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Changes in Sexual Behavior and Hormonal Contraceptives  
Use Among Finnish Adolescents



ACADEMIC DISSERTATION

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To Daniel and Helia

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# ABSTRACT

In Finland the rate of induced abortion increased by 66% in the period 1995-2000 among girls aged 15-19 years after a marked decline. Limited information was available on age-specific trends of sexual behavior and contraceptive use in the adolescent population from mid-1990s onwards. The aims of this study were as follows: 1) Trends of non-coital and coital experience and sexual risk-taking behavior among Finnish adolescents in the period 1996-2007; 2) Trends in oral contraceptive use and the characteristics of users during the years 1981-2003; 3) The use of vaginal ring and transdermal patch in 2007; 4) The use and awareness of emergency contraception (EC), the characteristics of EC users and the effect of non-prescription status on EC use.

Datasets from the School Health Promotion Study from 1996 to 2007 and the Adolescent Health and Lifestyle Survey from 1981 to 2007 were used. The School Health Promotion Study is an anonymous classroom survey among adolescents in the 8<sup>th</sup> and 9<sup>th</sup> grades (ages 14-16). The study has been carried out annually since 1996, every second year in Eastern Finland and every second year in Western Finland. The response rates have been high, around 90%. Number of respondents was 286,665 (143,843 boys and 142,822 girls). Information on kissing on the mouth, light petting (fondling on top of clothes), heavy petting (fondling under clothes or naked), and sexual intercourse was gathered. Among sexually active adolescents, the number of intercourse, the number of sexual partners, and the use of contraception at the most recent intercourse were asked.

The Adolescent Health and Lifestyle Survey is a nationwide biennial cross-sectional mailed survey with samples representing 12, 14, 16 or 18 year age groups. The sample has been drawn from the Central Population Register. The study samples have been based on dates of birth, so that all Finns born on the sample days have been included. The annual number of female respondents has varied between 1,200 and 4,100. Self-administered questionnaires have been mailed in February every second year with two or three reminders to non-responders. Questions on dating, oral contraceptive use and emergency contraceptive use have been included. The study has been conducted since 1977, while the use of oral contraceptives has been ascertained from 1981 onwards.

Based on the School Health Promotion Study, kissing on the mouth, light petting, and heavy petting increased between 1996/1997 and 2000/2001 and decreased between 2000/2001 and 2006/2007. Sexual activity and the intensity of sexual life followed the same pattern. The proportion of adolescents engaging in sexual intercourse, those having 10 or more sexual intercourses, having three or more sex partners and non-use of contraception at the most recent intercourse increased between 1996/1997 and 2000/2001. The measures of the intensity of sexual life decreased between 2000/2001 and 2006/2007. The only exception was the proportion of those having experienced sexual intercourse 10 or more times, which did not decrease between 2000/2001 and 2006/2007.

Based on the Adolescent Health and Lifestyle Survey, the use of oral contraceptives almost doubled in 1989 compared with 1981, from 9.5% to 20.2%, while no changes were observed between 1989 and 2007. The use of oral contraceptives was reported more frequently among older teenagers, girls living with parents, girls with lower age at menarche, girls whose mothers or fathers had low educational status, girls whose fathers had lower occupational status, and girls with poor school grades.

Only 1% of girls aged 14-18 used the vaginal ring or transdermal patch in 2007. The use of the vaginal ring was reported more commonly in older teenagers, girls not living with parents, smokers and alcohol consumers.

The awareness of EC increased with age and over time, and was 99.8% in 2007. Fifteen percent of adolescents had ever used EC in 2007. The use of EC did not change with non-prescription status between 1999 and 2007. The use of EC was more frequent in smokers and alcohol consumers than in non-smokers or non-drinkers.

This study showed an increase in all range of non-coital and coital sexual experiences, having multiple sex partners and not using a contraceptive method at most recent intercourse in 1996-2001. Our findings suggest that effective use of contraceptive methods did not increase consistently with increasing sexual activity. Therefore, increase in proportion of sexually active adolescents, intensity of sex life and insufficient use of effective contraceptive methods contributed to an increase in teenage abortions.

# TIIVISTELMÄ

Pitkän väheneminen jälkeen 15–19-vuotiaiden tyttöjen raskauden keskeytykset lisääntyivät 66 %:lla vuosina 1995–2000. Nuorten seksuaalikäyttäytymisestä ja ehkäisyvälineiden käytöstä oli niukasti tutkimustietoa 1990-luvun puolivälin jälkeen. Tämän tutkimuksen tarkoituksena oli selvittää 1) yhdynnän ja muiden seksuaalikokemusten sekä seksuaalisen riskikäyttäytymisen trendejä suomalaisilla nuorilla vuosina 1996–2007, 2) ehkäisypillerien käytön trendejä sekä näitä käyttävien tyttöjen taustaa vuosina 1981–2003, 3) ehkäisyrenkaan ja ehkäisyalaastarin käytön yleisyyttä vuonna 2007, 4) jälkiehkäisyyn käytön yleisyyttä, nuorten tietoisuutta jälkiehkäisyyn olemassaolosta sekä näitä käyttävien nuorten taustaa ja 5) reseptivapauden vaikutusta jälkiehkäisyyn käyttöön nuorilla.

Tutkimuksessa käytettiin Kouluterveyskyselyn aineistoja vuosilta 1996–2007 ja Nuorten terveystapatutkimuksen aineistoja vuosilta 1981–2007. Kouluterveyskysely oli anonymi luokkakysely 8.-9.-luokkaisille peruskoululaisille (14–16-vuotiaat). Tutkimus tehtiin vuosittain vuodesta 1996 siten, että kukin alue oli mukana joka toinen vuosi. Vastausprosentit ovat olleet korkeita, noin 90 %. Vastanneiden määrä oli 286,665 (143,843 poikaa ja 142,822 tyttöä). Seksuaalikäyttäytymisen kysymykset koskivat suutelemista suulle, hyväilyä vaatteiden päältä, hyväilyä vaatteiden alta tai alastomana ja yhdyntäkokemuksia. Seksuaalisesti aktiivisilta nuorilta kysyttiin lisäksi yhdyntöjen lukumäärää, yhdyntäkumppaneiden lukumäärää sekä ehkäisyä viimeisimmässä yhdynnässä.

Nuorten terveystapatutkimus on valtakunnallinen joka toinen vuosi toteutettava postikyselytutkimus, jonka otokset edustavat 12-, 14-, 16- ja 18-vuotiaita suomalaisia. Otokset poimittiin Väestörekisteristä ja ne perustuivat syntymäpäiväotantaan siten, että kaikki tiettyinä päivinä syntyneet suomalaiset tulivat otokseen mukaan. Kyselykohtainen vastanneiden tyttöjen määrä vaihteli 1,200:n ja 4,100:n välillä. Lomakkeet postitettiin helmikuussa joka toinen vuosi ja vastaamattomille lähetettiin kaksi uusintakyselyä. Mukana olivat kysymykset seurustelusta ja ehkäisypillerien ja jälkiehkäisyyn käytöstä. Tutkimus on toteutettu vuodesta 1977 ja ehkäisypillereitä on kysytty vuodesta 1981.

Kouluterveyskyselyn perusteella suuteleminen suulle, hyväilyt vaatteiden päältä ja hyväilyt vaatteiden alta tai alastomana lisääntyivät vuosien 1996/1997 ja 2000/2001 välillä ja



vähenevät vuosien 2000/2001 ja 2006/2007 välillä. Muutokset seksuaalisessa aktiviteetissa ja seksielämän intensiteetissä olivat samansuuntaisia: niiden nuorten osuus, jotka olivat olleet yhdynnässä, joilla oli vähintään kymmenen yhdyntää tai vähintään neljä yhdyntäkumppania ja jotka eivät olleet käyttäneet ehkäisyä viimeisimmässä yhdynnässä, kasvoi vuosien 1996/1997 ja 2000/2001 välillä. Seksielämän intensiteetti väheni vuosien 2000/2001 ja 2006/2007 välillä. Ainoa poikkeus oli niiden nuorten osuus, joilla oli vähintään kymmenen yhdyntää, sillä tämä osuus ei laskenut vuosien 2000/2001 ja 2006/2007 välillä.

Nuorten terveystapatutkimuksen perusteella ehkäisypillerien käyttö lähes kaksinkertaistui vuosien 1981 ja 1989 välillä, 9.5 %:sta 20.2 %:iin, mutta vuosien 1989 ja 2007 ei ollut muutosta. Ehkäisypillereiden käyttö oli yleisempää vanhempien ikäryhmien tytöillä sekä niillä, jotka asuivat muussa kuin ydinperheessä, joiden kuukautiset olivat alkaneet varhain, joiden isän tai äidin koulutustaso oli matala, joiden isän ammattiasema oli matala ja jotka menestyivät huonosti koulussa.

Vain 1 % 14–18-vuotiaista tytöistä käytti ehkäisylaastaria tai ehkäisyrengasta vuonna 2007. Käyttö oli yleisempää vanhimmissa tyttöikäryhmässä sekä niillä, jotka asuivat muussa kuin ydinperheessä, tupakoivat ja käyttivät alkoholia.

Nuorten tietoisuus jälkiehkäisystä kasvoi iän myötä sekä ajan kuluessa ja oli 99.8 % vuonna 2007, jolloin 15 % oli käyttänyt jälkiehkäisyä. Jälkiehkäisyn käyttö ei juuri muuttunut vuosien 1999 ja 2007 välillä, jona aikana reseptivapaus toteutui. Jälkiehkäisyn käyttö oli yleisempää tupakoijilla ja alkoholia käyttävillä verrattuna tupakoimattomiin ja alkoholia käyttämättömiin tyttöihin.

