states sexuality education only focuses on knowledge of Biology and the human body, in others further aspects such as on masturbation, homosexuality, single parenthood, STIs, contraception and sexual violence are also incorporated (BZgA 2004). The authors observed that there was no room left for emotional demands, discussions with pupils, gender aspects or gender-segregated trainings (BZgA 2004).
Although knowledge of STIs is an important part of sexuality education, care should be taken not to focus on negative consequences or risk behaviour only (Lazdane & Avery 2011). Sexuality education is defined as "an age-appropriate, culturally relevant approach to teaching about sex and relationships by providing scientifically accurate, realistic non-judgmental information" (UNESCO 2009).

7.2 Implications of results for public health

The findings of this work have several implications for public health practice and research, which will be discussed below.

7.2.1 Implications for practice

In many countries, including Germany, sexuality education is embedded in biology lessons and hence provided by teachers who are not necessarily trained to discuss sexual issues with adolescents. Sexuality educators have to be able and be prepared to discuss intimate issues with pupils, while remaining neutral and objective (WHO & BZgA 2010). Results of a survey conducted among teachers in Minnesota showed that a large majority of teachers teaching sexuality education had not received any training on how to teach the subject and were not prepared on how to deal with the controversial nature of the topic (Eisenberg & Madsen 2010). The subject is of a controversial, emotional and personal nature and some teachers are not sure how to react when pupils ask questions. For the pupils it can be embarrassing to ask teachers detailed questions concerning sexuality or sexual health for fear that this might be met with disapproval.
Furthermore, it is not realistic to expect that schools alone can provide young people with the information, skills and tools they need to make health-enhancing decisions. As portrayed in the schematic presentation of the information-motivation-behavioural skills model, a broad range of aspects interact with each other at different levels. In order to fulfill the objectives of the

definition of sexuality education, there is a need for cooperation between schools, parents and other agencies active in the field (SOGC 2004).

A viable means of relieving and assisting schools could be the establishment of the school nurse as is already the case in other European countries such as Sweden and England. The school nurse plays a central role in the provision of expertise and oversight for the provision of school health services, promotes health education and also serves as a mediator between school personnel, family, community and health care providers (Kocks 2008, Board et al. 2011). The school system in Germany is moving from the morning only to an all-day school system, making the school an important socialization place for young people. A school nurse could be involved in all aspects of adolescent health, from physical activity, nutrition, early diagnosis and routine health check-ups to vaccination. He/she can serve as a contact point to health services for school children who might otherwise have problems accessing relevant institutions for various reasons. The school nurse should however be trained to provide culturally and gender sensitive advice to school children of different backgrounds. The advantage over teachers is that pupils are able to go to the school nurse when they need to and can discuss issues which they might feel uncomfortable discussing in class.

7.2.2 Implications for research

One factor which makes it difficult to compare results of different studies on STI knowledge is the lack of common measures of knowledge and awareness.

Over the last years, attention has been paid to the items used to assess STI knowledge in adult populations and in college students. The majority of available questionnaires focus on HIV/AIDS knowledge, with only a few focusing on broad STI knowledge. Recently, Jaworski and Carey developed and validated a comprehensive 84 item STI knowledge questionnaire (STI-KQ) for use among adults or college students (Jaworski & Carey 2007). In the process of doing this, the authors reviewed existing questionnaires designed for, or used in surveys involving college students, and found that none of them were current and they did not cover all major STIs. There is a need for a similar evaluation and summarization of questionnaires used to assess broad STI knowledge among school-aged adolescents. In the United States, Volpe and colleagues modified the 45 item HIV-knowledge questionnaire developed by Carey and colleagues for use in adults (Carey et al. 1997) into an 18-item comprehensive questionnaire suitable for use in adolescent girls (Volpe et al. 2007). At the European level, a similar effort could be done in the context of the

current initiative to share information, including best practices and understandings of sexual behaviour (Public Policy Exchange 2012).

Furthermore, research which was initiated by the BZgA, in which they evaluated the curricula of different schools (BZgA 2004), should be extended to include the aspect of the actual implementation of these curricula. This could be done by conducting a national survey similar to the one which was conducted in the UK (External Steering Group 2008), in which adolescents are asked about what topics are dealt with during sexuality education and comparing them with what is written in the curricula. Although most countries have policies, it does not mean that these will be followed, as shown by the findings of a survey involving 14-18 year olds carried out in 2008 in England. Although sex education and education on HIV/AIDs is mandatory in secondary schools, one in four of the young people reported not having learnt about HIV/AIDS in school (Leonard Cheshire Disability 2011).

Finally, there is a need to organize and document studies done on adolescent health so that researchers can share information and learn from each other. As was correctly noted in the guidelines prepared by the BZgA (WHO & BZgA 2010), many such studies have been conducted in Germany. Although I agree with them that language is one of the reasons why this activity is not reflected in international documentations, to my experience, it is also difficult to get an overview of the studies conducted in Germany on a national level. There are numerous surveys which have been conducted in the context of university qualification work (Bachelor, Masters, and dissertation), a good number of them using sound methodology, which are however not systematically documented. To combat this deficit, a platform, similar to that developed for the "Kooperation für nachhaltige Präventionsforschung - KNP" (Cooperation for effective prevention research), where projects and project results, as well as cooperation between different institutes or agencies in the scientific field and practice are documented and summarised, needs to be initiated. Students should also be encouraged and assisted to publish their results in peer reviewed journals, not only nationally, but also at an international level.

Sexuality education should however not be viewed in isolation, but should be incorporated in a comprehensive health of adolescents' programme, in which other health issues such as smoking, alcohol intake, and obesity are handled, and diversity regarding age, gender and ethnicity is appropriately taken into account.

8 Afterword

As planned during the conception of the survey and according to Good Epidemiologic Practice, short reports for schools respectively teachers, in which the main findings on STIs heard of, STI knowledge and sources of sexual health or STI information reported by pupils were summarised, were prepared for each of the eight participating schools. Furthermore, a suitable method of communicating survey findings to participating pupils was developed in the context of a bachelor thesis. The product was a flyer which was distributed to all participating schools in print, as well as an electronic document. The decision to present the results in this form was reached as pupils had indicated that this would be more suitable for them as they can fold it and carry it around in their bags.

Reports were also prepared for the Senator of Science and Education and the local health authorities (Gesundheitsamt) in Bremen and Bremerhaven.

Summary

Background: Recently, an increase in numbers of diagnosed STIs such as syphilis, gonorrhoea and chlamydia has been observed in several western European countries, especially among teenagers 16-19 years old. This has been taken as an indication that adolescents lack the necessary information and options which can help them lead healthy sexual and reproductive lives.
Although Germany, similar to other western European countries such as Sweden, Austria, the Netherlands and Switzerland, has a long history of sexual education in schools, it is surmised that the majority of adolescents lack information about STIs other than HIV/AIDS. The reason being that HIV/AIDS is the topic concentrated on in many schools.

Aim: The aim of this thesis was to answer the following questions:

1 What is the level of knowledge and awareness of STIs among adolescents in Germany and are there differences between female and male adolescents?
2 Are there knowledge and awareness differences between same aged adolescents with and without migrant backgrounds?
3 How high is the prevalence of HPV vaccination among female adolescents and are there differences between female adolescents with and without migrant backgrounds who are of the same age?
4 How do adolescents perceive the risk of peers to get infected with an STI? And how do adolescents reporting sexual activity perceive their own risk to get infected with an STI?

Materials and Methods: To answer the above questions we conducted: (a) a systematic literature review on knowledge and awareness of STIs among school-going adolescents in Europe published between 1990 and 2010 and (b) a school-based cross-sectional survey to assess knowledge and awareness of STIs among secondary school pupils attending the 8th grade and above in Bremen and Bremerhaven, two cities in the north of Germany. The literature search for the systematic review was limited to Europe so that the results could be compared to the findings of the subsequent school-based survey which we conducted. For the latter, 18 of the 67 state secondary schools registered in the two cities during the school year 2009-2010 were randomly selected and the principals approached for cooperation. The schools were selected such that both school types present in both cities at the time of the survey were represented: offering up to the 10th grade only, and those offering up to the 12th, respectively 13th grade. Pupils with signed consent completed an anonymous questionnaire during school time. In addition to questions to

assess knowledge and awareness of STIs, information on sexual activity and method of contraception used, as well as demographic data such as age, sex, and migrant background were collected. Girls were also asked if they had been vaccinated against HPV. To assess awareness of STIs, pupils were asked to indicate which infections they had heard of. Knowledge of STIs was assessed based on four general questions and comprehensive awareness of HPV based on three items. Furthermore, all pupils were asked to rate the risk of peers to get infected with each of the following infections: HIV, HPV and chlamydia, as 'high', 'medium' or 'low'. Those reporting ever having sex were asked to rate their own risk of getting infected with each of the aforementioned infections. During data analyses, associations between age, sex, school type, migrant background and sexual activity and knowledge and awareness of STIs were investigated. Data were stratified by sex as well as by migrant background.

Results: A total of 15 studies were included in the systematic review, the majority of which focused on HIV/AIDS (**Samkange-Zeeb et al. 2011**). Six STIs were focussed on in the studies included in the review, with awareness and knowledge being assessed in depth mainly for HIV/AIDS and HPV, and to some extent for chlamydia. For syphilis, gonorrhoea and herpes only awareness was assessed. Awareness was generally high for HIV/AIDS (above 90%) and low for HPV (range 5.4%-66%). Our own survey yielded results similar to the findings of the literature review: almost all 1148 pupils (31% with a migrant background and 55% girls) who participated in the school-based survey had heard of HIV/AIDs, but only a few of HPV (13%) or chlamydia (23%). More girls than boys reported having heard of the latter two infections: HPV 18 vs. 8%; and chlamydia 31 vs. 16% (**Samkange-Zeeb et al. 2012a**). We generally observed poor knowledge of STIs, with slightly more than half of the pupils correctly answering at least 2 of the four questions used to assess the outcome variable. Comprehensive awareness of HPV was even worse, with only about a third of the pupils correctly responding to at least one of the three items used to assess this variable. Girls and older pupils were observed to have better knowledge and awareness than boys and younger pupils.

The most common sources of information on sexuality and STIs mentioned by the pupils were the school (biology lessons) and the mother.

Results of analyses stratified by migrant background showed that pupils with migrant background had poorer knowledge on STIs than those without a migrant background (**Samkange-Zeeb et al. 2012b, Pöttgen & Samkange-Zeeb 2013**). A significantly lower proportion of pupils with a migrant background correctly answered at least two of the four items on STI knowledge (45 vs.

60%). Similar associations between age, sex and STD knowledge were observed in both groups. No differences in comprehensive HPV awareness were observed between the two groups.

A total of 75 girls (12%) reported having been vaccinated against HPV, while more than half of the girls (57%) did not know whether or not they were vaccinated against HPV (**Samkange-Zeeb et al. 2012c**). The proportion of girls who did not know whether or not they were vaccinated against HPV was significantly higher among those with a migrant background (129/201 = 64%) than those without a migrant background (230/424 = 54%). Those who had ever been to a gynaecologist (316/632 = 50%) were more aware of their own vaccination status than those who had not.

In line with the low proportion of pupils reporting having heard of chlamydia and HPV, the majority of pupils responded with 'don't know' to the question on risk assessment for peers to get infected with the two infections (**Samkange-Zeeb et al. 2013**). Those who assessed the risk perceived the risk of peers to get infected HIV to be higher than for getting infected with chlamydia or HPV, with younger students and females more often rating the risk of getting infected as high/medium. Those reporting ever having sex also reported their own risk of getting infected with HIV to be higher than for HPV or chlamydia.

Conclusion: The results of this thesis confirm the importance of the school setting for adolescent sexuality education, and also the central role mothers play as a source of sexuality information for adolescents. However, the fact that HIV/AIDS remains the only STI most school-going adolescents have heard of is a clear indication that sexuality education needs to be broadened to encompass other STIs such as HPV and chlamydia. This is particularly so as the numbers of these two infections are reported to be increasing among adolescents in industrialised countries.

It is worrying that more than half of the participating girls did not know whether or not they were vaccinated against HPV as individuals are normally informed about procedures done on them. More research is needed to investigate factors contributing to this unawareness as these might have implications for health prevention and communication strategies.

Recently, a number of activities focusing on adolescent sexuality health and/or education have been have been organized at the European level. Among others issues, the participants discussed on how sexuality education and awareness of adolescents can be improved. Results of this thesis can help towards providing more evidence on the level of awareness and knowledge of STDs among school-attending adolescents, highlight gaps and contribute data to the discussion on improving sexuality education for adolescents.

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Appendix

1. Samkange-Zeeb F, Spallek L, Zeeb H. Awareness and knowledge of Sexually Transmitted Diseases (STDs) among school-going adolescents in Europe: A review of published literature. BMC Public Health 2011; 11:727 doi: 10.1186/1471-2458-11-727.
2. Samkange-Zeeb F, Mikolajczyk R, Zeeb H. (2012a) Awareness and knowledge of Sexually Transmitted Diseases (STDs) among secondary school students in two German cities. J Community Health. 2012 Sep 22. doi: 10.1007/s10900-012-9614-4.
3. *Samkange-Zeeb F, Pöttgen S, Schütte B, Zeeb H. (2012b) Awareness of sexually transmitted diseases among adolescents with and without migrant backgrounds in Bremen, Germany (currently under publication in proceedings of the 2nd Conference on "Health, Culture and the Human Body" held from 14-15 September 2012, Istanbul, Turkey)
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6. Pöttgen S**,** Samkange-Zeeb F. Wissen zu sexuell übertragbaren Infektionen: Ein Vergleich von Schülern und Schülerinnen mit türkischem und ohne Migrationshintergrund. Prävention und Gesundheitsförderung. 2013 Aug 28. doi: 10.1007/s11553-013-0403-4.
7. Eidesstattliche Erklärung

* Findings were initially presented at a conference and submitted for publication in a proceedings band and then later published in a peer-reviewed journal as article number 6. Whereas article number 3 compares all adolescents with a migrant background to those without a migrant background, article number 6 focuses on adolescents with a Turkish migrant background. The two articles however have strong similarities and are considered as one publication.

Article I

Awareness and knowledge of Sexually Transmitted Diseases (STDs) among school-going adolescents in Europe: A systematic review of published literature.

Samkange-Zeeb F, Spallek L, Zeeb H. Awareness and knowledge of Sexually Transmitted Diseases (STDs).

BMC Public Health 2011; **11**:727 doi:10.1186/1471-2458-11-727

Samkange-Zeeb et al. BMC Public Health 2011, 11:727
http://www.biomedcentral.com/1471-2458/11/727

BMC Public Health

RESEARCH ARTICLE Open Access

Awareness and knowledge of sexually transmitted diseases (STDs) among school-going adolescents in Europe: a systematic review of published literature

Florence N Samkange-Zeeb*, Lena Spallek and Hajo Zeeb

Abstract

Background: Sexually transmitted diseases (STDs) are a major health problem affecting mostly young people, not only in developing, but also in developed countries.
We conducted this systematic review to determine awareness and knowledge of school-going male and female adolescents in Europe of STDs and if possible, how they perceive their own risk of contracting an STD. Results of this review can help point out areas where STD risk communication for adolescents needs to be improved.

Methods: Using various combinations of the terms "STD", "HIV", "HPV", "Chlamydia", "Syphilis", "Gonorrhoea", "herpes", "hepatitis B", "knowledge", "awareness", and "adolescents", we searched for literature published in the PubMed database from 01.01.1990 up to 31.12.2010. Studies were selected if they reported on the awareness and/or knowledge of one or more STD among school-attending adolescents in a European country and were published in English or German. Reference lists of selected publications were screened for further publications of interest. Information from included studies was systematically extracted and evaluated.

Results: A total of 15 studies were included in the review. All were cross-sectional surveys conducted among school-attending adolescents aged 13 to 20 years. Generally, awareness and knowledge varied among the adolescents depending on gender.
Six STDs were focussed on in the studies included in the review, with awareness and knowledge being assessed in depth mainly for HIV/AIDS and HPV, and to some extent for chlamydia. For syphilis, gonorrhoea and herpes only awareness was assessed. Awareness was generally high for HIV/AIDS (above 90%) and low for HPV (range 5.4%-66%). Despite knowing that use of condoms helps protect against contracting an STD, some adolescents still regard condoms primarily as an interim method of contraception before using the pill.

Conclusion: In general, the studies reported low levels of awareness and knowledge of sexually transmitted diseases, with the exception of HIV/AIDS. Although, as shown by some of the findings on condom use, knowledge does not always translate into behaviour change, adolescents' sex education is important for STD prevention, and the school setting plays an important role. Beyond HIV/AIDS, attention should be paid to infections such as chlamydia, gonorrhoea and syphilis.

Background

Sexually transmitted diseases (STDs) are a major health problem affecting mostly young people, not only in developing, but also in developed countries.

Over the period 1985-1996, a general decrease of gonorrhoea, syphilis and chlamydia infections was noted in developed countries, both in the general population and among adolescents [1]. From the mid-1990s however, increases in the diagnoses of sexually transmitted diseases, in particular syphilis, gonorrhoea and chlamydia have been reported in several European countries, especially among teenagers 16-19 years old [2-7].

The problem with most STDs is that they can occur symptom-free and can thus be passed on unaware during unprotected sexual intercourse. On an individual level, complications can include pelvic inflammatory diseases

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and possibly lead to ectopic pregnancies and infertility [8-11]. Female adolescents are likely to have a higher risk of contracting an STD than their male counterparts as their partners are generally older and hence more likely to be infected [2,12].

The declining age of first sexual intercourse has been proffered as one possible explanation for the increase in numbers of STDs [7]. According to data from different European countries, the average age of first sexual intercourse has decreased over the last three decades, with increasing proportions of adolescents reporting sexual activity before the age of 16 years [13-18]. An early onset of sexual activity not only increases the probability of having various sexual partners, it also increases the chances of contracting a sexually transmitted infection [19]. The risk is higher for female adolescents as their cervical anatomic development is incomplete and especially vulnerable to infection by certain sexually transmitted pathogens [20-23].

The reluctance of adolescents to use condoms is another possible explanation for the increase in STDs. Some surveys of adolescents have reported that condoms were found to be difficult to use for sexually inexperienced, detract from sensual pleasure and also embarrassing to suggest [24-26]. Condoms have also been reported to be used primarily as a protection against pregnancy, not STD, with their use becoming irregular when other contraceptives are used [15,27]. Furthermore, many adolescents do not perceive themselves to be at risk of contracting an STD [27].

We conducted this systematic review in order to determine awareness and knowledge of school-going adolescents in Europe of sexually transmitted diseases, not only concerning HIV/AIDS, but also other STDs such as chlamydia, gonorrhoea, syphilis and human papillomavirus (HPV). Where possible we will identify differences in awareness and knowledge by key demographic variables such as age and gender, and how awareness has changed over time.

Although knowledge and awareness have been reported to have a limited effect on changing attitudes and behaviour, [16,28-30] they are important components of sex education which help promote informed, healthy choices [31-33]. As schooling in Europe is generally compulsory at least up to the age of 15 years [34] and sex education is part of the school curriculum in almost all European countries, school-going adolescents should be well informed on the health risks associated with sexual activity and on how to protect themselves and others. In view of the decreasing age of sexual debut and the reported increasing numbers of diagnosed STDs among young people, results of our review can help point out areas where STD risk communication for school-attending adolescents needs to be improved.

Methods

Search strategy

We performed literature searches in PubMed using various combinations of the search terms "STD", "HIV", "HPV", "chlamydia", "syphilis", "gonorrhoea", "herpes", "hepatitis B", "knowledge", "awareness", and "adolescents". The reference lists of selected publications were perused for further publications of interest. The search was done to include articles published from 01.01.1990 up to 31.12.2010. Inclusion and exclusion criteria were specified in advance and documented in a protocol (Additional File 1).

Inclusion criteria

Studies were selected if they reported on awareness and/or knowledge of one or more sexually transmitted disease(s) among school-attending adolescents in a European country, or in Europe as a whole, and were published in English or German.

Exclusion criteria

Case reports, reviews, editorials, letters to the editor, expert opinions, studies on sexual activity/behaviour only, studies evaluating intervention programmes and studies not specifically on school-attending adolescents were excluded.

Methodological assessment of reviewed studies

We used a modified version of the Critical Appraisal Form from the Stanford School of Medicine to assess the methodology of the studies included in the review [35]. The studies were classified according to whether or not they fulfilled given criteria such as 'Were the study outcomes to be measured clearly defined?', 'Was the study sample clearly defined?', or 'Is it clear how data were collected?' (Table 1). No points were allocated. Instead, the following categorisations could be selected for each assessment statement: 'Yes', 'Substandard', 'No', 'Not Clear', 'Not Reported', 'Partially Reported', 'Not Applicable', 'Not Possible to Assess', 'Partly'. The assessment was done independently by two of the authors (FSZ, LS) who then discussed their findings.

Definition of awareness and knowledge

For the purpose of this review studies were said to have assessed awareness if participants were merely required to identify an STD from a given list or name an STD in response to an open question. Knowledge assessment was when further questions such as on modes of transmission and protection were posed.

Results

Overall, 465 titles and abstracts were obtained from the searches conducted. Three hundred and ninety-three articles were excluded as they did not report on studies

Table 1 Results of methodological assessment of studies included in the review

	Number of studies in each assessment category*								
Criteria	**Y**	**S**	**N**	**NC**	**NR**	**PR**	**NA**	**NP**	**P**
Did the study address a clearly focused issue?	15								
Was/were the study outcome(s) to be measured clearly described?	15								
Were the questions posed to assess outcome(s) clearly defined?	14		1						
Was the study samle clearly defined?	13								2
Were participating schools recruited in an acceptable way?	4	1		1			1	8	
Were the pupils recruited in an acceptable way? [1]	11			4					
Were characteristics of subjects at enrolment reported?	12		1						2
Is it clear how data were collected?	15								
Did the authors mention that the instrument used for data collection was pre-tested or validated?	8		6						1
Were the questions posed appropriate to address given outcomes?	10			1				4	
Was participation rate reported?	9			2	4				
Was participation rate sufficiently high?	7	1	1					6	
Was the data analysis sufficiently rigorous?	15								
Were other factors accounted for that could affect outcomes?[2]	15								
Were results appropriately reported? [3]	11	1							3
Is there a clear statement of findings?	15								

*Y = Yes, S = Substandard, N = No, NC = Not Clear, NR = Not Reported, PR = Partially Reported, NA = Not Applicable, NP = Not Possible to Assess, P = Partly.

[1] did all pupils at the school(s), respectively in the grade concerned, have the same chance to participate?.

[2] for example, sex, age, grade, school type, social class.

[3] were numbers of outcome events reported on?.

conducted in Europe (Figure 1). A further 47 were excluded as they did not focus on knowledge and awareness of adolescents. Of the 25 identified articles dealing with knowledge on STDs among adolescents in Europe, 8 were excluded as they either did not specifically address the question of knowledge and/or awareness, or focused more on sexual behaviour/beliefs. A further seven articles were excluded because the study population was not clearly stated to be school-attending.

A review of the references listed in the 10 articles meeting inclusion criteria yielded four additional relevant articles. One article reported on two studies, hence a total of 15 studies published from 1990-2000 were included in the systematic review.

Six of the articles were published before the year 2000 [36-41], and nine after 2000 [42-49]. The studies report on surveys conducted from as early as 1986 to 2005 (Table 2).

The majority of the 15 studies specifically focused on HIV/AIDS only (7 studies) [36,39,41,43,44,49], four on STDs in general [37,38,40,42], one on STDs in general with focus on HPV [47], and three on HPV only [45,46,48]. All the HPV studies were published after the approval and market introduction of the HPV vaccine in 2006.

Generally the studies were conducted in particular regions/towns in different countries, with only one being conducted across three towns in three different countries (Russia, Georgia and the Ukraine) [43]. Six of the studies were conducted in Sweden [37,38,40,41,46,47] two in Russia [39,43] and one each in Ireland, [36] England, [42] Croatia, [44] Finland, [45] Italy [48] and Germany [49] (Table 2).

In the studies, generally both male and female adolescents varying in age from 13-20 years were surveyed. One study surveyed females only [40] and adolescents 11-12 years old were included in only one study [49] (Table 2). Whereas most of the studies included assessed awareness and knowledge among boys and girls separately, only one study [48] specifically assessed the association between age and awareness/knowledge.

Methodological summary of studies included in the review

All studies included in the review were cross-sectional in design. Apart from one study which recruited pupils by mailing the questionnaire to all households with adolescents in the 9th grade, [45] pupils were recruited via schools. For 8 of the 15 studies it could not be deduced from the methods section how the participating schools were selected and in 4 studies it was not clear how the participating pupils were selected. The pupils completed questionnaires in school in 10 studies, and in two the questionnaires were completed at home [45,48].

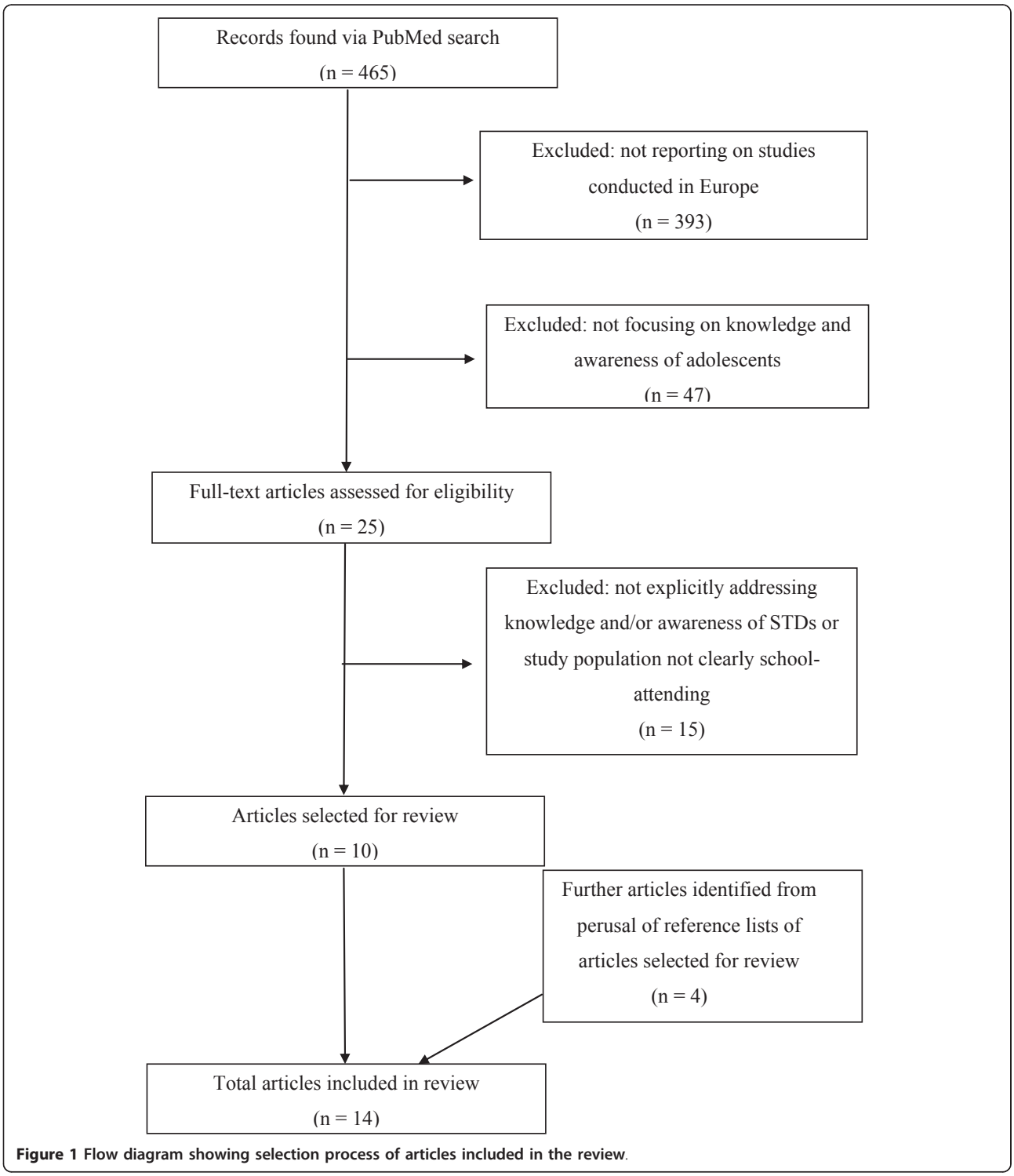

Figure 1 Flow diagram showing selection process of articles included in the review.

Face-to-face interviews were used only in the surveys by Andersson-Ellström et al. [40] and by Goodwin et al. [43] (Table 2).

The study outcomes were clearly defined in all studies and the topics on which questions were posed were clearly described in all but one study. The majority of the studies also reported the individual questions posed to assess the given outcomes. In six studies the authors did not mention whether the instruments used for data collection had been pre-tested, validated, or whether the questions posed had been used in previous surveys (Table 1). Of the 9 studies which clearly reported

Table 2 Characteristics of the 15 studies on knowledge on sexually transmitted diseases among school-attending adolescents in Europe

Reference	Study region, country	Year of study conduct	Survey instrument	Reported outcome (s) measured	Age of participants	No. of participants	Gender	Recruitment of pupils	Response rate
Fogarty [36]	Galway, Ireland	Not available	Classroom-completed questionnaire	Knowledge about AIDS	15-18 years	2614 leaving certificate pupils	Male/ female	All 50 Galway second-level schools	Not available
Andersson-Ellström et al. [37]	Not specified, Sweden	1986 and 1988	Classroom-completed questionnaire	Knowledge of and attitudes towards STDs	18-19 years	1986: 350 1988: 603 upper secondary school pupils	Male/ female	Not clear how many schools participated	100%
Tyden et al. [38]	Uppsala, Sweden	1988	Classroom-completed questionnaire	Knowledge of STDs and attitudes to condom	16-19 years	209 year 1 of upper secondary school pupils	Male/ female	5 of 6 upper secondary schools	98%
Lunin et al. [39]	St. Petersburg, Russia	1993	Classroom-completed questionnaire	Knowledge, attitudes and behaviour relevant to AIDS prevention	14-17 years	370 year 10 pupils	Male/ female	14 randomly selected schools	94%
Andersson-Ellström et al. [40]	Karlstad, Sweden	1989-1990	Questionnaire completed at clinic	Relationship between knowledge about STD, sexual behaviour, contraceptive use, STD protection and social class	16-18 years	88 year 1 of upper secondary school pupils	Female	Not clear how many schools participated	58%
Eriksson et al. [41]*	Not specified, Sweden	1994	Classroom-completed questionnaire	Knowledge on HIV/ AIDS and sources of information	14-16 years	146 year 9 pupils	Male/ female	1 school	100%
Garside et al. [42]**	Devon, England	1999-2000	Classroom-completed questionnaire	Knowledge and attitudes towards STDs, their detection and treatment	13-16 years	432 year 9 and 11 pupils	Male/ female	1 school	Not reported
Goodwin et al. [43][1]	St. Petersburg, Russia;	2000	Face-face interview in school	Knowledge on HIV/ AIDS, sexual behaviour	Mean age 15.6 years	50 school pupils	Male/ female	Not clear how many schools participated	Not clear
Goodwin et al. [43][2]	St. Petersburg, Russia; Tblisi, Georgia; Kiev, Ukraine	Not available	Face-face interview in school and classroom-completed questionnaire	Knowledge on HIV/ AIDS, sexual behaviour	14-17 years	102 school pupils	Male/ female	Not clear how many schools participated	Not clear
Macek et al. [44]	Nova Gradiska/ Zagreb, Croatia	Not available	Classroom-completed questionnaire	Knowledge on HIV/ AIDS, attitudes towards integration of HIV-positive pupils into regular schools	Not available	108 year 7 and 8 pupils	Male/ female	2 schools	Not reported
Woodhall et al. [45]***	Tampere, Finland	2005	Home-completed questionnaire	Knowledge of and attitudes towards STDs, esp. HPV	14-15 years	397 year 9 pupils	Male/ female	All households in Tampere with adolescents born in 1990 and in year 9 contacted	21.5%
Gottvall et al. [46]	Not specific, Sweden	2008	Classroom-completed questionnaire	Knowledge of and attitudes towards HPV vaccination and condom use	15-16 years	608 year 1 of upper secondary school pupils	Male/ female	7 schools	86%

Table 2 Characteristics of the 15 studies on knowledge on sexually transmitted diseases among school-attending adolescents in Europe *(Continued)*

Höglund et al. [47]	Uppsala, Sweden	Not available	Classroom-completed questionnaire	Knowledge of and attitudes to STDs, focus on HPV	15-20 years	459 year 1 of upper secondary school pupils	Male/ female	5 schools	98%
Pelucchi et al. [48]***	Milan area and Varese, Italy	2008	Home-completed questionnaire	Knowledge of HPV, prevention, and attitudes towards vaccination	14-20 years	863 high school pupils	Male/ female	8 schools	79%
Sachsenweger et al.[49]#	Mecklenburg-Western Pomerania, Germany	2005	Classroom-completed questionnaire	Knowledge on HIV/ AIDS	11-18 years	769 year 7-9 pupils	Male/ female	Not clear how many schools participated	Not available

* Other part of study conducted in Kenya. Only Swedish part reported on and included in this review.

** Focus group discussions also held with local teenagers. Only details pertaining to questionnaire survey reported on and included in this review.

[1,2] Publication reported on two separate studies. In both school children were compared to shelter children. Only details pertaining to school children are reported on and included in this review.

*** Questionnaires also sent to parents. Only details pertaining to adolescents reported on and included in this review.

#Publication in German.

participation rates, 7 had participation rates ranging from 79% to 100%. The remaining two studies had participation rates of 21.5% and 58% (Table 2).

Six STDs were focussed on in the studies included in the review, with awareness and knowledge being assessed in depth mainly for HIV/AIDS and HPV, [36,41-43,46-49] and to some extent for chlamydia [37,38,42,47]. For syphilis, gonorrhoea and herpes, only awareness was assessed in four studies [37,38,42,47].

Awareness and knowledge of HPV

The reported awareness of HPV among the surveyed adolescents was generally low (identification from given list), ranging from 5.4% in the study by Höglund et al. [47] to 66% in the study by Pelucchi et al. [48]. In the two studies which also reported results for females and males separately, awareness was observed to be statistically significantly higher among females than among males: 16.4% vs. 9.6% in the Swedish study by Gottvall et al. [46] and 71.6% vs. 51.2% in the Italian study by Pelucchi et al. [48]. In the study by Höglund et al., only one of the participating 459 adolescents mentioned HPV (in response to an open question on known STDs) [47].

Awareness of the HPV vaccine was also very low, with 5.8% and 1.1% of adolescents surveyed in the studies by Gottvall et al. and Höglund et al. respectively, reporting being aware of the vaccine [46,47]. Whereas only 2.9% and 9.2% of adolescents in these two Swedish studies were aware that HPV is sexually transmitted, the proportion was 60.6% in the Italian study [48]. A minority of adolescents knew that HPV is a risk factor for cervical cancer: 1.2% in the study by Höglund et al. [47] and 8.1% in the study by Gottvall et al. [46]. Among the adolescents who participated in the survey by Pelucchi et al., 48.6% were aware that the aim of the HPV vaccine is to prevent cervical cancer [48]. Among female adolescents who participated in the study by Gottvall et al., 11.8% did not believe they would be infected with HPV [46]. The proportion was 55% among female participants in the study by Pelucchi et al. [48]. The latter study surveyed pupils aged 14-20 years but did not report on age differences in awareness.

Three studies reported on awareness of condylomata, genital warts which are caused by the human papilloma virus. Two of the studies reported awareness of 35% [38] and 43% [37]. The third study mentioned that awareness of condylomata was lower than that for chlamydia without stating the corresponding figures [40].

Awareness and knowledge of HIV/AIDS

Knowledge and awareness was quite high in all studies reporting on HIV/AIDS, with more than 90% of adolescents being able to identify the disease as an STD from a given list or in response to the direct question "Have you ever heard of HIV/AIDS?" [36,38,42]. In one study where the open question "Which STDs do you know or have you heard of?" was used, 88% of respondents mentioned HIV/AIDS [47] (Table 3).

In the studies where this was asked, a large majority of the adolescents knew that HIV is caused by a virus, [36,41] is sexually transmitted, [36,41,43,47,49] and that sharing a needle with an infected person may lead to infection with the virus [36,41,43,49]. Statistically significant age specific differences in knowledge on mode of HIV-transmission were reported in the study conducted in Germany [49]. Compared to 13 and 15 year old pupils, a higher proportion of 14 year old pupils correctly identified the level of risk of HIV-transmission associated with bleeding wounds, intravenous drug use and sexual

Table 3 Awareness and knowledge of STDs reported in 14 of the 15 studies included in the review

Question/Item assessed in studies	Females % (reference)	Males % (reference)	Females and males % (reference)
HPV			
Heard of HPV (identification from list of STDs or direct question, 'Have you heard of HPV?')	71.6% (Pelucchi et al.) [49] 16.4% (Gottvall et al.) [46]	51.2% (Pelucchi et al.) [49] 9.6% (Gottvall et al., 2009) [46]	66.6% (Pelucchi et al.)** [49] 13.5% (Gottvall et al.)** [46] 5.4% (Höglund et al.) [47] 33% (Woodhall et al.) [45]
Heard of HPV (open question - 'Which STDs do you know/have you heard of?')			0.2% (Höglund et al.) [47]
Heard of HPV vaccine	9.2% (Gottvall et al.) [46]	1.1% (Gottvall et al.) [46]	5.8% (Gottvall et al.)** [46] 1.1% (Höglund et al.) [47]
Participants who knew that HPV is sexually transmitted	64.9% (Pelucchi et al.) [49] 12.1% (Gottvall et al.) [46]	47.4% (Pelucchi et al.) [49] 5.4% (Gottvall et al.) [46]	60.6% (Pelucchi et al.) [49] 9.2% (Gottvall et al.)** [46] 2.9% (Höglund et al.) [47]
Participants who knew that HPV is a risk factor for cervical cancer (closed question)	11.8% (Gottvall et al.) [46]	3.1% (Gottvall et al.) [46]	8.1% (Gottvall et al.) [46] 1.2% (Höglund et al.) [47]
Participants aware that aim of HPV vaccination is to prevent cervical cancer	53.9% (Pelucchi et al.) [49]	32.1% (Pelucchi et al.) [49]	48.6% (Pelucchi et al.)** [49]
Participants who thought that aim of HPV vaccination is to prevent an STD	8.6% (Pelucchi et al.) [49]	7.2%(Pelucchi et al., 2010) [49]	8.3% (Pelucchi et al.) [49]
Subjective rating of risk of contracting HPV	45% perceived at risk (Pelucchi et al.) [49] 11.8% do not believe will be infected (Gottvall et al.) [46]	26% perceived at risk (Pelucchi et al.) [49] 24.5% do not believe will be infected (Gottvall et al.) [46]	17.3% do not believe will be infected (Gottvall et al.)** [46]
HIV			
Heard of HIV (identification from list of STDs or direct question)	97.2% among year 9 and 100% among year 11 pupils (Garside et al.) [42]	97.0% among year 9 and 96.2% among year 11 pupils (Garside et al.) [42]	97.7% (Garside et al.) [42] 100% (Tyden et al.) 91% [38] (Fogarty) [36]
Heard of HIV (open question - which STDs do you know/have you heard of?)			88% (Höglund et al.) [47]
Participants who knew that you can not tell by looking at someone if they have HIV			Overall 53% (Goodwin et al.)[2] [43]
Participants who knew that HIV is caused by a virus			91% (Eriksson et al.) [41] 88% (Fogarty) [36]
Participants who knew that HIV is sexually transmitted	99% (Sachsenweger et al.) [#] [49] 97% (Goodwin et al.)[1][43]	99% (Sachsenweger et al.) [#][49] 86% (Goodwin et al.)[1][43]	99% (Sachsenweger et al.) [#][49] 81% (Höglund et al.) [47] 92% (Goodwin et al.)[1][43] 99% (Eriksson et al.) [41] 95% (Fogarty) [36]
Participants who knew that sharing a needle with an HIV infected person may lead to infection with the virus	91% (Sachsenweger et al.) [#][49] 72% (Goodwin et al.)[1][43]	91% (Sachsenweger et al.) [#][49] 62% (Goodwin et al.)[1][43]	91% (Sachsenweger et al.) [#][49] 68% (Goodwin et al.)[1][43] 95% (Eriksson et al.) [41] 99% (Fogarty) [36]
Participants who knew that use of condoms can protect against contraction of HIV	83%(Goodwin et al.)[1][43] 42% (Lunin et al.) [39]	86% (Goodwin et al.)[1][43] 60% (Lunin et al.) [39]	99% (Sachsenweger et al.) [#][49] 76% (Höglund et al.) [47] 84% (Goodwin et al.)[1][43] 99% (Eriksson et al.) [41] 51% (Lunin et al., 1995)** [39] 94% (Fogarty) [36]
Participants who knew where to go for diagnosis/treatment/advice on HIV			22% aware of STD clinic and 32% of AIDS telephone service (Fogarty) [36]
Subjective rating of risk of contracting HIV	11% perceived themselves 'not at risk' (Lunin et al.) [39]	19% perceived themselves 'not at risk' (Lunin et al.) [39]	15% perceived themselves 'not at risk' (Lunin et al.)** [39]
Chlamydia			
Heard of chlamydia (identification from list of STDs or direct question)	41.4% among year 9 and 22.7% among year 11 pupils (Garside et al.) [42] 79% (Tyden et al.) [38]	36.7% among year 9 and 13.2% among year 11 pupils (Garside et al.) [42] 60% (Tyden et al.) [38]	34% (Garside et al.)*** [42] 70% (Tyden et al.) [38] 91% in 1986, and 96% in 1988 survey (Andersson-Ellström et al.) [37]
Heard of chlamydia (open question - which STDs do you know/have you heard of?)			86% (Höglund et al.) [47]

Table 3 Awareness and knowledge of STDs reported in 14 of the 15 studies included in the review *(Continued)*

Participants who knew that chlamydia can be symptom-free	51% in 1986, and 68% in 1988 survey (Andersson-Ellström et al.) [37]	28% in 1986, and 45% in 1988 survey (Andersson-Ellström et al.) [37]	46% (Höglund et al.) [47] 40% in 1986, and 56% in 1988 survey (Andersson-Ellström et al.)** [37]
Syphilis			
Heard of syphilis (identification from list of STDs or direct question)	45.5% among year 9 and 47.0% among year 11 pupils (Garside et al.) [42]	43.4% among year 9 and 45.3% among year 11 pupils (Garside et al.) [42]	45% (Garside et al.) [42]
Gonorrhoea			
Heard of gonorrhoea (identification from list of STDs or direct question)	51.0% among year 9 and 53.0% among year 11 pupils (Garside et al.) [42]	52.4% among year 9 and 60.4% among year 11 pupils (Garside et al.) [42]	53% (Garside et al.) [42] ≥ 84% (Tyden et al.) [38] 98%, 1986 survey (Andersson-Ellström et al.) [37]
Heard of gonorrhoea (open question - which STDs do you know/have you heard of?)			50% (Höglund et al.) [47]
Herpes			
Heard of herpes (identification from list of STDs or direct question)	52.4% among year 9 and 75.8% among year 11 pupils (Garside et al.) [42]	53.6% among year 9 and 71.7% among year 11 pupils (Garside et al.) [42]	59.1% (Garside et al.)*** [42] 90%, 1986 survey (Andersson-Ellström et al.) [37] 56% (Tyden et al.) [38]
Heard of herpes (open question - which STDs do you know/have you heard of?)			64% (Höglund et al.) [47]
STDs in general			
Participants who knew that STDs in general can be symptom-free	53.8% among year 9 and 60.0% among year 11 pupils (Garside et al.) [42]	64.2% among year 9 and 60.4% among year 11 pupils (Garside et al.) [42]	59.7% (Garside et al.) [42]
Participants who knew that use of condoms can protect against contraction of STDs in general	15%, 1986 survey (Andersson-Ellström et al.) [37] 34%, 1988 survey (Andersson-Ellström et al.) [37] 100% (Andersson-Ellström et al.) [40]	27%, 1986 survey (Andersson-Ellström et al.) [37] 52%, 1988 survey (Andersson-Ellström et al.) [37]	20%, 1986 survey (Andersson-Ellström et al.)** [37] 43%, 1988 survey (Andersson-Ellström et al.)** [37] 100% (Tyden et al.) [38]
Subjective rating of risk of contracting an STD in general	32%, 1986 survey (Andersson-Ellström et al., 1991) [37] 24%, 1988 survey (Andersson-Ellström et al.) [37]	16%, 1986 survey (Andersson-Ellström et al.) [37] 24%, 1988 survey (Andersson-Ellström et al.) [37]	55% "low" perceived susceptibility (Woodhall et al.)* [45]
Reported use of condoms			
Participants who reported using condoms at first sexual intercourse	50% (Tyden et al.) [38] 65% (Gottvall et al.) [46]	40% (Tyden et al.) [38] 65% (Gottvall et al.) [46]	45% (Tyden et al.) [38] 65% (Gottvall et al.) [46] 61% (Höglund et al.) [47]
Participants who reported using condoms at last sexual intercourse	26% (Tyden et al.) [38]	38% (Tyden et al.) [38]	31% (Tyden et al.) [38]

* combined figure given for HPV and chlamydia

** statistically significant differences in awareness/knowledge between boys and girls

*** statistically significant differences in awareness/knowledge between year 9 and year 11 pupils

Publication in German

contact. For the latter mode of transmission, the lowest proportion of correct answers was observed among 16 year old pupils. Generally the proportion of respondents correctly reporting that use of condoms helps protect against contraction of HIV was above 90%. The only exception was in the Russian study conducted by Lunin et al. in 1993, in which only 42% of females and 60% of males were aware of this fact [39]. In the same study, only 15% of the adolescents perceived themselves 'not at risk' of contracting HIV (Table 3).