Tutkimus osoitti, että vuosina 1996–2001 nuorten yhdyntäkokemukset ja muut seksuaalikoemukset lisääntyivät samoin kuin lisääntyi niiden nuorten osuus, joilla oli useita seksikumppaneita ja jotka eivät käyttäneet ehkäisyä viimeisimmässä yhdynnässä. Tulosten perusteella näyttää ilmeiseltä, että tehokkaiden ehkäisymenetelmien käyttö ei lisääntynyt kasvaneen seksuaalisen aktiivisuuden myötä. Voidaankin päätellä, että seksuaalisesti aktiivisten nuorten osuuden kasvu, seksielämän intensiteetin kasvu sekä riittämätön tehokkaan ehkäisyn käyttö myötävaikuttivat nuorten tyttöjen raskauden keskeytysten lisääntymiseen.

# LIST OF PUBLICATIONS

This dissertation is based on the following articles:

1. Falah-Hassani K, Kosunen E, Shiri R, Rimpelä A. Adolescent sexual behavior during periods of increase and decrease in the abortion rate. *Obstetrics & Gynecology* 2009; Jul;114(1):79-86.
2. Falah-Hassani K, Kosunen E, Rimpelä A. The use of oral contraceptives among Finnish teenagers in 1981-2003. *J Adolesc Health* 2006; 39(5):649-55.
3. Falah-Hassani K, Kosunen E, Shiri R, Rimpelä A. The use of the vaginal ring and transdermal patch among adolescent girls in Finland. *Eur J Contracept Reprod Health Care* 2010; 15(1):31-4.
4. Falah-Hassani K, Kosunen E, Shiri R, Rimpelä A. Emergency contraception among Finnish adolescents: awareness, use and the effect of non-prescription status. *BMC Public Health* 2007 Aug 9; 7:201.

# ABBREVIATIONS

CI	confidence interval
EC	emergency contraception
HBSC	Health Behavior in School-aged Children
IUD	intrauterine device
OC	oral contraceptive
OR	odds ratio
STDs	sexually transmitted diseases
WHO	World Health Organization

# 1 INTRODUCTION

Sexual and reproductive health is at the center of people's lives and well-being (World Health Organization 2002). According to the World Health Organization (WHO), sexual health is a state of physical, emotional, mental and social well-being related to sexuality. The WHO emphasizes people's ability to develop and grow into sexually responsive and responsible adults. Sexuality is a multidimensional concept and includes ethical, psychological, biological, social and cultural dimensions (Feldmann and Middleman 2002). Sexual health requires having safe and pleasurable sexual experiences. Adolescent sexuality and sexual behavior should be viewed within the context of adolescent development.

The term "adolescents" is used for people aged 10-19 years. Nearly half of the global population is less than 25 years old (Bearinger et al. 2007). Adolescence is a time of changes. Adolescents undergo changes in their bodies, emotions, and thoughts as they develop into sexually mature individuals. Adolescence is a complex stage of an individual's development and moreover teenagers become biologically mature at an earlier age today than in earlier generations (Herter and Accetta 2001, McAnarney and Hendee 1989a). Biological and physiological changes in the body increase sexual desire and the initiation of sexual intercourse (Chapman and Werner-Wilson 2008).

The term "sexually experienced" is generally used in the sense of having experienced sexual intercourse at least once. Sexual intercourse is any physical contact between two individuals involving stimulation of the genital organs. A Finnish definition of sexual health refers to the ability of women and men to enjoy and express their sexuality and to do so free from the risk of sexually transmitted diseases, unwanted pregnancy, coercion and discrimination (Kirkkola 2004).

Adolescence is a time of risk taking as part of the process of growing up. Differences in adolescents' sexual behavior may exist between cultures, communities and countries, and may also occur within families and generations. Adolescent sexual activity is increasing globally and sexual intercourse at earlier age results in high rates of adolescent pregnancy and abortion, as well as in increased risk of sexually transmitted diseases (Creatsas 1993, Fortenberry et al.

2005). Adolescent pregnancy is a significant public health problem worldwide and early pregnancy can have harmful effects on a girl's physical, psychological, social and economic status. Unintended early childbearing has huge social and financial costs on society (DiCenso et al. 2002, Mitchell and Smith 2000). The use of effective contraceptive methods is a key to the prevention of unplanned pregnancy and abortion.

There are studies on adolescent sexual behavior and contraceptive practice, but study designs have usually been cross-sectional, producing fragmentary information on the epidemiology of contraceptive use in different times. Moreover, earlier studies on adolescent sexual behavior and contraceptive use have been conducted among small and selected populations. Little is known about the age-specific trends of sexual activity, sexual risk-taking behavior, and contraceptive use among representative samples of adolescent populations during the last two decades.

## **2 REVIEW OF THE LITERATURE**

### **2.1 Sexual behavior**

Sexual behavior is humans' sexuality experience (Rathus et al. 2007). It includes a wide range of actions, such as finding or attracting partners, interactions between humans, physical or emotional friendship, and sexual contact.

Non-coital sexual behaviors include kissing on the mouth, light petting (fondling on top of clothes), and heavy petting (fondling under clothes or naked). They are commonly reported among adolescents. Kissing on the mouth has been reported by 63-87% (Pinter et al. 2009, Shtarkshall et al. 2009), petting over the clothes by 46-79% (Pinter et al. 2009, Shtarkshall et al. 2009), and petting under the clothes by 24-70% (Shtarkshall et al. 2009).

Studies show that a large number of male and female teenagers have had sexual intercourse (Bearinger et al. 2007, Singh et al. 2000). Health Behavior in School-aged Children survey among 30 European countries in 2005/2006 showed that on average 24% of girls and 30% of boys aged 15 had had sexual intercourse (World Health Organization 2005/2006).

Family background factors and characteristics of early sexual relationships have a stronger influence on sexual behavior among girls than among boys (Manlove et al. 2006, Marin et al. 2006). Teenagers with little education are more likely to start intercourse earlier than those who are better educated (McAnarney and Hendee 1989b). Studies show a link between sexual intercourse and physical factors such as the influences of the workday (Cohen et al. 2002) and positive attitude and better support from partner (Fortenberry et al. 2005). After school and weekends may be times for having sex (Cohen et al. 2002). Teenagers' sexual intercourse is affected by the use of drugs and binge alcohol drinking, and there is a relationship between risk-taking health behaviors and engaging in unprotected sexual activity and having multiple sex partners (Baskin-Sommers and Sommers 2006, Imamura et al. 2007, Kangas et al. 2004b).

A Scottish study (Wight et al. 2006) supports the importance of both family structure (parents' higher educational level, living with both parents, having older mothers, being more religious) and family processes in shaping young people's sexual behavior. Both sexes are most likely to have sexual intercourse in their early teen years if living with only one parent, and boys are more likely to do so if living with neither (Wight et al. 2006). Girls in urban schools report a higher proportion of experiencing sexual relations than girls in rural schools, whereas boys in rural schools have a higher proportion of sexual intercourse than boys in urban schools (Drennan et al. 2009). Teenagers whose friends smoke or have higher number of sexual partners initiate sexual activity earlier (Poulin and Graham 2001). A study on high-risk adolescents showed teenagers who became pregnant had lower grades and IQ scores than those who postponed pregnancy until their twenties (Hardy et al. 1998).

## **2.2 Sexual risk-taking behavior**

The common sexual risk-taking behaviors in teenagers are early onset of sexual activity, having multiple sex partners and non-use of an effective contraceptive method (Kangas et al. 2004b, Santelli et al. 2000). An understanding of teenagers' sexual risk-taking behavior must approach the lack of knowledge about sexual risk behaviors. It should provide counselling and information about sexual and reproductive health ( World Health Organization 2002-2003). Both boys and girls seem to be at risk of sexual risk-taking behaviors, but males report having more sexual partners than females (Tubman et al. 1996).

Among girls, biological factors including early onset of puberty are associated with earlier sexual behavior and a higher rate of adolescent pregnancy (McDowell et al. 2007, Posner 2006). Early initiation of sexual activity, often mentioned as age less than 16 years, may be a risk factor of poor sexual health. Some studies have shown that increasing numbers of teenagers are involved in sexual activity by that age (Avery and Lazdane 2008, Johansson and Ritzen 2005, Ross and Wyatt 2000, Santelli et al. 2000). Secular changes in sexual and social mores in developed countries have led to earlier onset of sexual activity. Early pubertal development is related to earlier ages of sexual activity for both males and females (Capaldi et al. 1996). Girls

with menarche at an early age may engage in sexual activity with older boyfriends (Gupta et al. 2008).

Moreover, early onset of intercourse is associated with other forms of sexual risky behavior such as having sex without using contraception or with multiple partners (O'Donnell et al. 2001, Reese 2008, Takakura et al. 2007). Early sexual activity is connected to lower rates of condom use and higher rates of unwanted pregnancy and sexually transmitted diseases (Mosher and McNally 1991, O'Donnell et al. 2001). Teenagers with a short dating history may not have the emotional skills to cope with romantic relationship breakup, especially after initiation of sexual activity. A study showed that among female teenagers there is a connection between subsequent depressive symptoms and sexual activity started before age 16 (Meier 2007).

Non-use of contraception among sexually active teenagers is a public health problem (Ross et al., 2004). Non-use of contraception at the latest intercourse was 20% in the USA, 12% in France, 4% in the UK and 7% in Sweden (Darroch et al. 2001b). Not using contraception and having multiple sexual partners has been shown in several studies among adolescents (Raine et al. 2003, World Health Organization 2002-2003). In addition, multi-partner behavior is related to the use of condom and emergency contraception, which shows that unplanned intercourse (without using contraception) is more common in multi-partner teenagers (Kuortti and Kosunen 2009). Binge drinking, smoking, and drug use are related to multi-partner behavior.

### **2.3 Trends in sexual risk-taking behavior**

Only a few studies have shown changes of adolescents' sexual experiences in the last decade. Reports from some Western countries suggest that coital activity increased during the 1990s among young population (Agius et al. 2006, Breidablik and Meland 2004, Robinson and Rogstad 2002). A study in Australia among students in grades 10-12 showed an increase in the proportion of those who had ever had sexual intercourse in the period 1997-2002 (Agius et al. 2006). The increase was more prominent in the 10<sup>th</sup> grade. Moreover, two trend studies in Norway (1997-2001) and Sweden (1989-2007) among young people aged 15 to 24 showed an increase in the



proportion of those sexually experienced (Breidablik and Meland 2004, Herlitz and Forsberg 2010).

Two studies (Ford et al. 1999, Kangas et al. 2004a) showed a decline in the age of onset of sexual intercourse during the period 1990-2001 and no change in recent years (Kangas et al. 2004b). An increase in the number of sexual partners was reported among British young people aged 16-24 in 1990-1996 (Ford et al. 1999) and also in Australian students in grade 10 between 1997 and 2002 (Agius et al. 2006). On the other hand, a study among Danish adolescents in grades 10-12 did not show a change in the number of lifetime sex partners during 1996-2001 (Kangas et al. 2004b).

In the Health Behavior in School-aged Children survey among sexually active adolescents, 11 to 31% of boys and 2 to 32% of girls did not use contraception at their latest intercourse in 1997/1998 in 13 European countries (Ross and Wyatt 2000). The corresponding figures were 8-27% and 3-32% in 2001/2002 in 30 European countries (Ross et al. 2004). There was a trend to less use of an effective contraceptive method among Danish adolescents with no regular partner in 1996-2001 (Kangas et al. 2004b).

## **2.4 Health consequences of sexual risk-taking behavior**

Knowledge about teenage sexual activity and contraceptive use is important in understanding trends in pregnancy, childbearing, and sexually transmitted diseases (Abma et al. 2004). More attention has been paid to the health risks of unsafe sexual behavior in recent years. Teenagers are at high risk of negative health consequences such as human immunodeficiency virus (HIV), other sexually transmitted diseases, and unwanted pregnancy due to sexual risk-taking behavior (Gupta et al. 2008).

About 82% of pregnancies in girls aged 15 to 19 years are unintended (Whitaker and Gilliam 2008). Prevention of pregnancies in adolescents is difficult because of high rate of non-use of contraceptives.

Girls from lower socioeconomic background (Vikat et al. 2002) and girls who dislike school (Bonell et al. 2003) are at greater risk of teenage pregnancy. Most problems related to adolescent pregnancy have a social or economic origin.

## **2.5 The use of contraception in adolescents**

Use of contraceptive methods is crucial in the prevention of negative reproductive health outcomes. Young females may not feel free to discuss contraceptive methods, while many young males do not like to do so because they believe contraception to be the responsibility of women (World Health Organization 2002-2003). Almost half of teenagers engage in genital touching before discussing contraception and symptoms of sexually transmitted diseases (Santelli et al. 2009). Problems in getting information about sexual health and obtaining contraception are often suggested as a cause of non-use or inconsistent use of contraception (Jones et al. 1985). These problems are; not knowing where and how to get contraceptives, too high costs of contraceptive services and feeling of embarrassment or shame in obtaining them ( World Health Organization 2002-2003). For unmarried adolescents, services are offered as part of child health care. For married people, services for adolescent girls are part of the reproductive care for adult women (Capaldi et al. 1996). The use of contraception at first coitus varies across Europe. The rates were the highest in Germany (76%) and France (72%), and the lowest in Russia, the Baltic States and the Czech Republic (29-40%) (Cibula 2008).

### **2.5.1 Condom**

Condom is the most common method used by teenagers, especially at the first intercourse. Although the first intercourse is still often unprotected, contraceptive practices improve later on during the sexual career. Condom use by young people in developed countries has increased substantially (Wellings et al. 2006). Condom use at last sexual intercourse among 15-year-olds in the HBSC survey, 2005/2006, ranged from 65% (Sweden) to 89% (Spain) (World Health Organization 2005/2006). Condom use increased significantly in adolescent population throughout 1991–2003, from 46% in 1991 to 63% in 2003 in the United States (Anderson et al.

2006). Condom use is a key means for preventing negative reproductive health outcomes. The use of condom should be encouraged to prevent transmission of sexually transmitted infections.

### **2.5.2 Combined hormonal contraception**

Combined hormonal contraception is an effective and reversible contraceptive method. It is available in oral contraceptive (OC) pills, progestin-only injectable contraception, hormonal intrauterine device, and in novel hormonal contraceptive methods including the vaginal ring and transdermal patch.

The use of contraception at first intercourse depends on age: the younger the age the less frequent is the use of any contraceptive methods. Contraceptive efficacy, frequency of use, convenience and side effects are primary concerns of women when choosing a contraceptive method (Lete et al. 2007). The adoption of contraception is a stepwise process from non-use through barrier methods to prescription methods. It is related to length and stability of the sexual relationship. A study showed that most of the girls who were unprotected at first intercourse started to use contraception within three months (Kosunen 1996).

In a study comparing the use of contraceptive methods in nationwide samples of sexually active girls, teenagers in the USA reported less use of contraceptive pills, injectables, implants, and intrauterine devices at most recent sex (42%) than did girls in Canada (64%), France (50%), and the UK (69%) (Darroch et al. 2001b).

### **Oral contraceptives**

In addition to condom, the most appropriate contraceptives for most young people are oral contraceptive (OC) pills. The oral contraceptive pill and condom are the most common methods used by teenagers. Oral contraception is an established and popular method of preventing pregnancies among adolescents in Europe (Cibula 2008, Gupta et al. 2008). But oral contraceptives are not widely used in some Western countries, despite easy availability, reversibility, good tolerance and safety profile (Krishnamoorthy et al. 2005).

The first combined OC pill included high doses of estrogen and progestin and was approved by the Food and Drug Administration (FDA) for use in the USA in 1960 (Practice Committee of the American Society for Reproductive Medicine 2004). In the 1970s low dose ethinyl estradiol progestin combined pills and progestin-only minipills were marketed. On the Finnish market OC pills were introduced in 1962, progestin-only pills in 1971, low-estrogen oral contraceptives in 1974 and tri-phasic OCs and a combination of ethinyl estradiol/desogestrel in 1981 (Kirkkola 2004).

Combined OCs act mainly by inhibiting ovulation. Progestagen-only pills (minipills) act mainly by altering cervical mucus to reduce sperm penetration and the endometrium to reduce implantation. The failure rate of the OCs is 0.3 per 100 women-years with ideal use, while failure rate with typical use, particularly for adolescents, is much higher (3 to 8/ 100 women years) (Kuortti and Kosunen 2009). Oral contraceptive pills need daily compliance. Approximately 25% of OC users miss two or more pills during a pill cycle, placing them at increased risk of pregnancy (Oakley et al. 1997, Woods et al. 2006).

### **Vaginal ring and transdermal patch**

Novel methods of hormonal contraception are the vaginal ring and transdermal patch (Scott and Glasier 2006). The new products were supposed to replace the use of pills among adolescents, because adolescents may show greater compliance with the novel methods (Ornstein and Fisher 2006). In contrast to oral contraceptive pills, they do not need daily compliance. Moreover, adverse effects are mostly local, and systemic side-effects are supposed to be less because of the lower levels of or less daily variation in the levels of circulating ethinyl estradiol (Devineni et al. 2007, van den Heuvel et al. 2005). The vaginal ring and transdermal patch have efficacy similar to that of oral contraceptive pills, but the vaginal ring has more local adverse effects (Lopez et al. 2008, Ornstein and Fisher 2006, Roumen 2007). The vaginal ring and the transdermal patch are preferred because of convenience, weekly or monthly use and low omission rate (Lete et al. 2007). Novel hormonal contraceptives are being slowly adopted in the family planning clinics.

A combined estrogen/progestin contraception vaginal ring was approved by the FDA for use in the USA in 2001. The vaginal ring consists of a flexible ring made of ethylene-vinyl acetate copolymer. It releases 15 µg ethinylestradiol and 120 µg etonogestrel daily. The ring is left in the vagina for 21 days per cycle followed by a ring-free week to follow regular menstrual bleeding. The ring became available in Finland in 2003. Adolescents have accepted the vaginal ring more readily. They are less worried about health risks and fewer report problems with weight or headaches (Stewart et al. 2007). Adolescents should use the ring as a routine contraceptive method.

The transdermal combined estrogen/progestin contraceptive patch (Ortho Evra) was approved by the FDA for use in the United States in 2002 (Practice Committee of the American Society for Reproductive Medicine 2004). The contraceptive patch is the only transdermal contraceptive available. In Finland it has been on the market since 2003. This formulation allows 20 µg ethinyl estradiol and 150 µg norelgestromin daily to penetrate directly through the skin and failure rate varies between 0.3% and 8% (Ornstein and Fisher 2006).

A study showed that women are more likely to use the patch correctly than OC (Gupta et al. 2008). The most common adverse effects of the transdermal patch are skin irritation and rash at the site of application (Gupta et al. 2008). Patch users also report a higher rate of breast symptoms after 3 months of use. About 18% of users report breakthrough bleeding in the first month of use, which declines after the second month. This side effect is not different from the side effect of OC use. Contraindications of the patch use are the same as those with other combined hormonal contraception (Gupta et al. 2008).

### **Progestin-only methods**

*Depot medroxyprogesterone acetate:* An intramuscular injection of 150 mg of depot medroxyprogesterone acetate (DMPA) was introduced in 1963 (Scott and Glasier 2006). It protects against pregnancy for at least three months (Scott and Glasier 2006). Depot medroxyprogesterone acetate was approved for use by the FDA in 1992. In Finland it has been used for contraception with three-month intervals since 1995 (Kirkkola 2004). The agent acts by inhibiting ovulation, thickening the cervical mucus and thinning the endometrium to prevent

implantation. It is extremely effective as a contraceptive method and only 0.3-3% of women experience pregnancy in the first year of use with perfect and typical use.

The discontinuation rate of depot medroxyprogesterone acetate due to adverse effects is extremely high, with 33% of adolescents choosing not to receive a second injection at 3 months, and of those continuing, 75% discontinuing by 12 months. The primary adverse effects are menstrual irregularities, weight gain, and reduction in bone mineral density. Weight gain is one of the most important reasons for discontinuing depot medroxyprogesterone acetate. It occurs in 54% of adolescents and is a reason for discontinuation in 41% of adolescents (Gupta et al. 2008).