Only one study reported asking the adolescents if one can tell by looking at someone if they have HIV, to which 47% responded affirmatively [43].

Awareness and knowledge of chlamydia

The proportion of adolescents able to identify chlamydia as an STD from a list of diseases ranged from 34% in the study conducted in England by Garside et al. [42] to 96% in the Swedish study by Andersson-Ellström et al. [22]. In the Garside study, the proportion was higher

among year 9 than among year 11 pupils ($p < 0.05$). In another Swedish study by Höglund et al. 86% of the surveyed adolescents mentioned chlamydia as one of the STDs known to them in response to an open question [47]. In the two studies which reported on awareness among boys and girls separately, girls were observed to have higher awareness proportions than boys [38,42]. While the observation was not statistically significant in one of the studies, [27] this was not reported on in the other study [38].

Not many adolescents knew that chlamydia can be symptom-free: 40% and 56% in the 1986 and 1988 surveys by Andersson-Ellström et al. [37] and 46% in the study by Höglund et al. [47]. In one Swedish study where the level of knowledge in the same study population was assessed at age 16 and 18, a statistically significant increase in knowledge was observed over time [40]. Only the Finish study reported on the subjective rating of risk of contracting chlamydia. 55% of the adolescents surveyed reported 'low perceived susceptibility' [45] (Table 3).

Awareness and knowledge of gonorrhoea

Gonorrhoea was identified as an STD from a given list by 84% of adolescents in the survey by Tyden et al., [38] by 98% in the survey by Andersson-Ellström et al., [37] and by 53% in the survey by Garside et al. [42]. In the latter, the difference between year 9 and year 11 pupils was more pronounced among boys: 53% among year 9 and 60% among year 11 ($p > 0.05$). A statistically significant increase in knowledge over time was observed in a group of girls surveyed at age 16 and 18 [40]. Only 50% of the adolescents surveyed in the study by Höglund et al. mentioned gonorrhoea in response to an open question on known STDs [47] (Table 3).

Awareness of syphilis and herpes

Awareness of syphilis was surveyed only in the study conducted in England where 45% of the participating adolescents correctly identified the disease from a given list as an STD. The proportion was slightly higher among year 11 compared to year 9 pupils and awareness was slightly higher among girls than among boys ($p > 0.05$) [42] (Table 3).

In the Tyden et al. study, [38] 56% of the surveyed adolescents identified herpes as an STD from a given list. The proportion was 90% in the survey by Andersson-Ellström et al. [37] and 59% in the Garside et al. study [42]. In the latter, considerable differences were observed between year 9 and year 11 pupils ($p < 0.05$), but not between girls and boys in the same school year. Herpes was mentioned as an STD by 64% of the adolescents surveyed in the study by Höglund et al. [47] (Table 3).

Awareness of STDs in general

Five of the studies reviewed assessed the knowledge of participating adolescents on STDs in general. In the England study, all in all 59.7% of the participants knew that STDs in general can be symptom-free [42]. Among girls, knowledge was higher among year 11 than year 9 pupils, while the opposite was true for boys. The proportion of boys in year 9 who knew this fact (64.2%) was considerably higher than that of year 9 girls (53.8%) (Table 3). In two Swedish studies by Tyden et al. and by Andersson-Ellström et al., all surveyed adolescents knew that the use of condoms can protect against the contraction of STDs in general [38,40]. In an earlier study by Andersson-Ellström et al., 20% of sexually active pupils surveyed in 1986 were aware that condoms protect against infection. The figure significantly went up to 43% in 1988, with boys having significantly higher awareness than girls in both years [22] (Table 3). In the same study, the proportion of girls who felt themselves to be at risk of contracting an STD in general went down from 32% in the 1986 survey to 24% in the 1988 survey. Among boys, the proportion increased from 16% in 1986 to 24% in 1988. These changes were not statistically significant [37]. In the Finish study, 55% of the surveyed adolescents perceived themselves to be at low risk of contracting an STD [45].

Reported use of condoms

Use of condoms by sexually active participants was assessed in three studies, all conducted in Sweden [38,46,47]. Reported use at sexual debut was lowest in the study published in 1991 (31%), [38] and higher in the other studies both published in 2009: 61% [47] and 65% [46] respectively (Table 3). In the earlier study, the proportion of girls reporting condom use was, at 50%, considerably higher than that of boys (40%) [38]. In the study by Gottvall et al., no difference in condom use was observed between girls and boys [46]. Condom use at recent coitus was reported on only in the earlier study [38]. It was observed that the decrease in the proportion of girls reporting using condoms was more pronounced than that of boys (26% vs. 40%) (Table 3).

Discussion

The highest awareness and knowledge were reported for HIV/AIDS. This is certainly linked to the fact that since the mid 1980s, extensive awareness campaigns on this topic have been conducted globally. The lowest proportions were reported for HPV, with awareness as low as 5.4% in one study [47]. With only about 1 in 8 respondents knowing that HPV is an STD, awareness was still very low in one of the two studies conducted after the introduction of the HPV vaccine [46]. A higher awareness

(66.6% of respondents aware), measured in a different population, was observed in the second recent study on HPV [48].

Two factors appeared to have influenced awareness. The first was of a methodological nature and related to the fact whether an open or closed question was posed. Of the studies included in the review which assessed awareness, all but one used closed-form questions only. The adolescents either had to identify sexually transmitted diseases from a given list of diseases, or the question was in a yes/no format. Initially, Höglund et al. asked participating adolescents to list all STDs known to them and then later on, if they had ever heard of HPV. Only one participant (0.2%) mentioned HPV as one of the STDs known to them, but later, 24 (5.4%) reported to have heard of HPV [47]. In comparison to open-form questions, closed questions are not only more practical and easier to respond to, but also easier to code and analyse. One of the arguments raised against closed questions, especially where a list of possible answers is given, is the risk of guesswork. It can not be ruled out that some participants, unable to answer the question, will select answers at random [50,51]. In the study by Garside et al. for example, among year 9 pupils, 14.5% incorrectly identified plasmodium, and 20.6% filariasis from a given list as STDs [42]. Open questions have been recommended for surveying participants with unknown or varying knowledge/awareness [50] as these questions provide a more valid picture of the state of knowledge [51].

To a lesser extent, gender also appears to have influenced knowledge and awareness, especially for HPV [46,48]. Significant gender differences were observed, with females having better awareness and knowledge than males. Although the data are limited as not all studies reported results separately for males and females, these findings, could be reflective of the way awareness campaigns, for example on HPV, have been targeted more at females than at males.

The studies on HIV included in our review generally reported high awareness of the protective effect of condoms among adolescents [36,41,43,47,49]. One study included in the review however observed that adolescents seem to regard condoms primarily as a method of contraception and not as a means of protection against sexually transmitted diseases (40). In this study, 19 out of 20 female adolescents who reported more than 4 sexual partners at the age of 18 reported intercourse without a condom in relationships of less than 6 months' duration. The majority of them were, however, convinced that they had neither acquired (96%) nor transmitted (93%) an STD at last unprotected intercourse [40]. Other studies also indicate that consistent condom use is generally low among adolescents [27,52-55].

Where reported, participation rates were generally high, probably due to the fact that the adolescents were recruited in schools. In some instances however, the number of participants was low even though the participation rate was reported as high. In the study by Tyden et al. for example, the study sample consisted of 213 pupils, 12% of the 1830 students in the first form of upper secondary school in Uppsala [38]. The authors base the participation rate of their study (98%) on the 12%, without explaining how it came about that only 213 pupils were considered for participation. The one study which recruited participants per post had a very low participation rate of 21.5% [45]. Nevertheless, the study had more participants than others with comparatively higher participation rates. Bias related to selective participation is an issue that needs to be considered on a study by study basis, and reporting on response proportions should be considered essential for all studies.

Study strengths and limitations

To our knowledge no systematic reviews of published literature on knowledge and awareness of sexually transmitted diseases among school-attending adolescents in Europe have been conducted to date. The current review confirms that there are considerable gaps in knowledge and awareness on major STDs in European adolescents. Our results underline the importance of the objectives set for adolescents' sexual and reproductive health in Europe, the first of which foresees that adolescents be informed and educated on all aspects of sexuality and reproduction [31].

We could not identify many studies on knowledge and awareness of sexually transmitted diseases among school-attending adolescents in Europe. This could be due to the fact that knowledge has been shown to have little impact on behaviour change, and prevention interventions have generally moved away from a focus on knowledge and awareness as key mediators. Another possible reason is that schools are not always willing to participate in such studies due to competing demands of other school activities or because of the subject content [16,28-30].

One limitation of our review is that the 15 studies included did not all focus on the same sexually transmitted diseases. The four studies conducted in Eastern Europe were all on HIV/AIDS knowledge and awareness only, whereas Western European studies were on STDs in general or on HPV. Furthermore, the formulation of the questions used to assess awareness and knowledge varied between studies, making it difficult to directly compare the findings of individual studies. Another potential limiting factor is the age variation of participants in the studies included in the review, especially as all but one study did not clearly investigate the association between age and awareness or knowledge. Due to the afore-mentioned factors and the small number of studies available, it was not possible to perform a meta-analysis of the study findings.

The representativeness of study participants in some studies could not be assessed as it was not mentioned how the schools were selected [37,40-44,49]. Different socioeconomic environments of individual schools are likely to affect results, but there is currently not sufficient information to assess this.

The school setting offers an effective way to access adolescent populations universally, comprehensively and uniformly [56]. It plays an important role for sex education, especially for those adolescents with no other information sources. Furthermore, some parents are not comfortable discussing sexual issues with their children. It therefore comes as no surprise that many young people cite the school as an important source of information about sexually transmitted diseases [26,27]. Although sex education is part of the school curriculum in many European countries, there are differences in the issues focused on. In some countries sex education is integrated in life skills approach, whilst biological issues are predominant in others and at times the focus is on HIV/AIDS prevention [57]. Generally it seems that education schedules offer a range of opportunities to raise knowledge and awareness of STD among adolescents.

Conclusion

In general, the studies reported similar low levels of knowledge and awareness of sexually transmitted diseases, with the exception of HIV/AIDS. Although, as shown by some of the findings on condom use, knowledge does not always translate into behaviour change, adolescents' sex education is important for STD prevention, and the school setting plays an important role. Beyond HIV/AIDS, attention should be paid to infections such as chlamydia, gonorrhoea and syphilis.

Additional material

Additional file 1: Review Protocol: The preparation process for the systematic review is documented in the file. Included are the objectives of the review, inclusion and exclusion criteria, the search strategy, definition of outcomes, as well as the data abstraction table.

Authors' contributions

FSZ developed the concept for the study, conducted the literature search, assessed studies for inclusion in the review and extracted data. She also prepared drafts and undertook edits. LS was involved in the development of the study concept, conducted the literature search, assessed studies for inclusion in the review and extracted data. HZ was involved in the development of the study concept. All authors contributed to the editing of the drafts and have read and approved all versions of the manuscript.

Competing interests

The authors declare that they have no competing interests.

Received: 12 May 2011 Accepted: 25 September 2011
Published: 25 September 2011

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Pre-publication history

The pre-publication history for this paper can be accessed here:
http://www.biomedcentral.com/1471-2458/11/727/prepub

doi:10.1186/1471-2458-11-727
Cite this article as: Samkange-Zeeb *et al.*: Awareness and knowledge of sexually transmitted diseases (STDs) among school-going adolescents in Europe: a systematic review of published literature. *BMC Public Health* 2011 **11**:727.

Article II

Awareness and knowledge of sexually transmitted diseases among secondary school students in two German cities

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J Community Health. 2012 Sep 22. [Epub ahead of print]

J Community Health
DOI 10.1007/s10900-012-9614-4

ORIGINAL PAPER

Awareness and Knowledge of Sexually Transmitted Diseases Among Secondary School Students in Two German Cities

Florence Samkange-Zeeb · Rafael T. Mikolajczyk · Hajo Zeeb

Abstract Several western countries have reported increases of sexually transmitted diseases such as gonorrhea, syphilis and chlamydia since the mid-1990s, especially among teenagers 16–19 years old. We conducted a school-based survey to assess awareness and knowledge of STDs among students attending the 8th grade and above in Bremen and Bremerhaven, two cities in northern Germany. Between October and December 2011 students completed an anonymous questionnaire on awareness and knowledge of STDs in 8 different schools. To assess awareness of STDs, the students were asked to indicate which STDs they had heard of. Knowledge of STDs was assessed based on 4 general questions. Furthermore, comprehensive awareness of HPV was assessed based on 3 items. We assessed differences in HPV awareness and knowledge of STDs by key demographic variables such as age, gender and migrant background. A total of 1,148 students aged 12–20 years (response 28 %) completed the questionnaire. 31 % had a migrant background and 55 % were girls. Almost all students had heard of HIV/AIDS, but only 23 % of chlamydia and 13 % of HPV. Significantly more girls than boys had heard of HPV (18 vs. 8 %) and chlamydia (31 vs. 16 %). Generally, low levels of STD knowledge and awareness of HPV were observed. In multivariable analyses, age, gender, and ever having had sex were associated with both STD knowledge and awareness of HPV. HIV/AIDS remains the only sexually transmitted disease most students have heard of. Sex education at school needs to be broadened to include STDs other than HIV/AIDS.

Keywords Adolescents · Awareness · Knowledge · Sexually transmitted diseases · Chlamydia · HPV

Introduction

Sexually transmitted diseases (STDs) are a major health problem affecting mostly young people worldwide. While a general decrease of gonorrhea, syphilis and chlamydia was observed between 1985 and 1996 in developed countries [1], a number of countries have reported increases of these diseases since the mid-1990s, especially among teenagers 16–19 years old [2–6].

As most STDs can take a symptom-free course, they can be passed on unaware during unprotected sexual intercourse. The risk of contracting an STD is higher for female than for male adolescents, as the former generally have older partners who are more likely to be infected [3]. If untreated, an STD infection can lead to impaired fertility and adverse pregnancy outcomes [7].

The decreasing age of sexual debut and the reluctance of adolescents to use condoms are two explanations which have been given for the increase in numbers of STDs. When condoms are used, this is mainly done to prevent unwanted pregnancy and until another form of contraception is found [6, 8].

Several studies have observed that young adolescents are not well informed about STDs. Whereas many

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Published online: 22 September 2012

adolescents have heard of HIV/AIDS, the awareness of other STDs such as chlamydia and human papilloma virus (HPV) has been observed to be low. A recent systematic review on awareness and knowledge of STDs among school-attending adolescents in Europe confirmed this observation [9]. Chlamydia is the most common curable STD affecting young people in western countries, yet many of them are unaware of its risks and consequences [10, 11]. A contributing factor is certainly the fact that in some countries, STD prevention still mainly focuses on HIV/AIDS. In Germany, although information brochures and other materials on chlamydia are available from the Federal Centre for Health Education, there are no nationwide campaigns similar to those conducted for HIV/AIDS [12]. Among 15–17 year old girls who participated in a study in Berlin, only 17 % had heard of chlamydia [13].

According to literature, at some point in their life, most sexually active persons will get HPV, though many may not be aware of it [14]. Since the introduction of the vaccines against HPV, the awareness of HPV has been assessed in many studies, mainly focusing on women and girls. As among adults, awareness and knowledge of HPV among school-going adolescents has been observed to be low in several countries [6, 9, 15]. In Germany, only a few epidemiological studies have been conducted on this topic. Recently, Blödt et al. [16] assessed the awareness and knowledge of HPV among vocational students in Berlin aged 18–25 years. Only 50 % of the women and 25 % of the men surveyed had heard of HPV. Up to now, no epidemiologic studies conducted on secondary school students have been published.

We conducted a school-based survey in order to assess the awareness and knowledge of STDs among secondary school students attending the 8th grade and above, in two cities in northern Germany, Bremen and Bremerhaven. We assessed differences in awareness and knowledge of STDs by key demographic variables such as age, gender and migrant background.

Methods

As described in an earlier publication [17], we conducted the survey between October and December 2011 in 8 secondary schools in Bremen and Bremerhaven, two cities in the north of Germany. The participating students were 12–20 years old and attending the 8th grade and above.

We approached the principals of 18 randomly selected government secondary schools in these two cities and asked them for permission to conduct the survey in their schools. Each school was provided with a study flyer in which the study aims and issues concerning parental consent and data protection were documented. The principals of 8 schools, 6 in Bremen and 2 in Bremerhaven, gave their consent. The schools include both school forms offered in the region: schools offering up to the 10th grade and those offering up to the 12th or 13th grade.

The teachers, parents of the students, as well as the students themselves were provided with written information, including consent forms, about the study. Information for parents was also provided in Turkish and Russian, languages spoken by two major ethnic groups in Germany. Students younger than 18 years old had to have signed parental consent for them to take part in the survey. According to data protection regulations, students aged $\geq$18 years could only give information on parents' education with signed parental consent. Consequently, not all of them provided this information. The study was approved by the ethics committee of the University of Bremen, the Senator for Education, Science and Health, and the Data Protection Officer for the State of Bremen.

Questionnaire

Students with signed consent completed an anonymous, self-administered questionnaire at their school during normal school time. No personal details such as name or address were collected.

Socio-Demographic Characteristics

The students were requested to provide socio-demographic information such as age, school grade and country of birth. Migrant background was assessed on the basis of the following information: whether or not the pupil was born in Germany, whether or not one or both parents were born in Germany, the main language spoken at home. For the variables school education of the father and mother, three levels were created according to the International Standard Classification of Education (ISCED): 'low' = levels 0–2, 'medium' = 3–4 and 'high' $\geq$ 5 [18].

Sexual Activity and Information About Sex

The students were asked whether they thought they were well informed about sex and to indicate their sources of information. They were also asked if they had ever had sex, their age at first sexual contact, method of contraception used, and number of lifetime sexual partners.

Awareness of STDs

To assess awareness of STDS, the students were asked to indicate which of the following diseases they had ever heard of: HIV/AIDS, human papillomavirus (HPV),

chlamydia, herpes, syphilis, gonorrhea and hepatitis B. They were also asked to indicate their sources of information.

Knowledge of STDs

The following items were used to assess students' knowledge of STDs:

- knowing that using a condom protects against getting an STD,
- knowing that STDs can be passed on unaware,
- knowing that chlamydia, syphilis, gonorrhea are curable, but not HIV/AIDS and human papillomavirus (HPV), and
- knowing that there is no vaccine for HIV/AIDS, chlamydia, syphilis and gonorrhea

A summary variable describing knowledge of STDs was built based on the number of items the students had correctly answered, and ranged from 0 to 4.

Awareness of HPV

Awareness of HPV was assessed based on the following items:

- ever heard of HPV,
- aware that HPV can cause cervical cancer, and
- being aware that it is possible to be vaccinated against HPV.

As for STD knowledge, a new variable 'awareness of HPV' was built based on the number of items the students had positively responded to, and ranged from 0 to 3.

Girls were also asked if they had been vaccinated against HPV. The findings have been reported elsewhere [17].