*Hormonal intrauterine device (IUD):* The fourth generation IUD hormone-releasing devices was introduced in 1976 and the levonorgestrel-releasing IUD came onto the market in Finland in 1990 (Thiery 2000). This hormone-releasing IUD solved the menorrhagia problem which earlier IUDs had created. Lovonorgestrel causes atrophy in the endometrium and alters the cervical mucus (Scott and Glasier 2006). The fifth generation intrauterine implant is not available in Finland.

## **Emergency contraception**

Emergency contraception (EC) has been known and used for over three decades. EC is an effective method against an unwanted pregnancy. However, it is not a suitable substitute for a regular form of contraception among adolescents (Gold et al. 2004) and cannot protect against sexually transmitted disease. Emergency contraception is less effective than most other available methods for long-term contraception. In addition, continued use would result in exposure to higher levels of hormones than those of either combined or progestin-only oral contraceptives. Further, frequent use also would result in more side effects, including menstrual irregularities. Therefore, EC should not be used as long-term contraception (Bastianelli et al. 2005). In case of failure of a regular contraceptive method, an EC is used. EC is a good option in cases of rape, unplanned sexual intercourse, or condom rupture (Schor and Lopez 1990). Access to EC is important for adolescents, because teenagers have relatively high failure rates in regular contraceptive use due to “technical problems” (condom failure and irregular use of the pill) or having been drunk (Mawhinney and Dornan 2004, Virjo and Virtala 2003). In addition,

teenagers often have their first sexual intercourse without planning it in advance, and thus without using contraception (Darroch et al. 2001b, Lindberg 2003). EC is an important and effective contraceptive method against an unwanted pregnancy (Kosunen et al. 2002) and it can prevent 75-85% of unintended pregnancies if administered within 72 hours of intercourse.

The Yuzpe method of EC, including ethinylestradiol and levonorgestrel, has been available on doctor's prescription in many countries since the 1980s (Yuzpe and Lancee 1977). Another method is using levonorgestrel alone within 72 h after unprotected intercourse (Virjo and Virtala 2003). A large randomized control trial conducted by the WHO showed that a levonorgestrel regimen decreases pregnancy rate by 85% compared with the Yuzpe regimen rate of 57%. Levonorgestrel-only pills are better tolerated and are at least as effective as the Yuzpe regimen (Lancet 1998). In Finland levonorgestrel-only pills with 750 µg have been available on prescription since June 2000 (Kirkkola 2004) and without a prescription for teenagers aged 15 years or older since May 2002.

To be able to seek EC either from a doctor or directly from a pharmacy, adolescents need to be aware that there is a method for preventing pregnancy in the event of the slippage or breakage of a condom (Virjo et al. 1999). Awareness of EC in adolescent has varied a great deal, from 28% in the USA to 81% in the UK (Delbanco et al. 1998, Haggstrom-Nordin and Tyden 2001, Kosunen et al. 1999, Langille and Delaney 2000, Ottesen et al. 2002, Pearson et al. 1995, Walker et al. 2004). A few studies have also shown that even if adolescents were aware of EC, only a small proportion knew of the time limits within which EC is effective (Delbanco et al. 1998, Haggstrom-Nordin and Tyden 2001, Langille and Delaney 2000, Walker et al. 2004). In Finland, the first study on the awareness of EC in 1996 showed that over 90% of 14 to 16-year-old adolescents knew about the method (Kosunen et al. 1999). However, it is unknown what proportion of adolescents knows about the time limits. According to the Finnish Student Health Survey (Virjo and Virtala 2003), university students are well aware of the time within which EC pills need to be taken.

Comprehensive use of EC could reduce abortion rates and unplanned pregnancies (Glasier et al. 2004, Gold et al. 2004, Lindberg 2003). However, adolescents' lack of awareness about the availability of EC, appropriate use of EC and lack of access to prescriptions could be

important barriers to EC use (Kosunen et al. 1999, Larsson et al. 2004). In Finland, 6.6% of girls aged 14-17 years had used EC in 1996 (Kosunen et al. 1999). In 1997, one out of ten Finnish women aged under 25 reported having used EC (Kosunen et al. 1997b). In 2002, the Finnish Student Health Survey showed that only 1.6% of all female students aged 19 or older sought EC from the Finnish Student Health Service in one year (Virjo and Virtala 2003).

Easier access to EC by selling it over the counter has been discussed since the early 1990s (Haggstrom-Nordin and Tyden 2001). On February 14, 2001, more than 70 organizations, including the American Public Health Association, filed a Citizen's Petition with the Food and Drug Administration (FDA), requesting that EC be made available without prescription. EC is more effective the sooner it is used after unprotected intercourse (Marston et al. 2005, Sucato and Gold 2001). If the prescription requirement is dropped, there is no need to contact a physician, and women can begin to use the medication sooner. The levonorgestrel-only EC meet all the customary criteria for over-the-counter selling: low toxicity, no potential for overdose, no teratogenicity, no need for medical screening and intermediary, self-identification of the need, uniform dosage and no important drug interaction. In addition, the same dose is used for all age groups, so it is not necessary for a physician to determine the correct dose (Grimes 2002). The labeling instructions for EC products are used and by reading the label, most women understand how to use the product safely and effectively (Grimes 2002).

Many countries have accepted selling levonorgestrel-only EC over the counter. Women in the United Kingdom, Morocco, Norway, Sweden, Israel, France, Belgium, Denmark, Portugal, South Africa, Albania, and parts of Canada can obtain such products over the counter (Marston et al. 2005). Controversial findings regarding the over-the-counter effect on EC use have been reported so far. Some studies have found that allowing EC to be sold over the counter does not seem to have led to an increase in its use (Marston et al. 2005, Raine et al. 2005). On the other hand, others have shown an increase in EC use (Aiken et al. 2005, Soon et al. 2005). Young women using EC in advance are more likely to use it without compromising their routine use of contraception or increasing their sexual risk behavior (Harper et al. 2005, Larssona et al. 2004).



## **2.6 Characteristics of contraceptive users**

The knowledge of contraceptive methods is influenced by age, school background and partner. Male and female adolescents from two-parent families initiate sexual intercourse later than teens from other types of families, and are more likely to use contraception (Hogan et al. 2000, Lammers et al. 2000, Manlove et al. 2000, Manlove et al. 2009). Higher parental education is associated with a later initiation of first sexual intercourse, greater contraceptive use at first sex, and a lower risk of pregnancy (Hogan et al. 2000, Manlove et al. 2000, Manlove et al. 2009). Low self-esteem is also associated with inconsistent use of contraception in girls (Miller et al. 2000). Casual sexual partners (versus romantic or steady partners) are associated with reduced contraceptive use (Ford et al. 2001, Manning et al. 2000). Communication between parent and child about contraception and sexual issues increases the use of contraception among young men, but not among young women (Stone and Ingham 2002, Wight et al. 2006).

Limited information is available so far on the characteristics of EC awareness and use. The influence of education, family and life-style factors has been emphasized in EC awareness and use (Ottesen et al. 2002, Walker et al. 2005). EC awareness is positively associated with teens' scholastic curriculum and the level of their father's education (Ottesen et al. 2002). Girls with higher education are more aware of EC than those with mandatory school only.

## **2.7 Adolescent sexual health in Finland**

### **2.7.1 Sexual behavior**

The first Finnish national survey of adolescent sexual behavior was carried out in 1968. In 1971 the proportion of those who had experienced their first sexual intercourse by age 15 was 6% for boys and 4% for girls. In 1982, one study was carried out in the Finnish city of Jyväskylä and its rural surroundings. It showed that 7% of boys and 13% of girls had had their coital début by the age of 15 (Kosunen 1996). The series of KISS studies was launched in 1986, collecting samples from different parts of the country: the Helsinki area and rural areas in southern as well as Western Finland (Kosunen 1996). The first KISS study in 1986 indicated that 25% of girls and 21% of boys in the 9<sup>th</sup> grade had experienced sexual intercourse. In 1988 the proportion of

adolescent aged 15-16 who had experienced their first sexual intercourse was 31% in boys and 30% in girls. In 1992 the proportion was 19% in boys and 31% in girls (Kosunen 1996).

The second nationally representative study, Health Behaviour in School Aged Children, was carried out in 1990 using data collection techniques almost identical to those on the KISS project. These two studies reported the proportion of 9<sup>th</sup> graders (aged 15-16 years) who had experienced sexual intercourse (Kosunen 1996). The Health Behaviour in School Aged Children study in 1990 suggested that there is no important regional variation in the age at first intercourse. As far as females are concerned, the results were consistent with the findings of the KISS studies in the metropolitan area, as well as in rural areas in Western Finland. In the KISS study of 1992, 41% of sexually experienced girls at age 15 had had sexual intercourse at least 10 times. One fifth had had at least one sexual intercourse a week, half had engaged in intercourse at least once in the previous month. The initiation of an active sex life was related to socioeconomic background and educational level. Approximately two thirds of the girls had had only one or two partners (Kosunen 1996). Girls from lower middle class or working class families (27-32%) had experienced intercourse at age 15 more frequently than girls from upper middle class families (19%) and girls from agrarian families (16%). Coital experiences were less frequent among girls aiming at higher education than among girls intending to go work straight from school or after a few years of vocational training.

Finnish teenagers' sexual behavior did not change between the mid-1980s and the mid-1990s (Kosunen 2000). In the latter half of the 1990s, adolescents' sexual activity increased from 29% to 32% in girls and from 24% to 27% in boys aged 14-16 (Kosunen 2004).

### **2.7.2 Abortion rate**

Among the sub-regions of the world, Western Europe has the lowest abortion rate (Sedgh et al. 2007). Generally, the teenage abortion rate decreased in the Nordic countries from the 1980s to the mid-1990s, except for a steep increase in Iceland (Knudsen et al. 2003).