Analysis

Data analysis was conducted using SAS version 9.2 [19]. We performed descriptive statistics and calculated frequencies for all variables. The variable school education of father was not included in the analyses as there were many missing values. For other variables missing values were excluded from the analysis with the exception of maternal education, for which missing values were recoded into a separate category. Chi-square tests were used to assess bivariate relations between the independent variables age, gender, migrant background, school education of mother, ever had sex, type of school and the outcome variables "awareness of HPV" and "knowledge of STDs". As only four students correctly answered all items on STD knowledge, they were put in the same category with those who correctly answered three items. To account for clustering of individual observations by school, a random effects ordinal regression model (PROC GLIMMIX) was initially applied and the COVTEST statement was used to test for differences by school. Where the covariance parameter was not significant, standard ordinal regression analysis (PROC LOGISTIC) was conducted. In each case, the proportional odds assumption was used to test whether the ordinal regression model was appropriate. The analyses were conducted with backward selection, initially including all independent variables significant in bivariate analyses (significance set at $p \leq 0.05$). Thereafter, non-significant variables in the multivariable model were removed stepwise. The demographic variables age, gender, migrant background and school education of mother were maintained in all analyses as they have been shown to be associated with knowledge and awareness of STDs among adolescents in previous studies.

Results

A total of 1,148 students (participation rate of 28 %), about a third of whom had a migrant background, completed the questionnaire. 55 % of the students were girls, 45 % were aged 12–14 years (median age 15 years and range 12–20 years), and 54 % attended the 8th and 9th grade. Of all the students, 80 % felt they were well informed about sex and 27 % reported having ever had sex (Table 1). The average age of first sex was 15 years and the average number of lifetime sexual partners was two. More than 90 % of the students who had ever had sex reported using some form of contraception at first sexual contact. Differences in the form of contraceptive used at sexual debut were observed between girls and boys, with 37 % of the girls and 51 % of the boys reporting using a condom only and 49 % of the girls and 24 % of the boys reporting using a combination of the pill and condom ($p = 0.001$). Girls reported more often than boys to have had one sexual partner (51 vs. 39 %), and boys reported more often than girls to have had more than 2 sexual partners (38 vs. 27 %). These differences were however not statistically significant ($p = 0.069$).

Awareness of STDs

Whereas 99 % of the students had heard of HIV/AIDS, 91 % of herpes and 83 % of hepatitis, only 51 % had heard of syphilis, 23 % of chlamydia, 17 % of gonorrhea and 13 % of HPV. Significantly more girls than boys had heard of HPV (18 vs. 8 %) and chlamydia (31 vs. 16 %). More boys than girls had heard of syphilis (58 vs. 45 %) and gonorrhea (24 vs. 16 %) ($p \leq 0.001$).

Table 1 Demographic and other characteristics of the study population

	Total (n = 1,148) n (%)	Girls (n = 632) n (%)	Boys (n = 516) n (%)	*p* value*
Age in years				
12–14	522 (45.5)	290 (45.9)	232 (45.0)	
15–17	478 (41.6)	270 (42.7)	208 (40.3)	0.234
≥18	148 (12.9)	72 (11.4)	76 (14.7)	
Grade				
8th–9th	622 (54.2)	332 (52.5)	290 (56.2)	
10th and above	516 (44.9)	299 (47.3)	217 (42.1)	0.123
Missing	10 (0.9)	1 (0.2)	9 (1.7)	
Migrant background				
No	776 (67.6)	424 (67.1)	352 (68.2)	
Yes	353 (30.7)	201 (31.8)	152 (29.5)	0.471
Missing	19 (1.7)	7 (1.1)	12 (2.3)	
School education mother				
High	403 (35.1)	217 (34.3)	186 (36.0)	
Middle	318 (27.7)	197 (31.2)	121 (23.4)	0.047
Low	107 (9.3)	55 (8.7)	52 (10.1)	
Don't know/missing	320 (27.9)	163 (25.8)	157 (30.4)	
School education father				
High	365 (31.8)	197 (31.2)	168 (32.6)	
Middle	254 (22.1)	144 (22.8)	110 (21.3)	0.587
Low	123 (10.7)	63 (10.0)	60 (11.6)	
Don't know/missing	406 (35.4)	228 (36.1)	178 (34.5)	
Ever had sex				
No	823 (71.7)	466 (73.7)	357 (69.2)	
Yes	314 (27.4)	162 (25.6)	152 (29.5)	0.127
Missing	11 (0.9)	4 (0.6)	7 (1.4)	
Well informed about sex				
Yes	921 (80.2)	506 (80.1)	415 (80.4)	
No	20 (1.7)	14 (2.2)	6 (1.2)	0.382
Don't know/missing	207 (18.0)	112 (17.7)	95 (18.4)	
Reported source of information on sex*				
Biology lesson	895 (78.0)	498 (78.9)	397 (76.9)	0.419
Mother	637 (55.5)	401 (63.4)	236 (45.7)	<0.001
Internet	407 (35.5	173 (27.4)	234 (45.4)	<0.001
Newspaper/magazine	402 (35.1)	260 (41.2)	142 (27.5)	<0.001
Radio/TV	333 (29.0)	170 (26.9)	163 (31.6)	0.085
Reported source of information on STDs*				
Biology lesson	822 (72.0)	455 (72.0)	367 (71.1)	0.839
Mother	628 (55.0)	385 (60.9)	243 (47.1)	<0.001
Radio/TV	470 (41.2)	237 (37.5)	233 (45.2)	0.007
Internet	428 (37.5)	176 (27.8)	252 (48.8)	<0.001
Newspaper/magazine	396 (34.7)	243 (38.4)	153 (29.7)	0.002

* *p* value from χ^2 test

Sources of Information on Sexual Issues and on STDs

The sources of information on sexual issues commonly cited by the students were biology lesson (78 %), the mother (55 %), the internet and the newspaper/magazine (each 35 %; Table 1). Similar observations were made for sources of information on sexually transmitted diseases. Both boys and girls equally often mentioned biology lesson as a source of information, while significantly more girls than boys cited the mother or newspaper/magazine. The

internet and radio/TV were cited more by boys than girls ($p < 0.001$ and $p = 0.007$).

STD Knowledge

Ten percentage of the students did not correctly answer any of the items on STD knowledge, 37 % correctly answered one item, 43 % correctly answered two items and a further 10 % correctly answered at least 3 items Only 4 students (2 girls and 2 boys) correctly answered all 4 items. Although 94 % of the students knew that using a condom protects against contracting an STD, 26 % simultaneously indicated taking the pill, having one sexual partner and showering after sex as protective measures. 67 % correctly responded that STDs in general can be passed on unaware as they can be symptom-free, while 23 % responded that only HIV/AIDS can be passed on unaware. No differences in STD knowledge by school were observed (covariance test in random effects regression model, $p = 1.00$), hence only the model including individual variables was fit. Age, gender, migrant background, ever had sex, and type of school were significantly associated with STD knowledge in bivariate, as well as in the multivariable regression analysis (Tables 2, 3). Knowledge increased with age, was better among girls, among students with no migrant background, and among those who had ever had sex. For school education of mother, a significant association was observed only for the category high versus low (OR 1.65: 95 % CI 1.09–2.50). Excluding education of mother from the analyses did not change the other associations observed (data not shown).

Awareness of HPV

Sixty two percentage of the students did not positively respond to any of the items on HPV awareness, 22 % positively responded to one item, 10 % to 2 items, and 6 % to all three items. 26 % were aware that HPV can cause cervical cancer (36 % of the girls and 15 % of the boys) and 20 % that it is possible to be vaccinated against HPV (29 % of the girls and 9 % of the boys). In bivariate analyses age, gender ever having sex and type of school were significantly associated with awareness of HPV (Table 2). As the school heterogeneity test was significant ($p = 0.034$), random effects ordinal regression was fit to the data. In the initial backward regression (Table 3) and subsequent analyses, age, gender, and having ever had sex were significantly associated with awareness of HPV. The odds of a girl having awareness of HPV were 3.5 times

Table 2 Results of bivariate analyses between independent variables and both outcome variables, awareness of HPV and STD knowledge

	Awareness of HPV positive responses					STD knowledge correct responses				
	None (n/%)	1 item (n/%)	2 items (n/%)	3 items (n/%)	*p* value*	None (n/%)	1 item (n/%)	2 items (n/%)	≥3 items (n/%)	*p* value*
Age in years										
12–14	352 (67)	110 (21)	42 (8)	18 (3)		68 (13)	233 (45)	201 (39)	20 (4)	
15–17	277 (58)	108 (23)	58 (12)	35 (7)	0.004	33 (7)	179 (37)	201 (42)	65 (14)	<0.001
≥18	82 (55)	34 (23)	19 (13)	13 (9)		4 (3)	31 (21)	72 (49)	41 (28)	
Gender										
Female	315 (50)	172 (27)	87 (14)	58 (9)	<0.001	63 (10)	208 (33)	269 (43)	92 (15)	<0.001
Male	396 (77)	80 (15)	32 (6)	8 (2)		53 (10)	224 (43)	220 (43)	19 (4)	
School education of mother										
High	251 (62)	90 (22)	44 (11)	18 (4)		32 (8)	142 (35)	180 (45)	49 (12)	
Middle	176 (55)	78 (25)	38 (12)	26 (8)	0.062	33 (10)	127 (40)	134 (42)	24 (8)	0.131
Low	67 (63)	28 (26)	8 (7)	4 (4)		15 (14)	46 (43)	34 (32)	12 (11)	
Unknown	217 (68)	56 (18)	29 (9)	18 (6)		25 (8)	128 (40)	126 (39)	41 (13)	
Migrant background										
No	491 (63)	159 (20)	77 (10)	49 (6)	0.267	59 (8)	276 (36)	349 (45)	92 (12)	0.002
Yes	211 (60)	84 (24)	42 (12)	16 (5)		44 (12)	159 (45)	119 (34)	31 (9)	
Ever had sex										
No	537 (65)	171 (21)	78 (9)	37 (5)	<0.001	92 (11)	346 (42)	331 (40)	54 (7)	<0.001
Yes	166 (53)	79 (25)	40 (13)	29 (9)		12 (4)	93 (30)	138 (44)	71 (23)	
School type										
Up to 12th/13th grade	472 (60)	178 (23)	77 (10)	55 (7)	0.025	69 (9)	260 (33)	346 (44)	107 (14)	<0.001
Only up to 10th grade	239 (65)	74 (20)	42 (11)	11 (3)		36 (10)	183 (50)	128 (35)	19 (5)	

* p value from χ^2 test

Table 3 Results of multivariable regression analyses for awareness of HPV and STD knowledge

	n	Awareness of HPV[a] OR: 95 % CI	Knowledge of STDs OR: 95 % CI
Age in years			
12–14 (ref)	513	1.00	1.00
15–17	464	1.36: 1.01–1.84*	1.45: 1.12–1.88*
≥18	141	1.93: 1.18–3.17*	2.69: 1.73–4.17*
Gender			
Male (ref)	497	1.00	1.00
Female	621	3.50: 2.69–4.56*	1.72: 1.37–2.16*
School education of mother			
Low (ref)	103	1.00	1.00
Middle	312	1.49: 0.93–2.38	1.28: 0.84–1.94
High	394	1.22: 0.76–1.94	1.65: 1.09–2.50*
Unknown	309	0.87: 0.53–1.41	1.18: 0.77–1.81
Migrant background			
Yes (ref)	349	1.00	1.00
No	769	0.86: 0.66–1.12	1.51: 1.18–1.92*
Ever had sex			
No (ref)	812	1.00	1.00
Yes	306	1.53: 1.01–2.12*	1.40: 1.05–1.88*
School type			
Only up to 10th grade (ref)	360	1.00	1.00
Up to 12th/13th grade	758	0.88: 0.58–1.32	1.32: 1.03–1.70*

ref reference group

Ordinal regression models, both scores range from 0 to 3, odds ratios indicate effects per one point difference

[a] Model additionally included random effects of schools

* Statistically significant odds ratios

higher than that of a boy (95 % CI 2.71–4.58). Type of school did not maintain significance in multivariable analyses. Migrant background and school education of mother were not significantly associated with awareness of HPV in any of the analyses. Age, gender and having ever had sex remained the significant predictors of awareness of HPV. Excluding the variable school education of mother from the analyses did not change the results (data not shown).

A comparison of the 8 schools based on their random effects showed that 4 of them had significantly lower levels of awareness than the others, with both school types (offering up to the 10th grade and up to the 12th/13th grade) being equally represented (data not shown).

Discussion

We conducted a cross-sectional survey on knowledge and awareness of STDs among school-going adolescents in the 8th grade and above in two German cities. In addition to questions on general STD knowledge, we also assessed the awareness of HPV among participating students. Whereas most students had heard of HIV/AIDS and herpes, only a few had heard of chlamydia and HPV. Generally, low levels of STD knowledge and awareness of HPV were observed.

To our knowledge, this is the first epidemiologic study reporting on awareness of HPV among school-going adolescent girls and boys in Germany since the introduction of the vaccination in 2007. Knowledge of HIV/AIDS and of chlamydia among this population has been assessed previously [12, 20].

The issues of the low participation rate and the high number of unknown and missing data on parental education observed in our survey have already been discussed elsewhere [17]. In addition to parental conservatism towards the topic of sexually transmitted diseases, the fact that we used active and not passive consent may have also influenced the participation rate. It has been showed in various studies that participation rates are higher for passive than for active parental consent [21–24].

A strength of the study is that the 8 participating schools were randomly selected, and included both school forms offered in Bremen and Bremerhaven. Furthermore, awareness of HPV was assessed on the basis of three items, and not only asking if the students had heard of HPV. This enabled us to build a more comprehensive variable.

Similar to previous findings, almost all students had heard of HIV/AIDS (99 %), with only a few reporting having heard of chlamydia (23 %) or HPV (13 %) [9]. Although low, it cannot be ruled out that the proportion of students among the study group who have heard of HPV and chlamydia is still overestimated. The adolescents were asked to identify sexually transmitted diseases they had heard of from a given list of diseases, and hence the risk of guesswork cannot be ruled out [25, 26].

The observed higher levels of STD knowledge than of awareness of HPV are possibly due to the fact that the former was assessed based on general items dealing with protection and transmission, which are integrated in school-based sex education programs in Germany [12]. Items on awareness of HPV were however specific, and not necessarily covered in sexual education programs. This is further supported by the fact that traditional variables predicting knowledge (age, maternal education) were more strongly associated with STD knowledge, while female gender was more strongly associated with HPV knowledge.

In some studies, being sexually active was not associated with better knowledge of STDs [15]. In our study, results of both bivariate and multivariable analyses showed that students who had ever had sex had better STD knowledge and HPV awareness than those who had never

been sexually active. Persons belonging to an ethnic minority have been observed to have lower levels of HPV awareness and knowledge of STDs in some studies [16, 27–30]. In contrast, in our study this was only the case for knowledge of STDs. Apparently, education measures related to HPV were not influenced by migration background.

The gender differences we observed on both STD knowledge and awareness HPV and in those having heard of chlamydia have also been reported elsewhere [12, 31, 32], with girls having better knowledge and awareness than boys. This issue needs to be addressed as boys are equally at risk of contracting and transmitting the STDs [33, 34], even if their risk of most serious consequences such as cancer are lower. Furthermore, the HPV vaccine is now recommended for male adolescents in some countries [35, 36] and this recommendation is under discussion in others [37, 38]. Interestingly, significantly more boys than girls reported having heard of syphilis and gonorrhea. This may have sociocultural reasons such as the mentioning of these diseases in gender-specific media, but this is not more than a speculation.

As reported in other studies [8, 12, 39] biology lessons were the most cited sources of information on sexual issues and on sexually transmitted diseases in our survey. The importance of the school setting for sex education of adolescents has already been acknowledged [40]. There is however a need for the issues focused on to be broadened to include STDs such as HPV and chlamydia.

Conclusion

Our findings show that HIV/AIDS remains the only sexually transmitted disease most school-going adolescents have heard of. Sex education needs to be broadened to include STDs other than HIV/AIDS. The school setting is very important as it offers the opportunity to access both girls and boys from different social and ethnic backgrounds.

Recently, an international symposium on the sexual health of young people in Europe was held in Brussels. Among others issues, the participants discussed on how sexual health education and awareness of adolescents can be improved. Results of our study can help towards providing more evidence on the level of awareness and knowledge of STDs among school-attending adolescents and contribute data to the discussion.

Acknowledgments We would like to thank Beate Schütte, Svea Eichholz, Sinja Ernst, Stefanie Helmer, Kathi Liegmann, Natalya Makarova, Anna Muschalek, Julia Nürnberg, Saskia Pöttgen and Sandra Wegeng for their support during the conduction of the survey in the schools. We especially thank the following schools in which we conducted the survey for their co-operation: Gesamtschule Mitte Bremen, OS an der Schaumburger Str., OS Am Leibnizplaz, OS Findorff, SZ an der Lehmhorster Str., SZ Am Rübekamp II, Llyod Gymnasium and Johann-Gutenberg-Schule.

Conflicts of interests RTM received research funding from Sanofi Pasteur MSD for a different project. The remaining authors declare that they have no conflicting interests.

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Article III.

Awareness of sexually transmitted diseases among adolescents with and without migrant backgrounds in Bremen, Germany

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In press – conference proceedings of the 2nd Conference on "Health, Culture and the Human Body" held from 14-15 September 2012, Istanbul, Turkey

Awareness of sexually transmitted diseases among adolescents with and without migrant backgrounds in Bremen, Germany

F. Samkange-Zeeb, S. Pöttgen, B. Schütte, H. Zeeb

Introduction

Sexually transmitted diseases (STDs) and sexual hygiene are not only of high public health relevance, but also a health (and social) issue of long tradition. Although a cure has been found for most diseases, they still occur frequently and have serious long-term effects including cancer.[1] In the fight against these diseases, prevention plays a central role.

As most STDs occur symptom-free, meaning that the infected individual is not aware of the disease, STDs can be passed on unaware during unprotected sexual intercourse. If not treated, they can lead to serious long-term adverse effects such as ectopic pregnancy or infertility.[2] Compared to boys, girls are more at risk of infection as they tend to have older sexual partners, who are more likely to carry an infection.[3,4]

General decreases in the frequencies of gonorrhoea, syphilis and chlamydia infections were noted in developed countries over the period 1985-1996.[4] However, as from the mid-1990s, increases in the diagnoses of STDs, in particular syphilis, gonorrhoea and chlamydia have been reported in several European countries, especially among teenagers under the age of 20 years.[5]

Two main reasons have been put forward for the increase in STDs, the first being the declining age of sexual debut. Over the last three decades the average age of first sexual intercourse has decreased, with increasing proportions of adolescents reporting sexual activity before age 16.[6]

According to results of a survey conducted among 14-17 year old adolescents in Germany in 2005, 40% of the girls and 33 % of the boys reported having had sexual experience.[7] Among those with migrant background, the proportions were 28% of the girls and 45% of the boys.[8]

There are some data from Turkey that indicate that considerably more boys than girls report being sexually active. In a survey conducted among 10th graders in Istanbul (average age 16 years), published in 2005, 35% of the boys and 5% of the girls reported having had sexual intercourse.[9] In a different survey conducted among senior year high school students in the Konak district of Izmir in 2004 (average age 17.5 years), 57% of the boys and 5% of the girls reported having had sexual intercourse.[10]

A further reason which has been suggested for the increase in number of STDs among the young is the reluctance of adolescents to use condoms. Adolescents have reported that they find condoms difficult to use, that they detract from sensual pleasure and are also embarrassing to suggest to the partner.[11-13] In addition, in most cases condoms are primarily used as a protection against pregnancy, and not STDs. Consequently, their use becomes

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irregular when other contraceptives, such as the pill, are used.[7,14]

Although knowledge and awareness have been reported to have a limited effect on changing attitudes and behavior with regard to sexual health,[15] they are said to be important components of sex education which help promote informed healthy choices.[16] This may also be importance in the contexts of discussions about the newly available HPV vaccination, which links issues of sexual health with long-term prevention of chronic disease, i.e. cervical cancer. We thus have to find out what adolescents really know about STDs and whether there are knowledge and awareness differences between different groups such as migrants and non-migrants. Only when we have done this, can we identify areas which need to be improved on.

To this avail we conducted an epidemiological survey among school-going, adolescents in an urban setting. The specific aims of our study were:

1. to assess knowledge and awareness of adolescents attending the 8th grade and above in the Northern German towns of Bremen and Bremerhaven on STDs using a questionnaire, and
2. to investigate potential differences between pupils with and without migrant backgrounds.

Methods

Between October and December 2011 we conducted a cross-sectional school-based survey among pupils attending the 8th grade and above in Bremen and Bremerhaven. In preparation for the survey we contacted the principals of 18 randomly selected schools and asked them for permission to conduct the survey in their schools. Eight schools (6 in Bremen und 2 in Bremerhaven) agreed to co-operate. The teachers, parents of the pupils as well as the pupils themselves were provided with written information about the survey. Information for parents was also provided in Turkish and Russian. Pupils younger than 18 years old had to have parental consent for them to take part in the survey. Older pupils could sign their own consent forms. On the day of the survey, participating pupils completed the anonymous questionnaire during school time.

In the first section of the questionnaire we collected demographic characteristics such as age, school grade, school education and employment details of parents. To allow for anonymity, the pupils were informed not to write their names on the questionnaire. Migrant background was assessed based on the pupil's place of birth, place of birth of both parents and the main language spoken at home.

The second section of the questionnaire was on sexual activity and information on sex. The pupils were asked whether they thought they were well informed about sex and to indicate their sources of information. They were also asked if they had ever had sex, their age at first sexual contact, method of contraception used, and number of lifetime sexual partners.