In Finland teenage pregnancy and abortion rates declined from the 1980s to the mid-1990s in Finland (Gissler 2004, Knudsen et al. 2003, Kosunen et al. 2002). The pregnancy rate

was 49 per 1,000 in girls aged 15-19 in 1975 and 20 in 1993 (Kosunen 1996). In girls aged 15-19 years the rate of induced abortion decreased sharply between 1991 and 1994. In 1994, the abortion rate among 15 to 19-year-olds was remarkably lower in Finland than in other Nordic countries, but thereafter it increased (Gissler 2004, Kosunen et al. 2002). Induced abortions started to increase first among older teenagers and then gradually spread to young population in the mid-1990s, after a long and steady decline, and increased steadily between 1995 and 2000 (Miettinen 2000). The rise was most prominent in girls aged 15 to 17 years, being 66% between the years 1995 and 2000 (Koskinen et al. 2006, Kosunen et al. 2002). Since 2001 the abortion rate has decreased slowly. Currently, the abortion rates are around 15 per 1,000 in girls aged 15-19 in Finland, Norway and Denmark, but 24 in Sweden (STAKES 2007). Teenage pregnancy and abortion rates in Finland are low among European countries (Avery and Lazdane 2008).

There are several mechanisms that could explain the increase in teenage abortion rates in Finland. First, the number or proportion of teenagers engaging in sexual intercourse may have increased. Reports from some other Western countries show that the proportion of teens engaging in coital activity increased in the 1990s (Agius et al. 2006, Bredablik and Meland 2004). Moreover, studies from several countries report a shift towards an earlier age of sexual debut (Ross and Wyatt 2000, Ross et al. 2004, Santelli et al. 2000), thus increasing the number of population at risk. Early age at first sexual intercourse as such is considered a risk factor for poor sexual health, here often referred to as age less than 16 years. Early initiation of coital activity is also connected to other forms of sexual risk-taking behavior like having sex without protection (Takakura et al. 2007) or with multiple partners (O'Donnell et al. 2001).

Second, the number of teens who starting their sex life may not have increased, but they may have had more frequent intercourse or their sexual behavior may have shifted in a more risky direction; having multiple sex partners or not using effective contraception. Studies have shown an increase in the 1990s in the proportion of teenagers having three or more sex partners (Agius et al. 2006) or not using contraception (Kangas et al. 2004a, Ross and Wyatt 2000, Ross et al. 2004). In Finland, it is also possible that difficulties in obtaining contraception because of cuts in adolescent health services and deterioration in sex education at school in the late 1990s may have affected teenage abortion rates.

### **2.7.3 Sex education**

Close cooperation between education, health services and socio-behavioral activities are necessary to recognize the interventions for adolescents.

In 1972 the Finnish Ministry of Education set up a sex education program in comprehensive schools. Sex education was integrated into the Finnish national curriculum. The National Board of Health issued guidelines on human relations and sexual education in 1980 and new guidelines on contraceptive counseling in 1982 (Kirkkola 2004). Family planning services were developed and put into practice in the 1980s (Rimpelä et al. 1996). Contraceptive counseling has been conducted in family planning clinics. Since the mid-1990s, local authorities have had the right to decide more freely on their school curricula and schools alone have the responsibility for deciding whether sex education and contraceptive counseling should be included in their curricula (Kirkkola 2004). As health education was not at that time a compulsory subject, this reform resulted in variation in the quality and quantity of sex education in the schools (Liinamo 2005). A study among 8<sup>th</sup> and 9<sup>th</sup> graders showed that the amount of sex education was lower in 1996-1997 than ten years before, and contraceptive counseling given by school nurses and physicians had been reduced (Kirkkola 2004). These reforms could have contributed to the reduction in OC use. Nonetheless, the earlier positive trends in adolescent abortion and chlamydia trachomatis infection rates have reversed since the mid-1990s (Hiltunen-Back et al. 2003, National Public Health Institute 2007), and this raises the question whether service provision is adequate.

The Finnish Ministry of Social Affairs and Health organized a national action program for the promotion of sexual and reproductive health in 2007-2011. The final target is young people. The main principles of the program are sexual health counseling, raising the population's awareness of sexual and reproductive health, access to contraceptive services and prevention of sexually transmitted diseases.

#### **2.7.4 Family planning**

Health services are offered equally to all residents in Finland. The Primary Health Care Act of 1972 created a network of primary health care centers all over Finland. The main aim of the reform was to guarantee equal access to health services regardless of the place of residence and socioeconomic status (Kosunen et al. 1995, Rimpelä et al. 1996). The Act ensured that basic preventive services, including family planning were provided. Ninety percent of municipal health centers had started family counseling by 1976 (Kirkkola 2004). Visits to a municipal family planning clinic and the school health service, and the first method of contraception, e.g. oral contraceptive pills for the first few months, were free of charge. The Abortion Act was amended in 1979. The time limit for pregnancy termination was changed from 16 gestation weeks to 12 in cases involving social reasons. Adolescents used sexual health services from the school health service or from family planning clinics. School health services guaranteed easy access to contraceptive counselling (Kosunen 1996). Adolescent reproductive health improved in Finland during the 1980s and 1990s.

Finland has become one of the leading countries in providing high quality sexual health services and education (Virtala 2007). Family planning services are available in municipal health centers, in school and student health care services, maternity and family planning clinics, and from private medical practitioners. According to a review of social welfare and health care services in 2005, the number of visits to municipal school and student health care services was a little under 2 million in 2002 (Virtala 2007). The annual number of family planning consultations is not recorded in public health or private clinics.

The Primary Health Care Act is still in force and the municipalities have the same responsibilities to take care e.g. of the arrangement of family planning services. A population-based responsibilities system was tried out in certain areas of the country at the end of the 1980s (Kirkkola 2004). According to the national plan all municipalities have required a primary health care population-based responsibilities system by the end of 1996. Population-based responsibilities for primary health care increased access to care at health centres (Guidelines on health care in Finland 1999). The law on state financing was amended in 1993. The main objectives of the reform were to promote municipal autonomy, economy and efficiency. The

reform enabled the municipalities to organize their social welfare and health services as they saw fit (Finnish Ministry of Social Affairs and Health 1996). At the beginning of the 1990s, a healthcare reform from a centralized state governed health care to a decentralised municipality governed health care system shifted power in planning and funding to municipalities. Because of the economic recession at that time, several municipalities decided to reduce preventive services including family planning and school health services, thus causing regional inequality in service accessibility and quality.

In 1995 a survey was carried out on the municipal service structure. It showed that 27% of the municipalities arranged contraceptive counseling. Attitudes to cutting and increasing fees in health care in different Finnish population groups were studied in 1995. Respondents in all groups wanted to cut expenditure on family planning (Kirkkola 2004).

Family planning counseling has faced new challenges on since the mid-1990s. An increase in the incidence of chlamydia infection was reported in population aged under 20 (37% in girls and 69% in boys between 1995 and 2000) (Hiltunen-Back et al. 2003). While the incidence of chlamydia, human papilloma virus and herpes increased, the number of syphilis and gonorrhoea cases declined (Kirkkola 2004). There seems, however, to be a turning point around 2002.

### **2.7.5 Hormonal contraception**

Knowledge of contraceptive methods is generally good among Finnish adolescents (Kosunen et al. 1997b). Only three contraceptives are recommended to adolescents in Finland. Condoms (with emergency contraception in case of failure) are recommended if coital experiences are infrequent and casual, and oral contraceptives (alone or combined with condoms) are recommended if sex life is on a regular basis.

The first guidelines allowing the prescription of OC for young Finnish teenagers were published in 1979. A small proportion of OC users appeared among girls aged 14 (peaking at 2% in 1991), while among those aged 16 OC use almost tripled from 7% in 1981 to 19% in 1989. In

1993, 17% of girls aged 16 used OC (Kosunen 1996). The proportion of adolescents whose sexual activity is on a regular basis reflects the need for OC.

Novel combined hormonal contraceptives, the contraceptive vaginal ring and transdermal patch were introduced to Finnish markets in 2003. There is no estimate of the use of the vaginal ring and the transdermal patch in a representative sample of adolescent population. The Finnish primary health care system has been slow in adopting the latest medical eligibility criteria and new prescription practices (Sannisto and Kosunen 2009).

In Finland, emergency contraceptive pills were available on prescription from 1997/98, and over the counter from 2002 onwards for people at least 15 years old. Prescriptions for EC were easily obtained from family planning clinics, school and student health care and health centres (Kosunen et al. 1999). A doctor's prescription for EC was easily available, because local primary health care centres were obliged to offer family planning services within their own district (Virjo et al. 1999). The possibility of selling EC without a doctor's prescription has been discussed since the early 1990s, because making EC available over the counter may be an important measure towards better accessibility and thus towards effective use (Haggstrom-Nordin and Tyden 2001). In May 2002, the levonorgestrel-only method became available from pharmacies without a prescription for people aged over 15. Changing from prescription to non-prescription status was widely discussed in the media.

### **3 AIMS OF THE STUDY**

The overall aim of this study was to investigate changes in sexual behavior and use of hormonal contraceptives among Finnish adolescents. The specific objectives of the study were as follows:

- Trends of non-coital and coital experience and sexual risk-taking behavior in the period 1996-2007 (Paper 1).
- Trends in oral contraceptive use and the characteristics of users during years 1981-2003 (Paper 2).
- The use of vaginal ring and transdermal patch in 2007 (Paper 3).
- The use and awareness of emergency contraception (EC) and characteristics of EC users and the effect of non-prescription status on EC use (Paper 4).



# 4 MATERIALS AND METHODS

## 4.1 School Health Promotion Study

The School Health Promotion Study is an anonymous classroom survey among adolescents attending the 8<sup>th</sup> and 9<sup>th</sup> grades of comprehensive school. The survey deals with health, health behavior, and school experiences. The study has been carried out annually since 1996, every second year in Eastern Finland and every second year in Western Finland. The response rates have been high, around 90%. Less than one percent of the returned questionnaires have been rejected due to poor data quality. Pupils absent on the survey day are not contacted. Usually, around 10-15% of pupils have been absent from school during the data collection days.

Pupils have anonymously completed a structured questionnaire during one ordinary school lesson under the supervision of their own teachers. Sexual experiences have been elicited by asking if the respondent had ever experienced kissing on the mouth, light petting (fondling on top of clothes), heavy petting (fondling under clothes or naked), and sexual intercourse. The response alternatives for each item have been “yes” or “no”.

Adolescents who had experienced sexual intercourse have been asked to provide more data on their sexual behavior. Firstly, the number of intercourse experiences has been elicited by the question, “How many times have you had intercourse?” The alternative responses have been 1) Once; 2) 2-4 times; 3) 5-9 times; and 4) 10 times or more. Secondly, the number of sexual partners has been elicited by asking: “With how many different partners have you had intercourse?” 1) One; 2) two; 3) 3-4 times; 4) 5 times or more.

Among sexually active adolescents, the use of contraception has been evaluated by asking what kind of contraception they had used in the most recent intercourse. The alternative responses have been 1) nothing; 2) condom; 3) oral contraceptives; 4) condom and oral contraceptives; 5) other methods (please describe). The responses in the category “other methods” virtually include methods of natural family planning (withdrawal, calendar method). We defined non-use of contraception as using no contraceptives or using natural family planning.

The material of the present study comprises responses to the School Health Promotion Study in 1996-2007 among adolescents in grades 8 or 9. The total number of participants was 296,453. Of those 9,788 subjects with missing information on sexual activity were excluded, and 286,665 (143,843 boys and 142,822 girls) were included in the analysis.

## **4.2 Adolescent Health and Lifestyle Survey**

*Population:* Data on the use of hormonal contraception was drawn from the Adolescent Health and Lifestyle Survey, which was launched in order to monitor the health habits and attitudes of young people in Finland. The sample has been drawn from the Central Population Register. This study has been a nationwide biennial cross-sectional mailed survey with samples representing those aged 12, 14, 16 or 18 years (Kosunen et al. 1995). The study samples have been based on dates of birth, so that all Finns born on the sample days have been included. The annual number of girl respondents has varied between 1,200 and 4,100. The 12-year-olds were excluded from the analysis of contraceptive use because they rarely have used contraception. Self-administered 12-page (around 90-100 questions) questionnaires have been mailed in February every second year with two or three reminders to non-responders. Questions on dating, OC and EC use have been included, but sexual experiences have not been elicited. The Adolescent Health and Lifestyle Surveys have been conducted since 1977, while the use of oral contraceptives has been investigated from 1981 onwards and awareness and use of EC since 1999. To ensure comparability of the study in each year, the questionnaires have been kept as unchanged as possible from one year to the next year. The question of OC use has been repeated in similar form in each study. The most recent survey was carried out in February 2009.

*Use of hormonal contraception:* The use of hormonal contraceptives has been investigated with the questionnaire. Two questions have been asked regarding oral contraceptives and emergency contraceptives. The third and fourth questions on the use of hormonal ring and patch were included in the 2007 survey. The questions on the use of hormonal contraceptives have been:

- 1) "Are you currently using oral contraceptives?"
- 2) "Are you currently using the vaginal ring?"

3) “Are you currently using the transdermal patch?”

The response alternatives have been “No” and “Yes” for each.

4) “Have you ever used an emergency contraceptive?” with response alternatives “I do not know what emergency contraception is”, “No, I have not used it”, “Yes, how many times altogether\_\_\_\_\_”.

*Individual factors:* Educational career for girls was classified as: not in school, vocational school or upper secondary school. School achievement based on pupil's own assessment of his or her position in class according to the latest school report was categorized: much better and slightly better (than average), average and poorer (than average). Age at menarche was categorized in three groups; early (11 years or under), average (12 to 13 years), and late (14 years or older). Daily smoking was defined as smoking cigarettes every day. Information on the frequency of alcohol consumption has been elicited by a question: How often do you drink alcohol? The answers were classified: 1) never 2) less than monthly 3) monthly and 4) weekly. Dating was a dichotomized variable.

*Family factors:* Father’s or Mother’s education was grouped into three levels: low, middle, or high. Family structure were formed with two variables: living with parents (with mother and father, other family type) for all survey years, and family structure (living with both parents, own parent and stepparent, with one parent, with his/her partner) for 1989-2003. Father's occupation was grouped into four social classes: upper white collar, lower white collar, farmer or forestry, and blue collar.

*Factors describing the place of residence:* 11 provinces according to the official division of provinces in Finland until 2003 were divided into four geographical regions: Southern, Northern, Eastern and Western. The urbanization level of the place of residence is defined by: metropolitan area (the capital Helsinki and the adjoining towns), larger towns (population over 50,000), smaller towns and other settlements (including densely populated areas in rural municipalities), and sparsely populated rural areas (isolated homesteads in rural municipalities).

### **4.3 Ethical considerations**

Among the aspects of the approach to adolescents, confidentiality has been distinguished as one of the most important strategies, mainly when the topic is associated with questions related to sexuality (Kuortti and Kosunen 2009). The Adolescent Health and Lifestyle Survey and the School Health Promotion Study were approved by the local ethics committees.

### **4.4 Statistical analyses**

A statistical significance (two-tailed  $P$  value  $<0.05$ ) was assessed by chi-squared test. Logistic regression models were used to assess the associations of individual and family factors and place of residence with the use of oral contraceptives, the vaginal ring and emergency contraception. Confidence intervals for the proportions and odds ratios were estimated. Data were analyzed using SPSS and STATA softwares.

## 5 RESULTS

### 5.1 Non-coital sexual experiences

Light petting (fondling on top of clothes), and heavy petting (fondling under clothes or naked) increased between 1996/1997 and 2000/2001 and decreased between 2000/2001 and 2006/2007 in both boys and girls (Table 1). Kissing on the mouth increased between 2000/2001 and 2006/2007 only in boys.

**Table 1:** Gender-specific proportion (%) of adolescents with non-coital sexual experiences by survey year among total population, School Health Promotion Study.

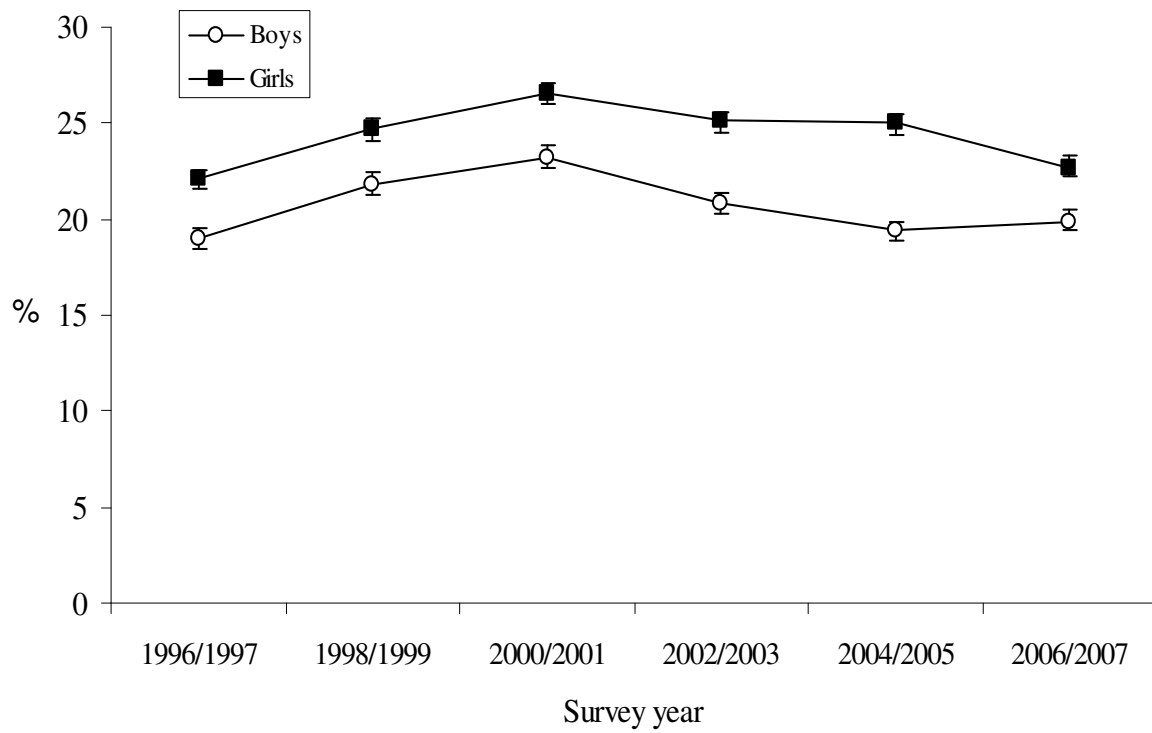
Gender	1996/1997	1998/1999	2000/2001	2002/2003	2004/2005	2006/2007
Kissing on mouth						
Boys	63.4	64.6	65.3	64.4	63.8	62.3
Girls	70.5	70.5	70.8	67.8	67.3	66.1
Light petting						
Boys	54.9	56.2	57.7	56.2	55.0	52.5
Girls	58.3	59.2	59.8	55.4	53.7	50.9
Heavy petting						
Boys	34.5	36.7	38.8	34.6	32.7	32.2
Girls	39.6	41.5	43.5	40.0	38.5	35.5