To assess awareness of STDs, the pupils were given a list of diseases from which they were asked to indicate which STDs they had heard of, as well as their source of information.

Knowledge of STDs was assessed based on the following 4 items:

- knowing that using a condom protects against getting an STD,
- knowing that STDs can be passed on unaware,
- knowing that chlamydia, syphilis, gonorrhea are curable, but not HIV/AIDS and human papillomavirus (HPV) and,
- knowing that there is no vaccine for HIV/AIDS, chlamydia, syphilis and gonorrhea.

In addition, we assessed the awareness of HPV based on the following 3 items:

- whether the pupils had ever heard of HPV,
- whether they were aware that HPV can cause cervical cancer, and
- whether they were aware that it is possible to be vaccinated against HPV.

For the analysis, summary variables were then built for knowledge of STDs, and for awareness of HPV. In both cases, the pupils were categorized according to the number of items correctly answered: ranging from 0-4 for knowledge of STDs and from 0-3 for awareness of HPV.

Girls were also asked if they had been vaccinated against HPV. The results of this analysis showing an overall low level of vaccination frequency, but also a low level of knowledge about the actual personal vaccination status were recently published in the Journal of Community Health.[17]

The study was approved by the ethics committee of the University of Bremen, the Senator for Education, Science and Health, and the Data Protection Officer for the State of Bremen.

Results

A total of 1,148 pupils took part in the study. 19 pupils did not answer the questions on place of birth and main language spoken at home and were thus excluded from the analyses.

Of the 1,129 pupils included in the analyses, 353 (31%) had a migrant background and 55% were girls. The distribution of pupils with and without migrant background according to sex, age and grade was similar (Table 1).

Significant differences were observed for school education of parents, with a lower proportion of pupils with migrant background reporting middle or high level of parental education. All in all 306 pupils (27%), reported ever having had sex. 251 (82%) reported using a condom at sexual debut, 147 (48%) the pill and 18 (6%) reported not to have used any form of contraception (Table 1).

Comparing the pupils according to migrant background, statistically significant differences were observed for the method of contraception used at sexual debut, with a lower proportion of pupils with a migrant background reporting using the pill, and a higher proportion reporting not having used any contraception. 313 of the 625 girls (50%) reported having been to a gynaecologist, and 74 (11.8%) said they had been vaccinated against HPV. A large proportion of the girls (57%) did not know whether or not they had received the vaccine. No significant differences were observed between those with and those without a migrant background (Table 2).

Sources of information on sexual issues and on STDs

The most commonly cited sources of information on sexual issues and on STDs among pupils with and without a migrant background were the biology lessons and the mother. Those without a migrant background however cited the mother more often than those with a migrant background (Table 3).

Of the 353 pupils classified as having a migrant background, 90 (25%) came from a family with Turkish roots, making up the largest group of pupils with a migrant background. We then compared pupils with a Turkish background to those without a migrant background (Table 4). Similar to all other pupils, those with a Turkish background more often cited biology lessons and the mother as their source of information on sexual issues and on STDs. Here again, a higher proportion of pupils without a migrant background indicated that their mother was the major source of information, with girls reporting this more often than boys.

STDs ever heard of

Almost all participants had heard of HIV/AIDS. Many pupils had also heard of herpes and hepatitis B. However, only a few had heard of HPV or chlamydia (Table 3). Generally, higher proportions of pupils without a migrant background reported having heard of the listed STDs.

Knowledge of STDs

For the variable knowledge of STDs, the proportion of pupils with a migrant background who correctly answered the items was generally less than that of those without a migrant background (Table 5). About 45% of

those with a migrant background correctly answered 2 or more items, in comparison to almost 60% of those with no migrant background.
Very similar results were observed when only adolescents with Turkish migrant background were considered.

Awareness of HPV
Awareness of HPV was generally low among all pupils regardless of migrant background (Table 5). All in all, 62% of the pupils did not positively respond to any of the items on HPV awareness, and only 16% positively responded to at least 2 items. Similar results were observed when comparing pupils with Turkish migrant background and those without a migrant background.
Multivariable assessment for knowledge of STDs and awareness of HPV
We also assessed the effect of sex, age and migrant background on knowledge of STDs and HPV awareness using multiple regression analysis. As can be seen in table 6, boys had less STD knowledge and HPV awareness than girls, older pupils had better STD knowledge and HPV awareness than younger ones, and pupils without a migrant background had better STD knowledge than those with a migrant background. The difference in HPV awareness was not significant between the groups.

Discussion
For the conduction of surveys with adolescents of school going age, school- based surveys are advantageous as the prospective participants can be reached in one setting. This is especially so in countries with compulsory school attendance up to a certain age. Germany has compulsory school attendance of a minimum of 9 years. A further advantage is that youths from different social backgrounds can be accessed. When other avenues of contact and recruitment for epidemiological or social research are used, there is often a lower level of participation from socially disadvantaged groups. For this survey written parental consent was required for all pupils below the age of 18, which renders it likely that some differences with regard to participation from different social groups remain.
The pupils who took part in our survey generally had better STD knowledge than HPV awareness. Whereas those with a migrant background had somewhat lower STD knowledge than those without, no differences were observed for HPV awareness.
We did not observe any specific findings regarding pupils with Turkish background.
There are differences in sources of information on STDs most cited by the adolescents who participated in our study and those who participated in a survey on youth sexual and reproductive health conducted in Turkey in 2007. In our survey, more than 70% of all participating pupils cited biology lessons (school) as a source of information on STDs and more than 50% cited the mother. Among those with a migrant background, 69% cited biology lessons and almost 50% the mother. Similar findings were also observed among pupils with Turkish background.
In the survey conducted in Turkey, about a third of the participants generally mentioned the school as a source of information, and only 5% mentioned the mother. The visual media (60%) was the most cited source of information among the Turkish adolescents, and friends also played an important role (40%) particularly among boys (40%).[18]
Although there is no official recommendation on HPV vaccination, as is the case for example in Germany, where the vaccine is recommended for girls aged 12-17 years,[19] the HPV vaccine is also marketed in Turkey.
Results of a study in which Turkish women's knowledge about HPV and their acceptance of the vaccine were assessed showed that although knowledge on HPV and its importance regarding cervical cancer among the surveyed women was low, the majority said they would be willing to have their female (and male) children vaccinated.[20]

The dissemination of information and discussion about HPV could thus be an important additional entry point for STD education and awareness.

Parental as well as adolescents' awareness and knowledge of STD and their prevention are crucial for a safe and healthy development of adolescents as they mature. The school can play a vital role in this respect as the institution that offers broad and non-differential access to children and adolescents, and is a trusted source of information and education in most countries including Turkey and Germany.. Results of a study on parental attitudes towards school based sex education in Western Australia showed that parents were generally supportive of such activities, as long as they were adequately informed in writing on the topics which were to be covered. They also wished the schools to be prepared to openly discuss any issues raised by concerned parents.[21] This indicates that transparency is important and there should be open communication between schools and parents. Sex education however does not have to be provided by school teachers only. Pupils might find it easier to discuss sexual issues with someone to whom they don't have a teacher-pupil relationship and whom they don't see on a regular basis. There are organisations which can provide support in this area either by hosting information sessions in the schools or providing information material on different topics of sexual health. Examples of such organisations in Germany are local health authorities (Gesundheitsämter), Pro Familia and the Federal Centre for Health Education. Some countries, like the United States, the United Kingdom and Canada have school based health centres which not only provide general health services to the pupils, but also specific sexual health services. Attending a school where such services are offered has been reported to be associated with an increased use of contraceptives and STD screening among sexually active female adolescents.[22]

There is room for cooperation between Turkey and Germany when planning future studies in this area. Such cooperation would be profitable to both countries as there are many young adolescents living between the two of them.

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Table 1: Characteristics of study population

	Migrant background (n=353)		No migrant background (n=776)		
	n	%	n	%	p-value[1]
Sex					
Male	152	43.1	352	45.4	0.47
female	201	56.9	424	54.6	
Age in years					
12-14	159	45.0	357	46.0	0.76
≥15	194	55.0	419	54.0	
Grade					
8^{th}-9^{th}	197	55.8	416	53.6	0.48
≥10th	153	43.3	354	45.6	
missing	3	0.8	6	0.8	
School education of mother					
Low	47	13.3	56	7.2	
Middle	98	27.8	219	28.2	<0.01
High	91	25.8	307	39.6	
DK/missing	117	33.1	194	25.0	
School education of father					
Low	46	13.0	76	9.8	
Middle	73	20.7	181	23.3	<0.01
High	79	22.4	284	36.6	
DK/missing	155	43.9	235	30.3	
Ever had sex					
Yes*	81	22.9	225	29.0	
No	268	75.9	544	70.1	0.04
missing	4	1.1	7	0.9	
Contraception used at sexual debut**					
Condom	64	79.0	187	83.1	0.41
Pill	29	35.8	118	52.4	0.01
Other	1	1.2	2	0.9	0.79
none	9	11.1	9	4.0	0.02

[1]p-value from χ^2 test

* average age of sexual debut 15 years

** multiple answers possible

Table 2: Responses of girls to questions on having been to a gynaecologist and vaccination against HPV

	Migrant background (n=201)		No migrant background (n=424)		
	n	%	n	%	p-value[1]
Ever been to a gynaecologist					
Yes	94	46.8	219	51.7	
No	106	52.7	204	48.1	0.27
missing	1	0.5	1	0.2	
HPV vaccination					
Yes	23	11.4	51	12.0	
No	46	22.9	131	30.9	0.07
Don't know	129	64.2	230	54.2	
missing	3	1.5	12	2.8	

[1]p-value from χ^2 test

Table 3: STDs ever heard of and sources of information on sexual issues and on STDs cited by the participants

	Migrant background (n=353)		No migrant background (n=776)		
	n	%	n	%	p-value[1]
STDs ever heard of*					
HIV/AIDS	344	97.5	773	99.9	<0.01
HPV	50	14.2	101	13.1	0.61
Chlamydia	68	19.3	201	26.1	0.01
Herpes	308	87.3	715	92.4	0.01
Syphilis	138	39.1	431	55.7	<0.01
Gonorrhoea	59	16.7	163	21.2	0.09
Hepatitis B	282	79.9	661	85.4	0.02
None	6	1.7	1	0.1	<0.01
Information sources on sexual issues*					
Biology lessons	268	76.2	610	78.7	0.34
Mother	156	44.2	476	61.3	<0.01
Internet	104	29.5	280	36.1	0.43
newspaper	119	33.7	291	37.6	0.01
Information sources on STDs*					
Biology lessons	242	69.3	568	73.4	0.16
Mother	163	46.7	461	59.6	<0.01
Radio/TV	143	41.0	320	41.3	0.91
Internet	136	39.0	285	36.8	0.49

* multiple answers possible
[1]p-value from χ^2 test

Table 4: Comparison of sources of information on sexual issues and on STDs cited by participants with a Turkish background and those with no migrant background

	Turkish background (n=90)		No migrant background (n=776)		
	n	%	n	%	p-value[1]
Information sources on sexual issues*					
Biology lessons	65	72.2	610	78.7	0.16
Mother	36	40.0	476	61.3	<0.01
Internet	21	23.3	280	36.1	0.02
newspaper	18	20.0	291	37.6	<0.01
Information sources on STDs*					
Biology lessons	61	69.3	568	73.4	0.42
Mother	44	50.0	461	59.6	0.09
Radio/TV	29	33.0	320	41.3	0.13
Internet	29	33.0	285	36.8	0.48

* multiple answers possible

[1]p-value from χ^2 test

Table 5: Number of items on STD knowledge and HPV awareness correctly/positively answered by the pupils

	Migrant background (n=353)		No migrant background (n=776)		
	n	%	n	%	p-value[1]
Number of items on STDs correctly answered					
0	45	12.8	68	8.8	
1	150	42.5	274	35.2	
2	135	38.2	347	44.7	<0.01
3	23	6.5	83	10.7	
4	0	0	4	0.5	
Number of items on HPV positively answered					
0	211	59.8	491	63.3	
1	84	23.8	159	20.5	
2	42	11.9	77	9.9	0.27
3	16	4.5	49	6.3	

[1]p-value from χ^2 test

Table 6: Results of multivariable regression analyses for knowledge of STDs and awareness of HPV

	STD Knowledge		HPV awareness	
	OR	95% CI	OR	95% CI
Sex				
Female (ref)	1.00	-	1.00	-
Male	**0.65**	**0.51-0.83**	**0.29**	**0.22-0.38**
Age				
12-14 (ref)	1.00	-	1.00	-
≥15	**1.53**	**1.16-2.01**	**1.40**	**1.04-1.88**
Migrant background				
Yes (ref)	1.00	-	1.00	-
No	**1.51**	**1.16-1.98**	0.81	0.61-1.07

OR = odds ratio
ref = reference
CI = confidence interval

Article IV

HPV infection awareness and self-reported HPV vaccination coverage in female adolescent students in two German cities

Samkange-Zeeb F, Spallek L, Klug SJ, Zeeb H.

J Community Health. 2012 Dec;37(6):1151-6. doi: 10.1007/s10900-012-9589-1.

J Community Health
DOI 10.1007/s10900-012-9589-1

ORIGINAL PAPER

HPV Infection Awareness and Self-Reported HPV Vaccination Coverage in Female Adolescent Students in Two German Cities

F. Samkange-Zeeb · L. Spallek · S. J. Klug · H. Zeeb

Abstract Low levels of human papillomavirus (HPV) awareness and knowledge have been observed in the few studies conducted among school-going adolescents. Such data are lacking in Germany. To assess awareness of HPV and of vaccination status among girls attending grades 8–13 in Bremen and Bremerhaven, two German cities. Participants completed a questionnaire in school including questions on demographic characteristics, about HPV awareness and on vaccination status. We analysed the relationship between awareness of HPV, of vaccination status and vaccine uptake and several variables including age and migrant background using univariate and multivariate logistic regression. Six hundred and thirty-two girls aged 12–20 years completed the questionnaire. 50 % had no awareness of HPV, 12 % reported being vaccinated against HPV and 57 % did not know whether or not they were vaccinated against HPV. In multivariate analyses, ever had sex was associated with awareness of HPV, and ever been to a gynaecologist with awareness of vaccination status. Our results may be an indication that female adolescents in Germany are not adequately informed and counselled about HPV and associated issues.

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Keywords HPV awareness · Vaccination status · Adolescents

Introduction

Human papillomavirus (HPV) is one of the most common sexually transmitted infections and a known causal risk factor for cervical cancer [21]. In 2006 and 2007 the European Commission licensed two vaccines against HPV, which have since been introduced in many countries. In Germany, the vaccine is recommended for girls aged 12–17 years STIKO [18].

Numerous studies on knowledge on HPV, awareness and acceptance of the vaccine were conducted mostly among adults before and around the time the vaccines were introduced. These studies generally observed low levels of HPV awareness and knowledge ranging from 3.4 to 53 % [8, 9, 12, 14, 22]. Few studies have assessed awareness and knowledge of HPV among school-going adolescents. As among adults, low levels of awareness and knowledge between 5.4 and 66 % have been observed [1, 7, 11, 23]. Awareness has been reported to be higher among females than among males: 16.4 versus 9.6 % in a Swedish study [6], 71.6 versus 51.2 % in an Italian study [15], and 50 versus 30 % among secondary school pupils in Hungary [11].

In Germany these issues have yet to be assessed among school-going adolescents. In a recent survey conducted among 18–25 year old vocational school students in Berlin, only 52 % of the women and 25.3 % of the young men had ever heard of HPV [2].

Varying HPV vaccine uptake rates have been reported in Europe. During the first year of the vaccination programme, the coverage of the three doses among eligible

Published online: 07 July 2012

girls was reported to be about 44 % in Belgium [17], 53.1 % in Italy and 77.3 % in Spain [10], and 80.9 % in the United Kingdom [16]. According to estimates based on data from health insurance companies, less than 20 % of 17 year old girls in Germany were vaccinated in 2008 [24], and the proportions were even lower among younger girls.

We assessed whether factors such as age, migrant background, sexual activity and visit to a gynaecologist are associated with awareness of HPV, of HPV vaccination status and self-reported vaccine uptake among female pupils. The data were collected in the context of a survey to assess awareness, knowledge and practices on sexually transmitted diseases among school pupils attending the 8th grade and above.

Methods

Recruitment of Schools and Pupils

The study was conducted between October and December 2011 among 12–20 year old adolescents attending the 8th grade and above in secondary schools in two cities Bremen and Bremerhaven, located in the north of Germany. The principals of 18 randomly selected government secondary schools were contacted and asked for permission to conduct our survey in their schools. Eight schools (6 in Bremen und 2 in Bremerhaven) agreed to co-operate. The schools are located in different areas of the two cities and included the two school forms offered in the region: schools offering up to the 10th grade and those offering up to the 12th or 13th grade. The teachers, parents of the pupils, as well as the pupils themselves were provided with written information, including consent forms, about the study. Information for parents was also provided in Turkish and Russian. Pupils younger than 18 years old had to have signed parental consent for them to take part in the survey. According to data protection regulations, pupils $\geq$18 years could not give information on parents' education without signed consent of the parents.

The study was approved by the ethics committee of the University of Bremen, the Senator for Education, Science and Health, and the Data Protection Officer for the State of Bremen.

Questionnaire

Pupils with signed consent completed an anonymous, self-administered questionnaire at their school. The pupils were asked to indicate whether they had ever heard about HPV and whether vaccination is possible. They were also asked if they had ever had sex, ever been to a gynaecologist, if they had ever heard of cervical cancer and the virus associated with it, and if they had been vaccinated against HPV. The items ever heard of HPV, aware that HPV can cause cervical cancer and aware of HPV vaccination possibility were combined to form the outcome variable awareness of HPV.

Although frequency of sexual partners and use of contraception were also measured, these were not included in the present analyses. Socio-demographic information such as age, country of birth and parents' educational level was also collected.

For the last variable, three levels were created according to the International Standard Classification of Education (ISCED): 'low' = levels 0–2, 'medium' = 3–4 and 'high' $\geq$5 (UNESCO [20].

Analysis

Data analyses were conducted using SAS version 9.2. We performed descriptive statistics and calculated frequencies for all variables. After reviewing the distribution of the frequencies for the outcome variable awareness of HPV, two categories were built for the variable: no awareness (no question on awareness positively answered) and some awareness (at least one question positively answered). The variable school education of father was not included in the analyses as there were many missing values. For the independent variable school education of mother, the levels 'low' and 'medium' were combined as the number of observations in the former group was very low. Using univariate logistic regression, we analysed the relationship between the three outcome variables, awareness of HPV, awareness of vaccination status and self-reported vaccine uptake, and each of the following variables: age, migrant background, school education of mother, ever had sex, ever having been to a gynaecologist. Multivariable logistic regression analyses were initially conducted including independent variables which were statistically significant in univariate analyses. For the variable awareness of HPV, regression analyses were also conducted comparing the two extreme groups: the group of pupils with no awareness versus those who positively answered at least two items.

Results

There were 2,049 girls registered in the 8 participating schools at the time of the survey, 418 (20 %) of whom were recorded in the school statistics as having a migrant background (defined as language other than German spoken at home). A total of 632 (31 %) girls completed the questionnaire. Of these, 201 (32 %) had a migrant background, 46 % were younger than 15 years old and 53 % were in the 8th and 9th grade (Table 1). Of all the

Table 1 Demographic and other characteristics of participants and distribution of reported awareness of HPV, of own vaccination status and of vaccine uptake by demographic and other characteristics of participants

	Total	Awareness of HPV		Aware of own vaccination status		Self-reported vaccine uptake	
	(n = 632) n (%)	None (n = 315) n (%)	Some (n = 317) n (%)	Aware (n = 256) n (%)	Not aware (n = 361) n (%)	Vaccinated (n = 75) n (%)	Not vaccinated (n = 181) n (%)
Age in years							
≤14	290 (45.9)	163 (51.7)	127 (40.1)	94 (36.7)	189 (52.4)	23 (30.7)	71 (39.2)
≥15	342 (54.1)	152 (48.3)	190 (59.9)	162 (63.3)	172 (47.6)	52 (69.3)	110 (60.8)
Grade							
8th–9th	332 (52.5)	182 (57.8)	150 (47.3)	107 (41.8)	216 (59.8)	28 (37.3)	79 (43.7)
10th and above	299 (47.3)	132 (41.9)	167 (52.7)	149 (58.2)	144 (39.9)	47 (63.7)	102 (56.3)
Missing	1 (0.2)	1 (0.3)	0 (0.0)	0 (0.0)	1 (0.3)	–	–
Migrant background							
No	424 (67.1)	212 (67.3)	212 (66.9)	182 (71.1)	230 (63.7)	51 (68.0)	131 (72.4)
Yes	201 (31.8)	101 (32.1)	100 (31.5)	69 (26.9)	129 (35.7)	23 (30.7)	46 (25.4)
Missing	7 (1.1)	2 (0.6)	5 (1.6)	5 (2.0)	2 (0.6)	1 (1.3)	4 (2.2)
School education mother							
High	217 (34.3)	135 (42.9)	111 (35.0)	94 (36.7)	117 (32.4)	23 (30.7)	71 (39.2)
Low/middle	252 (39.9)	117 (37.1)	106 (33.4)	106 (41.4)	141 (39.1)	35 (46.6)	71 (39.2)
Don't know/missing	163 (25.8)	63 (20.0)	100 (31.5)	56 (21.9)	103 (28.5)	17 (22.7)	39 (21.5)
School education father							
High	197 (31.2)	86 (27.3)	111 (35.0)	90 (35.2)	102 (28.3)	25 (33.3)	65 (35.9)
Low/middle	207 (32.8)	105 (33.3)	102 (32.2)	83 (32.4)	120 (33.2)	26 (34.7)	57 (31.5)
Don't know/missing	228 (36.1)	124 (39.4)	104 (32.8)	83 (32.4)	139 (38.5)	24 (32.0)	59 (32.6)
Ever had sex							
No	466 (73.7)	253 (80.3)	213 (67.2)	166 (64.8)	289 (80.1)	44 (58.7)	122 (67.4)
Yes	162 (25.6)	60 (19.0)	102 (32.2)	89 (34.8)	69 (19.1)	31 (41.3)	58 (32.0)
Missing	4 (0.6)	2 (0.6)	2 (0.6)	1 (0.4)	3 (0.8)	–	1 (0.6)
Ever been to gynaecologist							
No	311 (49.2)	170 (54.0)	141 (44.5)	102 (39.8)	203 (56.2)	19 (25.3)	83 (45.1)
Yes	316 (50.0)	141(44.8)	175 (55.2)	154 (60.2)	153 (42.4)	56 (74.7)	98 (54.9)
Don't know/missing	5 (0.8)	4 (1.3)	1 (0.3)	–	5 (1.4)	–	–

Percentages not always adding to 100 % due to rounding error

demographic items included in the questionnaire, the one with the highest proportion of missing values, respectively 'Don't know' responses was parental education (Table 1). More than 50 % of pupils aged ≥18 years did not give information on parents' education as they did not have signed parental consent to do so. However, the highest proportion of pupils who reported that they did not know their parents' school education level was among those younger than 15 years old.

Although 94 % of the girls had heard of cervical cancer, almost 50 % did not positively answer any of the items on awareness of HPV, 27 % positively answered one item, 14 % two items, and only 9 % positively answered all 3 items (data not shown). Fifty-two per cent of the pupils with no awareness of HPV were 12–14 years old and 80 % had never had sex. The distribution of pupils according to migrant background was similar among those with no awareness and those with some awareness of HPV: 67 % without and 32 % with migrant background (Table 1).

All in all, 12 % of the girls reported being vaccinated against HPV and 57 % did not know whether or not they had been vaccinated against HPV (Table 1). Of those who reported being vaccinated against HPV, 69 % were 15 years and older and 31 % had a migrant background. Forty-one per cent reported ever having had sex and almost three-quarters had been to a gynaecologist (Table 1).

Of the 361 girls who did not know whether or not they were vaccinated against HPV, more than 50 % were ≤14 years old and 36 % had a migrant background. Eighty per cent had never had sex and 56 % had never been to a gynaecologist (Table 1).

Awareness of HPV

Older age, ever had sex, having been to a gynaecologist and awareness of vaccination status were significantly associated with awareness of HPV in univariate analyses. Similar results were observed when comparing pupils with no awareness to those with some awareness (at least one positively answered awareness item) and when comparing them to those with at least two positively answered awareness items. In both instances, only the variable ever had sex remained statistically significant in multivariate analyses (Table 2).

Awareness of Own Vaccination Status

Older age, migrant background, ever had sex, having been to a gynaecologist and awareness of HPV were significantly associated with awareness of own vaccination status in univariate analyses. In multivariate analyses, only the variable having been to a gynaecologist remained statistically significant. Increased, but non-significant odds ratios were observed for the variables age and migrant background (Table 3).

Self-Reported Vaccine Uptake

In univariate analyses, only the variable ever been to a gynaecologist was significantly associated with self-reported vaccine uptake (OR 2.5; 95 % CI 1.37–4.53). A positive, non-significant association was observed for older age (OR 1.46; 95 % CI 0.82–2.59) (Table 4).

Discussion

Using data from a cross-sectional survey conducted among school-going adolescents in two German cities, we observed low awareness of HPV and of own vaccination status among female adolescents in the 8th grade and above.

Only 9 % of the participating girls positively answered all three items on awareness of HPV. Other than in previous studies conducted on HPV awareness we did not assess ever heard of HPV, awareness that HPV can cause cervical cancer and awareness of HPV vaccine separately, but instead combined the three items to form a comprehensive HPV awareness outcome. Although our results cannot be directly compared to previous findings, the low levels of awareness we observed, with only 23 % of the pupils responding positively to at least two of the awareness items, are similar to those reported in other studies among school-going adolescents [1, 6, 7, 11]. As this survey was conducted 4 years after the introduction of HPV vaccination in Germany, higher awareness of HPV was expected. This finding is an indication that information on HPV is not effectively reaching the vaccine target population of adolescent girls, especially those younger than 15 years old.

Table 2 Results of univariate and multivariate analyses for association between independent variables and the outcome awareness of HPV comparing those with no awareness to those with some awareness (at least 1 item positively answered)

	Univariate analyses			Multivariate analyses		
	n	OR	95 % CI	n	OR	95 % CI
Age in years						
≥15	342	**1.60**	**1.17–2.20**	336	1.22	0.84–1.77
≤14 (ref)	290	1.00	–	288	–	–
School education of mother						
High	217	0.91	0.63–1.31			
Low/medium (ref)	252	1.00	–			
Migrant background						
No	424	0.97	0.63–1.50			
Yes (ref)	201	1.00	–			
Ever had sex						
No	466	**0.56**	**0.36–0.86**	462	**0.59**	**0.38–0.91**
Yes (ref)	162	1.00	–	162	1.00	–
Ever been to gynaecologist						
Yes	316	**2.06**	**1.34–3.15**	315	1.11	0.77–1.61
No (ref)	311	1.00	–	309	1.00	–

OR odds ratio, *CI* confidence interval, *ref* reference

Bold value represents statistically significant odds ratios

Table 3 Results of univariate and multivariate analyses for association between independent variables and the outcome awareness of own vaccination status

	Univariate analyses			Multivariate analyses		
	n	OR	95 % CI	n	OR	95 % CI
Age in years						
≥15	334	**1.89**	**1.37–2.63**	233	1.46	0.98–2.16
≤14 (ref)	283	1.00	–	216	1.00	–
School education of mother						
High	211	1.07	0.74–1.55			
Low/medium (ref)	247	1.00	–			
Migrant background						
No	256	**1.48**	**1.04–2.10**	313	1.36	0.94–1.95
Yes (ref)	105	1.00	–	136	1.00	–
Ever had sex						
No	238	**0.45**	**0.31–0.64**	343	0.73	0.47–1.15
Yes (ref)	129	1.00	–	106	1.00	–
Ever been to gynaecologist						
Yes	307	**2.00**	**1.45–2.78**	216	1.51	**1.03–2.22**
No (ref)	305	1.00	–	233	1.00	–

OR odds ratio, *CI* confidence interval, *ref* reference

Bold value represents statistically significant odds ratios

Table 4 Results of univariate analyses for association between independent variables and the outcome self-reported vaccine uptake

	Univariate analyses		
	n	OR	95 % CI
Age in years			
≥15	162	1.46	0.82–2.59
≤14 (ref)	94	1.00	–
School education of mother			
High	94	0.66	0.35–1.22
Low/medium (ref)	106	1.00	–
Migrant background			
No	182	0.78	0.43–1.41
Yes (ref)	69	1.00	–
Ever had sex			
No	166	0.68	0.39–1.18
Yes (ref)	89	1.00	–
Ever been to gynaecologist			
Yes	154	**2.50**	**1.37–4.53**
No (ref)	102	1.00	–

Multivariate analyses not done as only one variable was significantly associated with vaccine uptake in univariate analyses

OR odds ratio, *CI* confidence interval, *ref* reference

Bold value represents statistically significant odds ratios

As commonly done in studies assessing vaccine uptake, studies estimating HPV vaccination rates generally rely on self-reported information [2, 3, 11]. Adolescents may however not only underestimate HPV vaccination [19], they may also not know whether or not they are vaccinated.

The fact that more than half of the girls surveyed did not know their vaccination status is disturbing as this appears to play an important role for awareness. Having been to a gynaecologist was significantly associated with all three outcome variables in univariate analyses, and with awareness of own vaccination status in multivariate analyses. It however cannot be ruled out, that some adolescents are being vaccinated without their knowledge on the request of their parents.

In a recent study of secondary school students in Australia, sexually active pupils did not exhibit better HPV knowledge [1]. In our study, results of both univariate and multivariate analyses showed that pupils who had never had sex had less HPV awareness than those who were already sexually active.

Ethnic differences in awareness and knowledge of HPV which persist even after multivariate analyses have been reported in some studies [2, 4, 5, 13, 22]. We observed significant associations between migrant background and awareness of HPV or of own vaccination status in univariate, but not in multivariate analyses.

To our knowledge, this is the first epidemiologic study reporting on awareness of HPV and of own vaccination status among school-going adolescent girls in Germany since the introduction of the vaccination in 2007. Participating schools were randomly selected and included both school forms offered in Bremen and Bremerhaven.

Our study has some weaknesses, one of which is the relatively low participation rate. We believe that parental conservatism towards the topic of survey may have played a role in reducing participation. Another limiting factor is the high number of unknown or missing data on parental education. This probably resulted in the apparent under-representation of mothers with low educational level.

The results on vaccine uptake have to be viewed with caution as the majority of the participants did not know whether or not they had been vaccinated and the possibility of under-reporting cannot be ruled out [19]. Furthermore, as we relied on self-reported information, we could not assess how many vaccine doses the girls had received.

In conclusion, our findings indicate that HPV prevention and vaccination information in Germany is not adequately reaching young adolescents. More research is needed to investigate factors contributing to unawareness of own HPV vaccination status among adolescents as these might have implications for health prevention and communication strategies.

Acknowledgments We would like to thank Beate Schütte, Svea Eichholz, Sinja Ernst, Stefanie Helmer, Kathi Liegmann, Natalya Makarova, Anna Muschalek, Julia Nürnberg, Saskia Pöttgen and Sandra Wegeng for their support during the conduction of the survey in the schools. We especially thank the 8 schools in which we conducted the survey for their co-operation.

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Article V

Higher risk perception of HIV than of chlamydia and HPV among secondary school students in two German cities.

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PLOS ONE 2013 Apr 24;8(4):e61636. doi: 10.1371/journal.pone.0061636.

Higher risk perception of HIV than of chlamydia and HPV among secondary school students in two German cities.

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Abstract

Background

Chlamydia and genital human papillomavirus (HPV) are the two most common sexually transmitted infections (STIs) among teens and young adults in industrialised countries. The majority of adolescents however have limited or no knowledge of these infections. Within the context of a cross-sectional survey on awareness and knowledge of sexually transmitted infections, secondary school students attending the 8th grade and above in Bremen and Bremerhaven, two cities in northern Germany, were asked to rate the risk of peers to get infected with HIV, HPV or chlamydia.

Methods

Between October and December 2011, students aged 12-20 years completed an anonymous, self-administered questionnaire at their school. In addition to answering questions on awareness and knowledge of sexually transmitted infections, all students were also asked to rate the risk of peers to get infected with HIV, HPV or chlamydia.

Furthermore, those reporting ever having sexual intercourse were asked to rate their own risk of getting infected with each of the three infections.

Results

1148 students, 55% female, completed the questionnaire. 27% of the students reported having had sexual intercourse. 68% of all students rated the risk of same-aged students to get infected with HIV/AIDS as high/medium. The corresponding proportions for HPV and chlamydia were 19 and 25% respectively. Those reporting ever having sexual intercourse generally perceived their own risk of getting infected with HIV, chlamydia or HPV as lower than that of their peers.

Conclusion

Generally, the risk of getting infected with HIV was perceived as being higher than that of getting infected with HPV or chlamydia, most likely due to the fact that the students were more aware of HIV than of the other two infections. Efforts should be made to improve awareness and knowledge of HPV and chlamydia among school going adolescents, and to make them realize that these are common infections which are preventable.

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Introduction

The average age of first sexual intercourse in western European countries is reported to be decreasing [1] and adolescents are said not to use condoms consequently [2]-[4], placing them at risk of unplanned pregnancies and sexually transmitted infections (STIs). According to recent data, an increase in STIs such as chlamydia, syphilis and gonorrhea has been observed in several western European countries, particularly among young people aged 16-19 years [1], [5]-[9]. Although the HIV epidemic is reported to be generally stable in this region, increased rates of transmission have been observed in a number of countries, especially among men who have sex with men [10]. Heterosexual intercourse is however currently presumed to be the most common mode of transmission [11]. Thus, there is a non-negligible

risk of adolescents to be infected with a sexually transmitted infection if they do not take preventive measures [12].

Chlamydia and genital human papillomavirus (HPV) are the two most common sexually transmitted infections (STIs) among teens and young adults in industrialised countries, affecting mostly females [13]. Similar to HIV, both infections can be asymptomatic; hence most people are not aware that they are infected. If not treated, chlamydia can lead to pelvic inflammatory diseases in women and painful infection in men, and possibly to reduced fertility or infertility in both sexes. Some HPV types lead to genital warts, while others can lead to cancer of the cervix, penis, anus or oropharynx [14]-[17]. Although both diseases are more prevalent than HIV/AIDS among adolescents in industrialised countries, awareness of these STIs in this population group is lower than that of HIV/AIDS [18], [19]. Awareness and knowledge of a risk, such as an STI, is closely linked to risk perception, and, together with other influencing factors such as perceived severity, benefits or barriers, assumed to shape health behavior [20]. To be able to perceive the personal risk for a particular STI, one needs to be equipped with basic information on the infection, such as how prevalent it is, how it presents itself, how one can be infected, and where one can go for testing or for help [21]. Awareness of a potential risk leads to it being better perceived, and to more concern being shown [22]. According to the Health belief Model, a high perception of risk leads to reduced risk taking and/or encourages protective health behavior [23]. This assumption, however, has been challenged by studies that find only a weak positive or even a negative association between perceived risk and subsequent preventive behavior [24], [25]. Likewise, the effect of knowledge and awareness on changing attitudes and behaviour appears limited [26]-[29]. Nevertheless, the three aspects, awareness, knowledge and risk perception, which are interlinked, are crucial components of sex education which help promote informed, healthy choices [30]-[32]. We assessed the awareness and knowledge of sexually transmitted infections among secondary school students attending the 8th grade and above in Bremen and Bremerhaven, two cities in northern Germany, using an anonymous questionnaire. The students were also asked to rate the risk of peers to get infected with HIV, HPV and chlamydia. Those reporting ever having sexual intercourse were asked to rate their own risk of getting infected with each of the three named infections. The results of the analyses on awareness and knowledge have been published elsewhere [33]. In this paper we focus on STI risk perception. We were interested in assessing the adolescents' appraisal of the risk of peers to get infected with an STI, as well as the appraisal of those already sexually active of their own risk to get infected with an STI.

Methods

The study was conducted in 8 secondary schools in two cities in northern Germany, Bremen and Bremerhaven, among 12-20 year old students attending the 8th grade and above. Approval to conduct the study was received from the ethics commission of the University of Bremen, the Senator for Education, Science and Health and the Data Protection Officer for the State of Bremen.

As described in our manuscript on knowledge and awareness of STIs [33], the principals of 18 randomly selected secondary schools in Bremen and Bremerhaven were contacted and requested for permission to conduct the survey in their school. Each school was sent a flyer with information about the survey, including details on issues concerning informed consent and data protection. Eight schools, 6 in Bremen and 2 in Bremerhaven, agreed to cooperate with us. Both school types offered in the study region were included: those offering up to the 10th grade only, and those offering up to the 12th or 13th grade.

The teachers, parents and students were provided with written information on the study. The study information was delivered to each school and the class teachers distributed the information to the students, who in turn passed on the study information, including consent forms, to their parents. In all the 8 participating schools, study information was provided for each student attending the 8th grade and above. There was no

selection of individual classes or particular grades. Information for parents, including consent forms, was also provided in Turkish and Russian.
Only students with signed parental or own consent (for those aged 18 and above) could take part in the survey.

The questionnaire
On the day of the survey students with signed consent completed an anonymous, self-administered questionnaire at their school during normal school time. In the first section of the questionnaire socio-demographic information such as age, country of birth and parents' school education were collected. The second section covered issues on knowledge and awareness of STIs.
Questions on knowledge and awareness of STIs and on risk perception were constructed based on questionnaires used in other studies [34]-[38]. The questionnaires (one for girls and one for boys) were pre-tested on a sample of school-going adolescents aged 13-15 years. The pre-test participants were recruited from a school in Bielefeld, a city about 180 km from Bremen. The completed questionnaires were assessed for ambiguity, clarity, comprehensibility, and completion times required, and were then modified accordingly.
The students were asked which of the following infections, listed in the questionnaire, they had ever heard of: HIV/AIDS, human papillomavirus (HPV), chlamydia, herpes, syphilis, gonorrhoea and hepatitis B. This was followed by several questions on awareness and knowledge of STIs, covering specific issues on HPV awareness and general knowledge on sexually transmitted infections. The latter included questions on whether the students knew that using a condom protects against getting an STI, that infections such as HIV and HPV are treatable, but not curable, and that there is no vaccine against HIV/AIDS and chlamydia. Thereafter, the students were asked to rate the risk of same-aged adolescents to get infected with HIV/AIDS, HPV or chlamydia. The following response possibilities were offered: high, medium, low or don't know. In the last section students were asked if they had ever had sex, and if yes, their age at sexual debut, and the method of contraception they had used then, and the method they used now. Those reporting ever having sex were asked to rate their own risk of getting infected with HIV/AIDS, HPV or chlamydia. Again the following response possibilities were offered: high, medium, low or don't know.

Analysis
Data analyses were conducted using SAS version 9.2.

Variables included
We used maternal educational status as an indicator of socioeconomic status. The variable father's education was excluded from the analyses as there were many missing values. Responses to the outcome variables peer and own risk perception for HIV, HPV and chlamydia were categorised as 'high/medium', 'low' and 'don't know'. Students who did not responded to the questions on rating were excluded from all analyses.

Statistical methods
We performed descriptive statistics and calculated frequencies for all variables. Chi-squared tests were used to assess bivariate relations between the independent variables age, gender, migrant background, school education of mother, ever had sex, and type of school and the outcome variables peer and own risk perception for HIV, HPV and for chlamydia. For those reporting ever having sex, additional tests for use of condoms at sexual debut and currently and a comparison between indicated peer risk perception and own risk perception were done. As the outcome variables were polytomous, multivariable analyses were conducted using standard ordinal regression analysis (PROC LOGISTIC) with backward selection, including all independent variables. Ordinal logistic regression assumes that the relationship between each pair of outcome groups is the same. In our case this would mean that the coefficients describing the relationship between the category 'don't know' versus the category low is the same as that which describes the relationship between the category

'low' and the category 'medium/high'. To assess the appropriateness of the ordinal regression model, the proportional odds assumption was tested and the score test (chi square) was not significant.

Results

The study population and the findings on knowledge and awareness of sexually transmitted infections have already been reported [33]. Here the study population will be briefly described, as will observations regarding STIs adolescents had heard of.

1148 students, (632 girls and 516 boys), aged 12-20 years, participated in the study (response rate 28 %). 31% of the students had a migrant background (i.e. they themselves, or one/both of their parents were born abroad) and 27% reported ever having sexual intercourse. The average age of first sex was 15 years and the average number of lifetime sexual partners was two. Among those who reported ever having sex, 81% (76% of the girls and 86% of the boys) reported using a condom at sexual debut and 65% (79% of the girls and 51% of the boys) reported currently using condoms.

Almost all students (99%) had heard of HIV/AIDS, 91% of herpes, 83% of hepatitis, 23% of chlamydia, 17% of gonorrhea and 13% of HPV. Gender differences were observed for HPV, chlamydia, syphilis and gonorrhea, with significantly more girls than boys reporting having heard of HPV and chlamydia, and significantly more boys than girls reporting having heard of syphilis and gonorrhea.

Risk perception for peers

Of the three infections for which the students were asked to rate the risk of getting infected for same-aged adolescents, HIV/AIDS had the least proportion of students who responded with "don't know" or with missing responses (4%). The corresponding proportions for HPV and chlamydia were 65% and 60%, respectively. Whereas 68% of the students rated the risk of same-aged students to get infected with HIV/AIDS as high/medium, the corresponding figures where 19% for HPV and 25% for chlamydia. In bivariate analyses, gender was significantly associated with risk perception for all three infections, with a higher proportion of girls rating the risk of getting infected as high/medium (table 1). In comparison to students whose mothers had a low/medium school education, a higher proportion of students whose mothers had a high level school education rated the risk of peer to get infected with HIV/AIDS as low. For HPV and chlamydia, no differences based on maternal school education were observed. In comparison to those reporting no sexual experience, a higher proportion of students who reported ever having sex rated the risk of peers to get infected with HPV and chlamydia as high/medium. In multivariable analyses, age and gender were significant predictors for HIV risk perception for peers, with younger students and females more often rating the risk of getting infected as high/medium. For HPV risk perception, only the variable ever having sex remained a significant predictor. For chlamydia risk perception, age and ever having sex remained significant predictors (table 2).

Own risk perception

Of the 314 students who reported ever having sex, 5% responded 'don't know' to the question on own HIV risk perception. The corresponding proportions for HPV and chlamydia were 34% and 29%, respectively. Among those who rated their own risk of getting infected with HIV, 16% perceived their risk as high/medium (HPV 9%, chlamydia 13%). Results of bivariate analyses showed an association between age and own risk perception for HIV and chlamydia, with a higher proportion of students older than 14 years reporting their risk of getting infected as low. Students younger than 14 years and those with a migrant background more often responded to the question on HIV risk perception with 'don't know' (table 3). We did not observe any significant predictors in multivariable analyses.

Comparison between peer and own risk perception

For HIV, 27% of the students reporting ever having sexual intercourse perceived their own risk of getting infected and that of their peers as low,

while 51% perceived their own risk as low, but that of their peers as high/medium (table 4). For HPV, 15% of the students reported their own risk and that of peers as low, and 17% reported low own risk but high/medium peer risk. For chlamydia, 15% of the students perceived their own risk of getting infected and that of their peers as low, while 25% perceived their own risk to be low but that of their peers as high/medium. The differences in own and peer risk perception for all three infections were statistically significant.