N=286,665

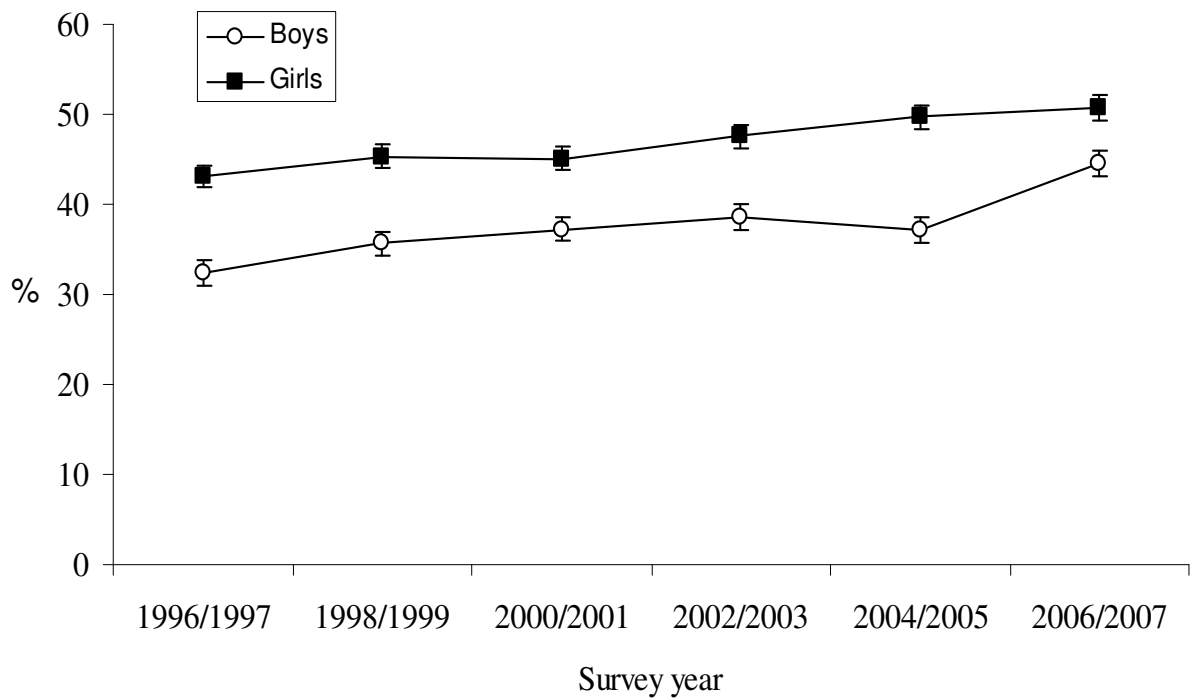
### 5.2 Sexual intercourse

In both boys and girls aged 14-16 (grades 8-9), the percentage of those who had had sexual intercourse increased in the period 1996-2001 (Figure 1), while declining thereafter, with some exceptions. This proportion slightly increased in 2006/2007 among boys and showed no changes in the period 2002/2003-2004/2005 among girls.

The proportion of both boys and girls reporting sexual intercourse 10 times or more increased over time ( $p$  for trend  $<0.001$ , both). Among sexually active adolescents, the proportion of boys and girls reporting sexual intercourse 10 times or more increased from 1996 to 2007, except in 2004/2005 in boys (Figure 2).



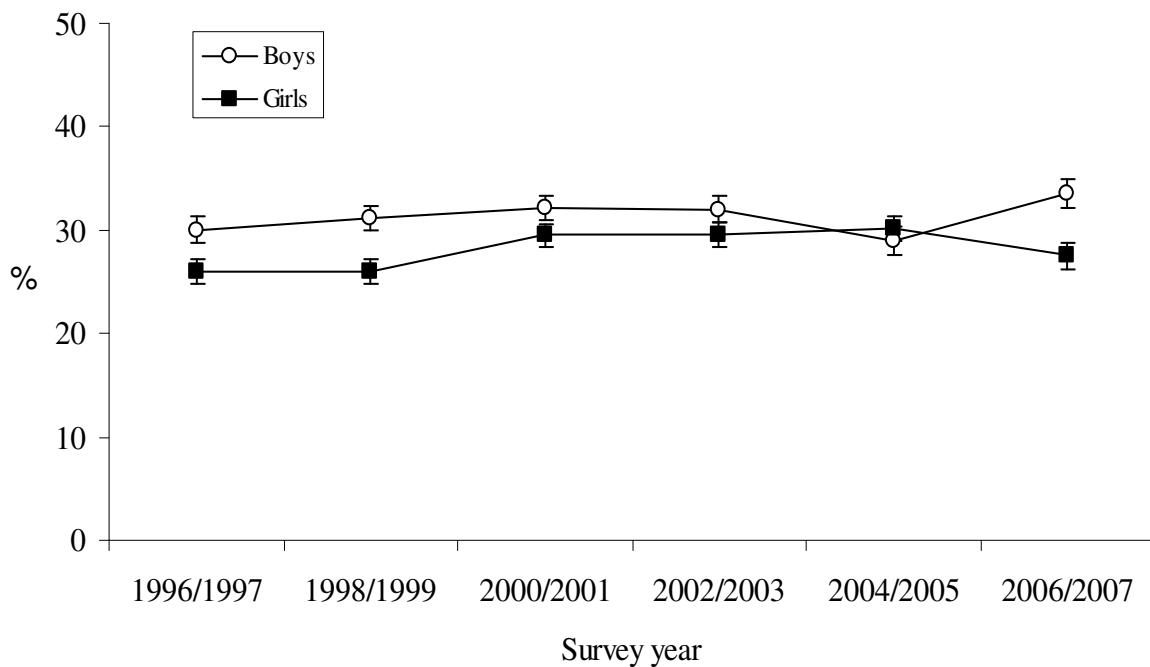
**Figure 1.** Gender-specific proportion and 95% confidence intervals of ever having sexual intercourse by survey year, School Health Promotion Study.



**Figure 2.** Gender-specific proportion and 95% confidence intervals of having sexual intercourse 10 times or more by survey year among sexually active adolescents (N = 64,521), School Health Promotion Study.

### 5.3 Number of sex partners

The proportion of those with 3 or more sex partners increased between 1996/1997 and 2000/2001 in boys ( $p$  for trend = 0.01) and between 1996/1997 and 2004/2005 in girls ( $p$  for trend <0.001) (Figure 3).

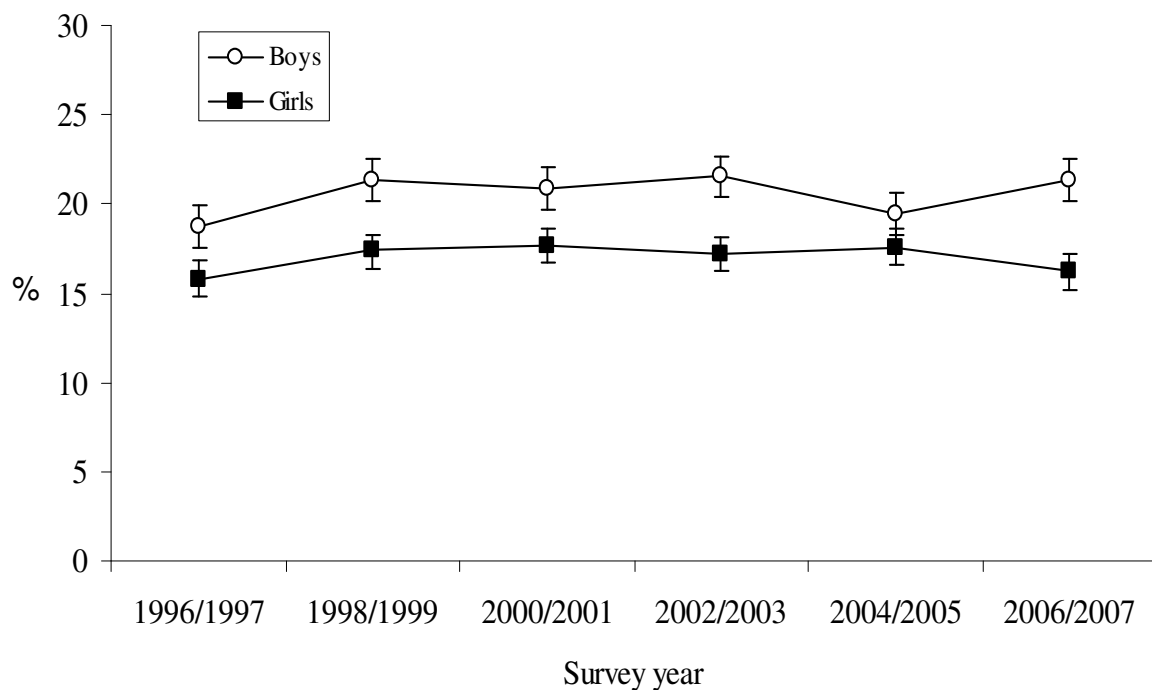


**Figure 3.** Gender-specific proportion and 95% confidence intervals of adolescents with multiple partners (3 or more) by survey year among sexually active adolescents (N = 64,521), School Health Promotion Study.



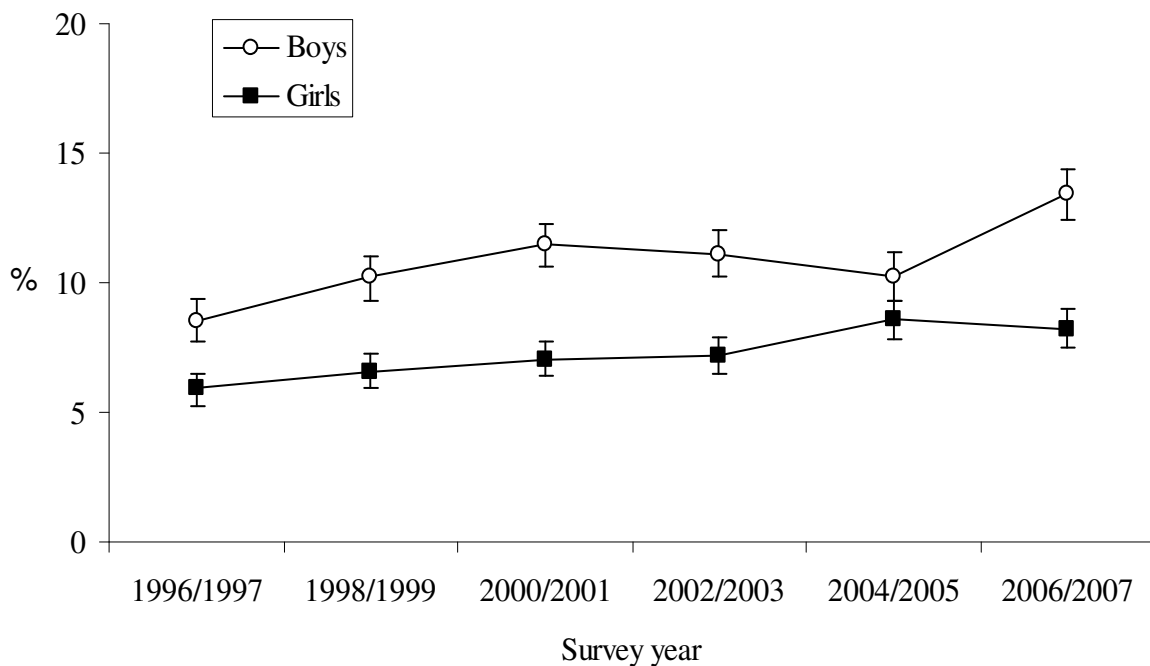
## 5.4 Non-use of contraception among sexually active adolescents

Overall, 21% of the boys and 17% of the girls did not use contraception at most recent intercourse. The proportion of teenagers using no contraceptive methods increased in the period 1996-2003 in boys ( $p$  for trend = 0.003) and in the period 1996-2005 in girls ( $p$  for trend = 0.03) (Figure 4). In gender- and grade-specific analyses the trend was significant only among 9th graders of both genders.