Discussion

In the context of a cross-sectional survey on awareness and knowledge of sexually transmitted infections, secondary school students attending the 8th grade and above were asked to rate the risk of peers to get infected with HIV, HPV and chlamydia. Those reported ever having sexual intercourse were also asked to rate their own risk of getting infected with the three infections. Generally, the students were able to rate the risk of peers to get infected with HIV, with only a small proportion responding with 'don't' know'. In contrast, the majority of students responded with 'don't know' for chlamydia and HPV. Similarly, the lowest proportion of 'don't know' for own risk perception was observed for HIV. All in all, students rated their peers to be at higher risk of getting infected with HIV than with chlamydia or HPV. Those reporting ever having sex generally rated their own risk of getting infected with each of the three infections to be lower than that of their peers.

There is a lack of epidemiological data on risk perception of infection with sexually transmitted infections among school-going adolescents in Germany and our study helps fill this gap. Results of a number of surveys on awareness and knowledge of HIV/AIDS, chlamydia and HPV among this population group have recently been published [18], [39]-[42].

As we conducted an observational cross-sectional study, our analyses were of an explorative nature. The estimated p-values can therefore only be regarded as indicative of a relationship between the independent variables and risk perception.

Although the low participation rate observed in our study can be partly explained by the sensitive nature of the research question and the reluctance of parents to allow their children to take part in such surveys, it still remains a limiting factor.

Our observation that only a small proportion of students responded to the question on risk perception for HIV with 'don't know', while the corresponding proportions for chlamydia and HPV are very high, is a further indication that adolescents are more aware of HIV than of the latter infections. As has been noted for Germany [18], [43], the emphasis of STI prevention programs in some industrialised countries is on HIV/AIDS. Consequently, young people perceive their own risk, or that of peers, to get infected with HIV to be higher than that to get infected with chlamydia or HPV, although the latter are more prevalent in these countries, especially among this population group [34], [44], [45].

In bivariate analyses we observed gender differences in risk perception for peers for all three infections, with girls more often than boys perceiving the risk of getting infected to be high/medium. Interestingly, we did not make the same observation for own risk perception. Here the majority of students, irrespective of gender, perceived their own risk of getting infected as low. We also did not observe any statistically significant differences based on use of condoms at sexual debut or currently. The low perception of own risk, particularly for chlamydia and HPV, can be taken as a further indication of the lack of awareness of these infections among the study population. Findings of a chlamydia prevalence study conducted among sexually active school girls aged 14-17 years conducted in 2004 in Berlin, Germany, serve to underline this assumption. In that study, 83% of the participants had never heard of chlamydia. 6% of the participants were found to be infected with chlamydia, with the highest prevalence (10%) being observed among those 17 years old [43].

A comparison of the perceived risk for peers and own perceived risk showed that the students, irrespective of gender, generally perceived their

own risk to get infected as lower than that of their peers. This discrepancy in risk perception was particularly observed for HIV, the STI almost all students had heard of, with 51% of the students perceiving their own risk of infection to be low, but that of their peers to be high/medium. For HPV and chlamydia, the STIs students were less aware of, the discrepancy was less marked. According to literature, individuals generally perceive themselves to be less at risk than others, particularly where the risk is controllable or behavior related [46], [47], a phenomenon known as 'optimistic bias'. This observation has also been made among adolescents, who during the change from childhood to adulthood believe that negative effects of risky behavior only happen to others [48].

The concept of risk perception is based on the understanding that an individual is more likely to take preventive measures when he or she believes to be personally at risk [23]. Although this aspect is debatable, as is the case with the effect of awareness and knowledge on behaviour change [26]-[29] it is a core component of public health interventions aiming at encouraging the adoption of healthier behavior [49]. For HIV, the intensive prevention and information campaigns, particularly in industrialised countries, led to high awareness and knowledge of the infection, and to a high risk perception. This in turn probably led to the infection not spreading the way it could have otherwise done, with ensuing low factual risk for the broad population. The dreaded aspect of HIV/AIDS also played and continues to play a role, while other STIs do not have the same dreaded potential. Awareness and knowledge are important prerequisites for risk perception, as it is not possible to perceive the risk of something one is not aware of or has no knowledge of [22]. Given this basic fact, remodeling of STI prevention curricula in schools should be considered to support a more realistic and differentiated risk perception on STIs among adolescents, including a focus on preventability.

Acknowledgements: We would like to thank Beate Schütte, Svea Eichholz, Sinja Ernst, Stefanie Helmer, Kathi Liegmann, Natalya Makarova, Anna Muschalek, Julia Nürnberg, Saskia Pöttgen and Sandra Wegeng for their support during the conduction of the survey in the schools. We especially thank the following schools in which we conducted the survey for their co-operation: Gesamtschule Mitte Bremen, OS an der Schaumburger Str., OS Am Leibnizplatz, OS Findorff, SZ an der Lehmhorster Str., SZ Am Rübekamp II, Lloyd Gymnasium and Johann-Gutenberg-Schule.

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Table 1: Results of bivariate analyses for STI risk perception for peers and various predictor variables

	HIV risk perception for peers				HPV Risk perception for peers				Chlamydia risk perception for peers			
	High/med (n/%)	Low (n/%)	*DK (n/%)	**p value	High/med (n/%)	Low (n/%)	*DK (n/%)	**p value	High/med (n/%)	Low (n/%)	*DK (n/%)	**p value
Age in years												
≤14	366 (71)	131 (25)	18 (4)	0.09	84 (17)	74 (15)	341 (68)	**<0.01**	98 (20)	63 (13)	339 (68)	**<0.01**
≥15	414 (67)	191 (31)	15 (2)		136 (23)	109 (18)	277 (59)		187 (31)	114 (19)	246 (50)	
Gender												
Female	474 (76)	135 (22)	13 (2)	**<0.01**	138 (23)	85 (14)	382 (63)	**<0.01**	176 (29)	76 (13)	356 (59)	**<0.01**
Male	306 (60)	187 (36)	20 (4)		82 (17)	98 (20)	314 (64)		109 (22)	101 (20)	287 (58)	
School education of mother												
High	255 (63)	135 (34)	12 (3)		71 (18)	63 (16)	254 (65)		101 (26)	58 (15)	230 (59)	
Middle	236 (74)	79 (25)	3 (1)	**<0.01**	72 (24)	56 (18)	178 (58)	0.14	70 (23)	63 (21)	172 (56)	0.12
Low	70 (66)	33 (31)	3 (3)		24 (24)	20 (20)	57 (56)		27 (26)	19 (19)	57 (55)	
Unknown	219 (71)	75 (5)	15 (5)		53 (17)	44 (14)	207 (68)		87 (28)	37 (12)	184 (60)	
Migrant background												
no	523 (68)	229 (30)	18 (2)	0.15	138 (18)	127 (17)	482 (65)	0.14	190 (25)	128 (17)	434 (58)	0.40
yes	246 (71)	87 (25)	13 (4)		79 (36)	54 (16)	200 (60)		88 (26)	46 (14)	200 (60)	
Ever had sex												
No	560 (69)	224 (28)	27 (3)	0.36	139 (18)	124 (16)	525 (67)	**<0.01**	166 (21)	118 (15)	507 (64)	**<0.01**
yes	213 (68)	94 (30)	6 (2)		79 (26)	56 (19)	166 (55)		117 (39)	56 (18)	131 (43)	
School type												
up to 10^{th} grade	244 (68)	105 (29)	12 (3)	0.77	64 (18)	64 (18)	221 (63)	0.45	86 (25)	57 (16)	205 (59)	0.85
Up to 12^{th}/13^{th} grade	536 (69)	217 (28)	21 (3)		156 (21)	119 (16)	475 (63)		199 (26)	120 (16)	438 (58)	

*DK = Don't know

**p-value Chi-square

Table 2: Results of multivariable regression analyses for STI risk perception for peers [a]

	HIV risk perception for peers	HPV Risk perception for peers	Chlamydia risk perception for peers
	OR: 95% CI	OR: 95% CI	OR: 95% CI
Age in years			
≥15 (ref)	1.00	1.00	1.00
≤14	1.38: 1.02-1.85*	0.77: 0.58-1.02	0.59: 0.45-0.78*
Gender			
Male (ref)	1.00	1.00	1.00
Female	2.07: 1.59-2.68*	1.10: 0.86-1.41	1.13: 0.88-1.44
School education of mother			
Low (ref)	1.00	1.00	1.00
Middle	1.38: 0.85-2.26	0.91: 0.58-1.42	0.94: 0.60-1.48
High	0.85: 0.53-1.36	0.69: 0.44-1.08	0.96: 0.61-1.49
Unknown	1.24: 0.76-2.02	0.57: 0.38-0.90	0.88: 0.56-0.98
Migrant background			
yes (ref)	1.00	1.00	1.00
no	0.90: 0.66-1.20	0.81: 0.62-1.06	1.03: 0.79-1.35
Ever had sex			
no (ref)	1.00	1.00	1.00
yes	1.12: 0.81-1.55*	1.59: 1.17-2.15*	2.01: 1.29-2.70*
School type			
up to 10th grade (ref)	1.00	1.00	1.00
Up to 12th/13th grade	1.10: 0.82-1.48	0.89: 0.67-1.18	0.74: 0.57-0.98

[a] ordinal regression models, all scores range from 0 to 2, odds ratios indicate effects per one point difference
* statistically significant odds ratios.
ref = reference group

Table 3: Results of bivariate analyses for own risk perception among those reporting having had sexual intercourse (fisher's exact test)

	HIV own risk perception				HPV own risk perception				Chlamydia own risk perception			
	High/med (n/%)	Low (n/%)	*DK (n/%)	**p value	High/med (n/%)	Low (n/%)	*DK (n/%)	**p value	High/med (n/%)	Low (n/%)	*DK (n/%)	**p value
Age in years												
≤14	6 (22)	18 (67)	3 (11)	0.01#	3 (11)	11 (41)	13 (48)	0.22	4 (15)	10 (37)	13 (48)	0.05#
≥15	43 (15)	228 (81)	12 (4)		24 (9)	162 (58)	93 (33)		34 (12)	169 (60)	77 (28)	
Gender												
Female	22 (14)	135 (84)	4 (2)	0.06	16 (10)	90 (57)	52 (33)	0.63	22 (14)	95 (60)	42 (26)	0.47
Male	27 (18)	111 (75)	11 (7)		11 (7)	83 (56)	54 (36)		16 (11)	84 (57)	48 (32)	
School education of mother												
High	18 (20)	68 (77)	2 (2)		11 (13)	49 (56)	27 (31)		13 (15)	50 (58)	23 (27)	0.68
Middle	12 (15)	64 (80)	4 (5)	0.39	5 (6)	50 (63)	25 (31)	0.63	9 (11)	48 (60)	23 (29)	
Low	4 (12)	25 (76)	4 (12)		3 (9)	16 (50)	13 (40)		4 (12)	15 (45)	14 (42)	
Unknown	15 (14)	89 (82)	5 (5)		8 (7)	58 (54)	41 (38)		12 (11)	66 (61)	30 (28)	
Migrant background												
no	33 (15)	183 (82)	6 (3)	0.02#	19 (9)	125 (57)	75 (34)	0.90	28 (13)	131 (60)	61 (28)	0.57
yes	15 (19)	58 (72)	8 (10)		8 (10)	44 (55)	28 (35)		10 (13)	43 (54)	27 (34)	
School type												
up to 10th grade	6 (14)	35 (81)	2 (5)	0.95	4 (9)	22 (51)	17 (40)	0.70	3 (7)	24 (56)	16 (37)	0.33
Up to 12th/13th grade	43 (16)	211 (79)	13 (5)		23 (9)	151 (57)	89 (34)		35 (13)	155 (59)	74 (28)	
Condom used at sexual debut												
no	9 (16)	45 (78)	4 (7)	0.65	3 (5)	32 (56)	22 (39)	0.55	6 (10)	33 (57)	19 (33)	0.76
yes	40 (16)	201 (80)	11 (4)		24 (9)	141 (57)	84 (34)		32 (13)	146 (59)	71 (29)	
Condom currently used												
no	14 (13)	92 (84)	3 (3)	0.23	8 (7)	64 (59)	36 (33)	0.71	14 (13)	65 (60)	30 (28)	0.88
yes	35 (18)	153 (77)	12 (6)		19 (10)	108 (55)	70 (36)		24 (12)	113 (57)	60 (30)	

* DK= Don't know

**p- value - fisher exact test

#statistically significant p-values

Table 4: Comparison of peer and own risk perception rating for HIV/AIDS, HPV and chlamydia infection among students reporting having had sexual intercourse

	Own risk perception			*p-value
Peer risk perception	High/medium	low	Don't know	
HIV/AIDS (n=309)				
High/medium	14%	51%	3%	
Low	2%	27%	1%	<0.01
Don't' know	0%	1%	1%	
HPV (n=299)				
High/medium	6%	17%	4%	
Low	2%	15%	2%	<0.01
Don't know	1%	25%	29%	
Chlamydia (n=301)				
High/medium	10%	25%	3%	
Low	2%	15%	2%	<0.01
Don't know	1%	18%	24%	

*p- value - fisher exact test

Article VI

Wissen zu sexuell übertragbaren Infektionen: Ein Vergleich von Schülern und Schülerinnen mit türkischem und ohne Migrationshintergrund

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Prävention und Gesundheitsförderung. 2013 Aug 28. doi: 10.1007/s11553-013-0403-4.

Wissen zu sexuell übertragbaren Infektionen: Ein Vergleich von Schülern und Schülerinnen mit türkischem und ohne Migrationshintergrund

Saskia Pöttgen, Florence Samkange-Zeeb

Zusammenfassung

Hintergrund: Seit Mitte der 1990er-Jahre ist ein Anstieg der Prävalenz sexuell übertragbarer Infektionen (STIs) bei Jugendlichen zwischen 16 und19 Jahren in Europa zu verzeichnen. Geringes Wissen kann hierbei eine Rolle spielen. Ziel dieser Arbeit war, das Wissen zu STIs bei Schülern/-innen ab der 8. Klasse mit türkischem und ohne Migrationshintergrund zu untersuchen.

Methoden: Zwischen Oktober und Dezember 2011 wurden 12-20 Jährige Schüler/innen an 8 Schulen im Land Bremen zum Thema STIs schriftlich befragt. Der Survey wurde mit uni- und multivariaten Methoden ausgewertet.

Ergebnisse: Von den 1.148 teilnehmenden Schülern/-innen (28%) gaben 776 keinen und 90 einen türkischen Migrationshintergrund an. Insgesamt war das Wissen zu STIs unter den befragten Schülern/-innen gering, wobei ein höheres Wissen signifikant mit keinem Migrationshintergrund, dem weiblichen Geschlecht, einem höherem Alter, dem Besuch einer Schule bis zum Abitur und sexueller Erfahrung assoziiert war.

Schlussfolgerung: Vor allem für männliche Schüler, jüngere Schüler/innen, sexuell unerfahrene Schüler/innen und Schüler/innen mit türkischem Migrationshintergrund besteht ein erhöhter Aufklärungsbedarf bezüglich STIs.

Schlüsselwörter: Wissen, Sexuell übertragbare Infektionen, Migrationshintergrund, Jugendliche, schulbasierte Querschnittsbefragung

Abstract

Background: Since the mid-1990s an increase in sexually transmitted infections (STIs) has been reported among adolescents aged 16 to 19 years in Europe. Lack of knowledge of STIs may play a role in this. The aim of the study was to assess knowledge of STIs among school-going adolescents with Turkish migrant background and without a migrant background attending the 8th grade and above.

Methods: Between October and December 2011, 12-20 year old students attending 8 schools in the state of Bremen participated in a written survey. Analyses were conducted using uni- and multivariate methods.

Results: 1,148 students (28%) completed the questionnaire; 90 students with a Turkish migrant background and 776 without a migrant background. Overall, low level of STI knowledge was observed. A higher STI knowledge was associated with non-migrant background, female sex, higher age, attending a school to Abitur and sexual experience.

Conclusion: There is an increased need for sexual education with a focus on STIs, especially for male, younger and sexually inexperienced students, particularly those with Turkish migrant background.

Key words: knowledge, sexually transmitted infections, migrant, adolescents, school-based cross-sectional survey

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Interessenkonflikt: keine

Hintergrund

Sexuell übertragbare Infektionen (STIs) sind in Industrieländern unter jungen Menschen weit verbreitet. Bei Nicht-Behandlung können je nach STI schmerzhafte Entzündungen, Eileiterschwangerschaften, Unfruchtbarkeit oder Krebserkrankungen die Folge sein [26]. Erste Untersuchungen aus Deutschland zeigen, dass v.a. Chlamydien und Humane Papillomaviren (HPV) eine hohe Prävalenz unter Jugendlichen aufweisen [8, 10], wohingegen Gonorrhö, Hepatitis B, Human Immunodeficiency Virus (HIV)/ Acquired Immune Deficiency Syndrome (AIDS) und Syphilis weitaus seltener auftreten [14-15]. Der Schule wird bei der Sexualaufklärung eine wichtige Rolle zugeschrieben [3]. Thematisch fokussiert sie im Bereich STIs meist auf HIV/AIDS [11]. Folglich ist das Wissen unter Jugendlichen zu HIV/AIDS gut [16]. Das Wissen zu anderen STIs, v.a. zu Chlamydien und HPV, ist hingegen defizitär [2, 9, 11]. Neben dem Geschlecht, dem Alter und der sexuellen Erfahrung scheint ein Migrationshintergrund eine Rolle in Bezug auf das Wissen zu STIs zu spielen [7, 11].

Mögliche Gründe stellen verschiedene gesundheitsrelevante Hürden und Barrieren sowie Einstellungen und Verhaltensweisen der in Deutschland lebenden Menschen mit Migrationshintergrund dar. Beispielhaft sind die seltenere Nutzung von Früherkennungsangeboten oder unzureichende Informationen zum deutschen Gesellschafts- und Gesundheitssystem zu nennen [21]. Ein weiterer Aspekt ist, dass den Themen Sexualität und Familienplanung ein anderer Stellenwert zugeschrieben wird. Erkenntnissen der Bundeszentrale für gesundheitliche Aufklärung (BZgA) zufolge meiden gerade Migranten/-innen aus islamisch-geprägten Ländern im Gespräch mit Familie und Freunden Themen wie Sexualität und Verhütung [5].

Im Jahr 2010 hatten 19% der Wohnbevölkerung in Deutschland einen Migrationshintergrund, von denen die meisten aus der Türkei stammten [22]. Derzeit existieren unserem Wissensstand zufolge keine epidemiologischen Studien, die das Wissen zu STIs von Jugendlichen mit türkischem und ohne Migrationshintergrund vergleichen.

Ziel dieser Arbeit war es daher, das Wissen zu STIs bei Schülern/-innen ab der 8. Klasse mit türkischem und ohne Migrationshintergrund zu untersuchen.

Methoden

Die Befragung fand zwischen Oktober und Dezember 2011 bei 12-20 Jährigen Schülern/-innen ab der 8. Klasse im Land Bremen statt. Die Methoden wurden an anderer Stelle ausführlich erläutert und hier nur zusammenfassend dargestellt [18]

Für die Studie wurden nach einem zufälligen Verfahren 18 weiterführende Schulen im Land Bremen ausgewählt, von denen sich nach Zusendung der Studieninformationen 8 Schulen (6 in Bremen, 2 in Bremerhaven, 4 mit Jahrgängen bis zum Abitur) zu einer Teilnahme bereit erklärten.

Die Rekrutierung der Studienteilnehmer/innen fand über die jeweilige Schule statt. Lehrer/innen, Eltern und Schüler/innen erhielten schriftliche Informationen über die Studie inklusive Einwilligungserklärungen. Die Studienteilnahme war freiwillig, bei Schülern/-innen unter 18 Jahren war jedoch eine Einwilligung zur Teilnahme der Erziehungsberechtigten notwendig.

Die Studie wurde durch die Ethikkommission der Universität Bremen, die Senatorin für Bildung, Wissenschaft und Gesundheit sowie die Datenschutzbeauftragte des Landes Bremen bewilligt.

Die Schüler/innen füllten während der Unterrichtszeit geschlechtsspezifische, anonyme Fragebögen aus, in denen u.a. soziodemographische Angaben, wie das Alter, die besuchte Schulklasse und das Geburtsland erfasst wurden. Der Migrationshintergrund wurde anhand des Mindestindikatorensatzes zur Erfassung des Migrationsstatus [20] durch das Geburtsland von Schüler/in, Mutter und

Vater sowie der zu Hause hauptsächlich gesprochenen Sprache ermittelt. Neben der Unterscheidung nach Migrationshintergrund allgemein konnten aufgrund der Angaben zum Geburtsland und Sprache auch spezifisch Schüler/innen mit türkischem Migrationshintergrund identifiziert werden.
Der sozioökonomische Status wurde durch den Schulabschluss von Vater und Mutter erfasst. Die Einteilung erfolgte nach der Internationalen Klassifikation für Bildung (ISCED) in „niedrig", „mittel" und „hoch" [24].

Wissen zu STIs
Wissensfragen zu STIs bezogen sich auf die folgenden Themen:

- Wissen, dass die Verwendung von Kondomen vor der Ansteckung mit STIs schützen kann
- Wissen, dass STIs unbemerkt weitergegeben werden können
- Wissen, dass Chlamydien, Gonorrhö und Syphilis heilbar sind, nicht aber HIV/AIDS und HPV
- Wissen, dass eine Impfung gegen HPV, nicht aber gegen HIV/AIDS, Chlamydien, Syphilis und Gonorrhö existiert

Statistische Methoden
Das Wissen zu STIs wurde anhand von 5 Ausprägungen (0-4 Fragen richtig beantwortet) operationalisiert. Für die weitergehenden Analysen wurde das Wissen zu STIs wegen niedriger und ungleichmäßiger Zellenbesetzungen in Schüler/innen mit niedrigem (0-1 Frage richtig beantwortet) und hohem Wissen (2-4 Fragen richtig beantwortet) dichotomisiert.
Zur Beschreibung der Studiencharakteristika nach Migrationshintergrund und des Wissens zu STIs wurden deskriptive Analysen durchgeführt. Um Unterschiede zwischen Schülern/-innen mit türkischem und ohne Migrationshintergrund zu ermitteln, wurde der p-Wert mittels Chi-Quadrat-Test errechnet. Bei Zellenbesetzungen n<5 wurde ein exakter Test verwendet.
Zur Untersuchung der Einflussfaktoren auf das Wissen zu STIs wurden Odds Ratios (OR) und 95% Konfidenzintervalle (KI) durch uni- und multivariate logistische Regressionen berechnet. Die multivariaten Analysen wurden für die in der Literatur identifizierten Einflussvariablen (Migrationshintergrund, Geschlecht, Alter, Schulabschluss der Mutter (Schulabschluss Vater wg. fehlender Werte nicht berücksichtigt), jemals Geschlechtsverkehr, Schultyp) adjustiert. Zusätzlich wurden die uni- und multivariaten Analysen getrennt für Nicht-Migranten/-innen und türkische Migranten/-innen durchgeführt, um mögliche Unterschiede in den untersuchten Einflussfaktoren aufzuzeigen. Alle statistischen Analysen wurden mit SAS Version 9.2 durchgeführt.

Ergebnisse

Studiencharakteristika
1.148 Schüler/innen nahmen an der Studie teil (Response 28%), davon 353 Schüler/innen (31%) mit Migrationshintergrund. Von den Migranten/-innen hatten 26% einen türkischen, 10% einen polnischen und 6% einen russischen Hintergrund. In die Auswertungen wurden aufgrund der geringen Fallzahlen nur Schüler/innen mit türkischem Migrationshintergrund eingeschlossen, so dass 866 Studienteilnehmer/innen (776 ohne, 90 mit türkischem Migrationshintergrund) die Analysepopulation bildeten. Unterschiede hinsichtlich der Geschlechts- und Altersverteilung zwischen den Befragten mit türkischem und ohne Migrationshintergrund bestanden nicht. Beim Schulabschluss von Mutter und Vater gaben Jugendliche ohne Migrationshintergrund häufiger einen hohen Schulabschluss an als Befragte mit türkischem Migrationshintergrund (Schulabschluss Mutter: 40 vs. 14%, Schulabschluss Vater: 37 vs. 13%). Insgesamt 26% bzw. 32% der Jugendlichen machten keine Angaben zum Schulabschluss von Mutter und Vater. 29%

(n=225) der Nicht-Migranten/-innen und 12% (n=11) der türkischen Migranten/-innen hatten bereits Geschlechtsverkehr, wobei mehr Schüler/innen ohne Migrationshintergrund beim ersten Geschlechtsverkehr mit Kondom verhüteten (83 vs. 64%). Die HPV-Impfung hatten den Selbstangaben zufolge 10% (n=5) der Schülerinnen mit türkischem Migrationshintergrund und 12% (n=51) der Schülerinnen ohne Migrationshintergrund erhalten. 71% bzw. 56% der befragten Schülerinnen mit türkischem bzw. ohne Migrationshintergrund wussten jedoch nicht, ob sie gegen HPV geimpft wurden (Tabelle 1).

Wissen zu STIs

Fast allen Befragten waren HIV/AIDS bekannt (93% mit türkischem und 100% ohne Migrationshintergrund), wohingegen Chlamydien (9% bzw. 26%), Gonorrhö (10% bzw. 21%) und HPV (14% bzw. 13%) nur einem geringen Anteil der Schüler/-innen bekannt waren. Die meisten Schüler/innen konnten ein oder zwei Fragen zum Wissen zu STIs richtig beantworten. 52% der Schüler/innen mit türkischem (n=47) und 35% der Schüler/innen ohne Migrationshintergrund (n=274) beantworteten nur eine Frage zum Wissen zu STIs richtig. Drei oder mehr Fragen konnten 1% der türkischen Migranten/-innen (n=1) und 12% der Nicht-Migranten/-innen (n=87) richtig beantworten. Insgesamt wurden am seltensten die Fragen zur Impfung gegen STIs (13%) und zur Heilbarkeit von STIs (5%) richtig beantwortet (Tabelle 2).

Die Ergebnisse der multivariaten Analyse zeigen, dass der Migrationshintergrund, das Geschlecht, das Alter, der Schultyp und die sexuelle Erfahrung einen signifikanten Einfluss auf das Wissen zu STIs haben. Schüler/innen ohne Migrationshintergrund, weiblichen Geschlechts, ≥15 Jahre alt und mit sexueller Erfahrung hatten ein signifikant höheres Wissen, ebenso Schüler/innen, die eine Schule bis zum Abitur besuchten. Der Schulabschluss der Mutter zeigte in der uni- und multivariaten Analyse keinen Einfluss auf das Wissen zu STIs auf (Tabelle 3). Vergleichbare Ergebnisse konnten auch in den nach Migrationshintergrund getrennten uni- und multivariaten Analysen gezeigt werden.

Die Ergebnisse der multivariaten Analyse zeigen, dass der Migrationshintergrund, das Geschlecht, das Alter, der Schultyp und die sexuelle Erfahrung einen signifikanten Einfluss auf das Wissen zu STIs haben. Schüler/innen ohne Migrationshintergrund, weiblichen Geschlechts, ≥15 Jahre alt und mit sexueller Erfahrung hatten ein signifikant höheres Wissen, ebenso Schüler/innen, die eine Schule bis zum Abitur besuchten. Der Schulabschluss der Mutter zeigte in der uni- und multivariaten Analyse keinen Einfluss auf das Wissen zu STIs auf (Tabelle 3). Vergleichbare Ergebnisse konnten auch in den nach Migrationshintergrund getrennten uni- und multivariaten Analysen gezeigt werden.

Diskussion

Die vorliegenden Ergebnisse zeigen, dass das Wissen zu STIs unter den Befragten insgesamt, aber im besonderen Maße bei türkischstämmigen Schülern/-innen, gering ist. Ähnliche Ergebnisse in Bezug auf Assoziationen mit dem Migrationshintergrund finden sich bei insgesamt schwacher Studienlage in den meisten internationalen Studien. In einer Befragung von Schülern/-innen der 11.-13. Klasse in London hatten weiße britische Mädchen und Jungen verglichen mit dunkelhäutigen oder asiatischen Jugendlichen einen höheren Wissensstand [7]. Eine Studie, die das Wissen zu Chlamydien bei deutschen und dänischen Schülern/-innen der 10.-11. Klasse untersuchte, kam zu dem Ergebnis, dass das Wissen besonders unter deutschen Jugendlichen gering war; v.a. wenn zusätzlich ein Migrationshintergrund vorlag [11]. Türkische Migranten/-innen der ersten und zweiten Generation zwischen 16-40 Jahren in den Niederlanden hatten in einer Befragung zum Wissen zu Hepatitis B einen insgesamt

schlechten Wissensstand; bei Migranten/-innen der zweiten Generation war der Wissensstand allerdings höher [25]. Eine Befragung von Schülern/-innen der 9. und 11. Klasse in der Türkei zum Wissen zu HIV/AIDS zeigte, dass insgesamt ein moderates Wissen vorherrscht [19]. Keine Wissensunterschiede bei Jugendlichen mit und ohne Migrationshintergrund fanden sich hingegen bei Befragungen von Schülern/-innen zwischen 15-20 Jahren zu HIV/AIDS in Malaysia [1] und bei Jugendlichen zwischen 12-21 Jahren zu STIs in den USA [6].

Die in dieser Studie aufgedeckten Wissensunterschiede zu STIs bei Schülern/-innen mit türkischem und ohne Migrationshintergrund könnten auf eine unterschiedliche Aufklärung in der Familie zurückzuführen sein. Bei den befragten Schülern/-innen war die zweithäufigste genannte Informationsquelle zu STIs die Mutter, jedoch gaben dies weniger türkische Migranten/-innen als Nicht-Migranten/-innen an. Dieses Ergebnis steht im Einklang mit Untersuchungen der BZgA [5]. Migranten/-innen und Nicht-Migranten/-innen sind durch unterschiedliche kulturelle Hintergründe geprägt, die sich auch auf den Umgang mit Sexualität auswirken. Die Kommunikation über Sexualität stellt v.a. in islamisch-arabischen Ländern ein Tabuthema dar [13]. Demzufolge könnten Kinder, die einen islamisch-arabischen Migrationshintergrund haben, weniger aufgeklärt sein und somit ein geringeres Wissen zu STIs aufweisen.

Neben dem Migrationshintergrund hatten das Alter, das Geschlecht, der Schultyp und die sexuelle Erfahrung einen signifikanten unabhängigen Einfluss auf das Wissen zu STIs. Der Einfluss von Alter und Geschlecht zeigte sich ebenfalls in mehreren früheren Untersuchungen über das Wissen zu STIs. Dabei hatten jüngere Schüler/-innen und Jungen ein geringeres Wissen als Ältere und Mädchen [2, 23, 25]. Eine Studie zum Wissen zu HIV aus den USA zeigte außerdem, dass ein höheres Wissen mit einer besseren Schulbildung und bereits erfolgtem Geschlechtsverkehr einherging [23]. Ein möglicher Erklärungsansatz für den höheren Wissensstand zu STIs bei Schülerinnen liegt darin, dass Mädchen interessierter an den Themen Sexualität und STIs sind [3, 16] oder sich eher von Präventionskampagnen, z.B. für HPV, angesprochen fühlen [17].

Stärken unserer Studie beziehen sich auf die zufällige Auswahl der Schulen und die Berücksichtigung aller im Land Bremen vorhandenen Schulformen. Der Migrationshintergrund wurde anhand des Geburtslandes von Schüler/in, Mutter und Vater sowie der zu Hause hauptsächlich gesprochenen Sprache erfasst. Von den teilnehmenden Migranten/-innen liegen somit spezifische Angaben zum Migrationshintergrund vor, die über eine einfache Einteilung nach Migrationshintergrund hinausgehen.

Einige Einschränkungen sind zu diskutieren. Als Erhebungsinstrument wurden geschlechtsspezifische Fragebögen zum Selbstausfüllen verwendet. Entsprechend basiert die Untersuchung auf Selbstangaben mit dem Risiko eines Informationsbias. Die befragten Schüler/innen könnten z.B. aufgrund vorherrschender sozialer Normen falsche Angaben gemacht haben. Beispielhaft ist das Verhütungsverhalten zu nennen; Schüler/innen könnten angegeben haben, dass sie verhüten, weil dies normativ erwünscht ist, ohne dass sie dies wirklich tun.

Acht der 18 zufällig ausgewählten Schulen erklärten sich zur Studienteilnahme bereit. Es ist denkbar, dass sich insbesondere Schulen zur Teilnahme bereit erklärten, in denen der Sexualkundeunterricht und die sexuelle Aufklärung einen hohen Stellenwert haben. Der Lehrplan sieht allerdings einheitlich entsprechende Unterrichtseinheiten vor. Selektionsbias kann auch die Teilnahme an der Befragung beeinflussen. Zum einen könnten Schüler/innen, die an der Befragung teilnahmen, ein höheres Wissen zu STIs oder ein größeres Interesse an den Themen

Sexualität und STIs haben. Zum anderen könnte die Teilnahmebereitschaft von Jugendlichen mit türkischem Migrationshintergrund beispielsweise aufgrund der behandelten Thematik geringer sein als von Jugendlichen ohne Migrationshintergrund. Hinweise in dieser Richtung liegen aus anderen Befragungen vor [3, 4].

Für die relativ geringe Teilnahme von 28% ist aus unserer Sicht von Bedeutung, dass eine schriftliche Zustimmung zur Studienteilnahme von den Eltern eingeholt werden musste, die in vielen Schulen mit einem schlechten Rücklauf einherging. Auch das eher sensible Thema der Befragung spielt hierbei vermutlich eine Rolle.

Für die Analyse ist einschränkend anzumerken, dass die Angaben zum Schulabschluss der Eltern viele fehlende oder „Weiß Nicht"-Angaben aufwiesen, die für die Analysen der Kategorie „unbekannt" zugeordnet werden mussten. Besonders der Anteil niedriger Schulabschlüsse der Eltern erscheint zudem gering. In anderen Studien untersuchte Einflussfaktoren wie die Religionszugehörigkeit [12], Migranten/-innengeneration [25] und das Interesse am Thema [16] konnten in den Analysen nicht berücksichtigt werden.

Fazit für die Praxis

Das Wissen zu STIs war bei den befragten Schülern/-innen unzureichend. Altersgerechte Aufklärungs- und Präventionsanstrengungen für alle Jugendlichen sollten entsprechend intensiviert werden. Insbesondere Schüler/innen mit türkischem Migrationshintergrund und Jungen könnten von diesen Angeboten profitieren, da sie besondere Wissensdefizite aufweisen.

Die Schule ist als wichtigste institutionelle Einrichtung der Wissensvermittlung zu benennen. Gerade für sexuell unerfahrene Jugendliche stellt sie eine wichtige Informationsquelle dar, da vermutet wird, dass sie im Gegensatz zu sexuell Erfahrenen kaum Kontakt zu weiteren wichtigen Informationsquellen im Gesundheitssystem (z.B. Arztpraxen, Beratungsstellen) haben. Ein hoher Wissensstand über STIs ist die Grundlage für adäquates Verhalten, z.B. Verwendung von Kondomen, jedoch wird Verhalten auch von anderen Faktoren, wie Überzeugungen, beeinflusst. Unsere Ergebnisse legen nahe, dass nicht allein HIV/AIDS, sondern vermehrt STIs mit höherer Prävalenz unter Jugendlichen angesprochen werden sollten, die zudem bei vielen Jugendlichen nicht bekannt sind. Die Aufklärung muss dabei nicht zwangsläufig im Biologieunterricht erfolgen, sondern könnte in Zusammenarbeit mit anderen Fachlehrern/-innen fachübergreifend thematisiert werden. Materialien liegen teilweise vor, z.B. bei der BZgA, oder sollten von Gesundheits- und Bildungsfachleuten gemeinsam erstellt werden. Die soziokulturelle Diversität der heutigen Schülergenerationen gilt es dabei zu berücksichtigen.

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Tabelle 1: Studiencharakteristika nach Migrationshintergrund (n=866)

	Gesamt (n=866) n (%)	Türkischer Migrationshintergrund (n=90) n (%)	Ohne Migrationshintergrund (n=776) n (%)	p-Wert[a]
Geschlecht				
Männlich	389 (45)	37 (41)	352 (45)	0,44
Weiblich	477 (55)	53 (59)	424 (55)	
Alter				
12-14 Jahre	397 (46)	40 (44)	357 (46)	0,78
≥15 Jahre	469 (54)	50 (56)	419 (54)	
Besuchte Schulkasse				
8.-9. Klasse	465 (54)	49 (56)	416 (54)	0,77
≥10. Klasse	393 (46)	39 (44)	354 (46)	
Schulabschluss Mutter				
Unbekannt	225 (26)	31 (34)	194 (25)	
Niedrig	78 (9)	22 (24)	56 (7)	<0,01
Mittel	243 (28)	24 (27)	219 (28)	
Hoch	320 (37)	13 (14)	307 (40)	
Schulabschluss Vater				
Unbekannt	274 (32)	39 (43)	235 (30)	
Niedrig	95 (11)	19 (21)	76 (10)	<0,01
Mittel	201 (23)	20 (22)	181 (23)	
Hoch	296 (34)	12 (13)	284 (37)	
Jemals Geschlechtsverkehr				
Ja	236 (28)	11 (12)	225 (29)	<0,01
Nein	623 (73)	79 (88)	544 (71)	
Verhütung beim ersten Geschlechtsverkehr[c]				
Kondom	194 (82)	7 (64)	187 (83)	0,11[b]
Pille	122 (52)	4 (36)	118 (52)	0,36[b]
Andere	2 (1)	0 (0)	2 (1)	0,99[b]
Keine	12 (5)	3 (27)	9 (4)	0,01[b]
Jemals Frauenarztbesuch[d]				
Ja	242 (51)	23 (44)	219 (52)	
Nein	233 (49)	29 (56)	204 (48)	0,30
Impfung gegen HPV[d]				
Ja	56 (12)	5 (10)	51 (12)	
Nein	141 (30)	10 (19)	131 (32)	0,10
Weiß Nicht	267 (58)	37 (71)	230 (56)	

[a]p-Werte aus Chi-Quadrat-Test

[b]p-Werte aus Fisher`s exaktem Test

[c]Mehrfachantworten möglich

[d]Nur Mädchen

Prozentwerte lassen sich aufgrund von Rundungsfehlern nicht immer auf 100% addieren

n Summe, HPV Humane Papillomaviren

Tabelle 2: Bekannte STIs und Wissen zu STIs nach Migrationshintergrund, richtige Antworten (n=866)

	Gesamt (n=866) n (%)	Türkischer Migrationshintergrund (n=90) n (%)	Ohne Migrationshintergrund (n=776) n (%)	p-Wert[a]
Bekannte STIs				
HIV/AIDS	857 (99)	84 (93)	773 (100)	<0,01[b]
HPV	114 (13)	13 (14)	101 (13)	0,71
Chlamydien	210 (24)	8 (9)	202 (26)	<0,01
Herpes	765 (89)	70 (78)	715 (92)	<0,01
Syphilis	450 (52)	19 (21)	431 (56)	<0,01
Gonorrhö	172 (20)	9 (10)	163 (21)	0,01
Hepatitis B	724 (84)	63 (70)	661 (85)	<0,01
Keine	4 (1)	3 (3)	1 (0)	<0,01[b]
Schutz vor STIs[c] Kondome schützen vor STIs	601 (70)	47 (52)	554 (72)	<0,01
Weitergabe von STIs[c] STIs können unbemerkt weitergegeben werden	586 (68)	49 (54)	537 (69)	<0,01
Heilbarkeit von STIs[c] Chlamydien, Syphilis und Gonorrhö sind heilbar	39 (5)	0 (0)	39 (5)	0,03[b]
Impfung gegen STIs[c] Es existiert eine HPV-Impfung	111 (13)	8 (9)	103 (13)	0,25
Wissen zu STIs				
Keine Frage richtig	83 (10)	15 (17)	68 (9)	
1 Frage richtig	321 (37)	47 (52)	274 (35)	<0,01
2 Fragen richtig	374 (43)	27 (30)	347 (45)	
3 Fragen richtig	84 (10)	1 (1)	83 (11)	
4 Fragen richtig	4 (1)	0 (0)	4 (1)	

[a]p-Werte aus Chi-Quadrat-Test

[b]p-Werte aus Fisher`s exaktem Test

[c]richtige Antwort

Prozentwerte lassen sich aufgrund von Rundungsfehlern nicht immer auf 100% addieren

n Summe, STIs Sexuell übertragbare Infektionen, HPV Humane Papillomaviren, HIV Human Immunodeficiency Virus, AIDS Acquired Immune Deficiency Syndrome

Tabelle 3: Ergebnisse der uni- und multivariaten logistischen Regressionen für Einflussfaktoren zum Wissen zu STIs

	n	univariat	multivariat
		OR [95% KI]	OR [95% KI]
Migrationshintergrund			
Türkisch[a]	90	1,00	1,00
Ohne	769	**2,81 [1,76-4,49]**	**2,61 [1,60-4,27]**
Geschlecht			
Männlich[a]	385	1,00	1,00
Weiblich	474	**1,44 [1,10-1,89]**	**1,46 [1,10-1,93]**
Alter			
12-14 Jahre[a]	395	1,00	1,00
≥15 Jahre	464	**2,04 [1,55-2,68]**	**1,66 [1,21-2,30]**
Schulabschluss Mutter			
Unbekannt	223	1,36 [0,81-2,28]	0,96 [0,55-1,66]
Niedrig[a]	78	1,00	1,00
Mittel	240	1,22 [0,73-2,03]	0,93 [0,54-1,59]
Hoch	318	1,52 [0,92-2,50]	1,20 [0,71-2,04]
Schultyp			
Schulen bis zur 10. Klasse[a]	275	1,00	1,00
Schulen bis zum Abitur	548	**1,95 [1,46-2,61]**	**1,51 [1,10-2,07]**
Jemals Geschlechtsverkehr			
Ja	236	**2,18 [1,59-2,98]**	**1,47 [1,02-2,11]**
Nein[a]	623	1,00	1,00

[a]Referenzkategorie

n Summe, STIs Sexuell übertragbare Infektionen, OR Odds Ratio, KI Konfidenzintervall

signifikante Ergebnisse sind fett gedruckt

Hiermit erkläre ich, Florence Samkange-Zeeb, dass für das Verfassen der vorliegenden Dissertation ‘Assessing knowledge and awareness of sexually transmitted infections among school-going adolescents’, folgende drei Aussagen zutreffen:

1. Ich habe die Arbeit ohne unerlaubte Hilfe angefertigt.
2. Ich habe keine anderen als die von mir angegebenen Quellen und Hilfsmittel benutzt.
3. Ich habe die den benutzten Werken wörtlich oder inhaltlich entnommenen Stellen als solche kenntlich gemacht.

Weiterhin hin bestätige ich, dass diese Dissertation keiner anderen Fakultät oder Universität zur Prüfung vorgelegen hat.

Bremen, 26. März 2013

Florence Samkange-Zeeb