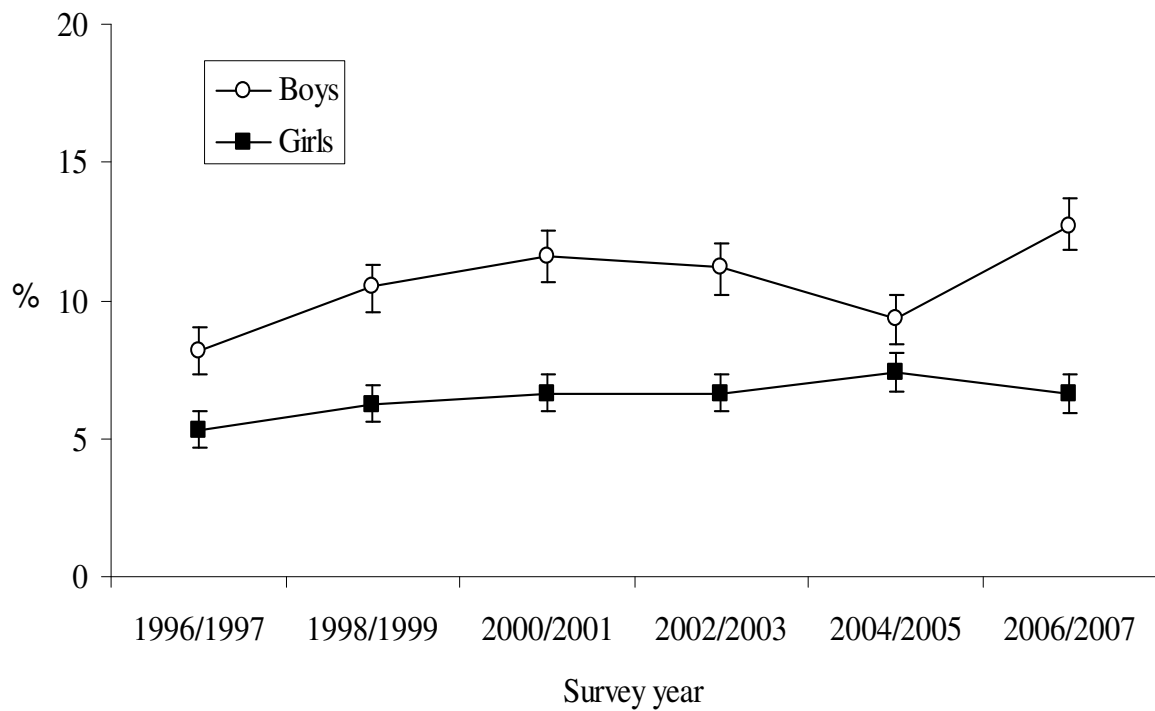


**Figure 4.** Non-use of contraception at most recent intercourse by sex and survey year among sexually active adolescents (N = 64,521), School Health Promotion Study.

The proportion of those having a combination of sexual intercourse  $\geq 10$  times and not using contraception at most recent intercourse (Figure 5), and having a combination of multiple sex partners and not using contraception (Figure 6) increased between 1996 and 2001 in boys and between 1996 and 2005 in girls ( $p$  for trend  $< 0.001$ , all). In boys the proportion of those reporting a combination of sexual intercourse  $\geq 10$  times and non-use of contraception, or having a combination of multiple partners and not using contraception increased again in 2006/2007 after a decline for a few years.



**Figure 5.** Gender-specific proportion and 95% confidence intervals of teenagers with  $\geq 10$  times lifetime sexual intercourse and non-use of contraception among sexually active adolescents ( $N = 64,521$ ), School Health Promotion Study.



**Figure 6.** Gender-specific proportion and 95% confidence intervals of teenagers with multiple partners and non-use of contraception by survey year among sexually active adolescents (N = 64,521), School Health Promotion Study.

## **5.5 Use of oral contraceptive pills**

The proportion of oral contraceptive users almost doubled in 1989 compared with 1981, from 9.5% to 20.2%, while no changes were observed between 1989 and 2007. The test for linear trend of oral contraceptive use was statistically significant ( $P \leq 0.001$ ). The rising trend leveled off after 1989 and the proportion of users settled down at around 18-19%. The proportion of adolescents aged 16 years taking oral contraceptives increased from 6.6% in 1981 to 16.7% in 1993 and to 20.8% in 2003. The corresponding figures for adolescents aged 18 years were 22.0%, 38.2%, and 40.1%. The trends were also significant among adolescents aged 14, 16, and 18 years ( $P \leq 0.001$ , all).

In 2007, 20% of girls aged 14-18 used oral contraceptive pills. Of girls aged 16 years 17.2% and of those aged 18 years 43.2% used oral contraceptives.

## **5.6 Characteristics of oral contraceptive users**

Use of oral contraceptives was more frequently reported among older teenagers and girls with lower age at menarche (Table 2). Moreover, adolescents living with father and mother used OC (16.3%) less often than those living with mother and stepfather (24.5%), father and stepmother (23.5%) or only one-parent (22.3%).

Girls whose mothers or fathers had low educational status used OC more frequently than those with highly educated fathers or mothers. OC use was more common in teenagers whose fathers had lower occupational status than those whose fathers had higher occupational status. Student grade was associated with OC use. The proportion of OC users was higher in adolescents with poorer grades compared with those with better grade than class average.

The use of OC significantly increased in all regions over time. There was no significant difference in the use of OC between regions. Furthermore, OC use was not associated with level of urbanization.

**Table 2:** Characteristics of oral contraceptive users, Adolescent Health and Lifestyle Survey.

Background characteristic	Population	Users	%	Age-and year-adjusted		Mutually adjusted	
				OR	95% CI	OR	95% CI
<b><i>Individual factors</i></b>							
Age							
14	12232	221	1.8	1		1	
16	12329	1990	16.1	10.0	9.2-12.2	12.1	8.9-16.4
18	11378	4250	37.4	32.0	29.4-38.8	40.1	29.1-55.2
School attendance							
No	11859	375	3.2	1		1	
Yes	21034	5132	24.4	0.9	0.8-1.0	0.9	0.6-1.1
Student grade *							
Much better	4916	588	12.0	1		1	
Slightly better	10373	1601	15.4	1.2	1.1-1.4	1.2	1.0-1.5
Average	14004	2683	19.2	1.5	1.3-1.7	1.4	1.2-1.7
Poor	3732	696	18.7	1.8	1.6-2.1	1.7	1.4-2.1
Age at menarche							
Early	3689	854	23.2	1		1	
Average	16133	2886	17.9	0.7	0.6-0.8	0.6	0.5-0.7
Late	5349	657	12.3	0.4	0.3-0.5	0.4	0.3-0.5
<b><i>Family factors</i></b>							
Living with parents							
Living with mother and father	26817	4123	15.4	1		1	
Other family type	8817	2261	25.6	1.8	1.7-1.9	1.6	1.1-2.5
Family structure							
Mother-father	20376	3315	16.3	1		1	
Mother-stepfather	1945	477	24.5	1.9	1.7-2.2	1.0	0.6-1.6
Father-stepmother	315	74	23.5	1.7	1.2-2.1	-	-
One-parent	3815	850	22.3	1.5	1.4-1.7	0.9	0.5-1.3
Husband/wife	732	441	60.3	3.0	2.6-3.6	3.4	2.0-5.6
Other guardian	174	48	27.6	1.3	0.9-2.0	0.7	0.3-1.4
Father 's occupation							
Upper white collar	6788	1061	15.6	1		1	
Lower white collar	8540	1630	19.1	1.4	1.2-1.5	1.2	1.0-1.4
Farmer or forestry	2400	361	15.0	0.9	0.8-1.1	1.0	0.7-1.2
Blue collar	11852	2343	19.8	1.4	1.3-1.6	1.3	1.2-1.6
Father's education							
Low	22821	4392	19.3	1		1	
Middle	6071	992	16.3	0.8	0.7-0.9	0.8	0.7-0.9
High	5316	757	14.2	0.7	0.6-0.8	0.7	0.6-0.8

Mother's education							
Low	7142	1569	22.0	1			
Middle	2483	449	18.1	0.9	0.7-1.0		
High	4506	697	15.5	0.7	0.6-0.8		
<b><i>Place of residence</i></b>							
Urbanization level							
Capital city area	3384	585	17.3	1		1	
Other cities	10646	1974	18.5	1.1	0.9-1.2	1.1	0.9-1.4
Rural village	7770	1390	17.9	1.1	0.9-1.2	1.1	0.9-1.4
Sparsely populated area	3367	448	13.3	0.7	0.6-0.9	1.0	0.8-1.3
Region							
Southern	12868	2363	18.4	1		1	
Northern	5544	976	17.6	0.9	0.8-1.0	0.9	0.8-1.1
Eastern	4587	728	15.9	0.8	0.7-0.9	0.8	0.6-0.9
Western	12937	2394	18.5	1.0	0.9-1.1	1.0	0.8-1.1

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\* Compared with class average

## 5.7 Use of novel hormonal contraception

Only 1% of girls aged 14-18 used the vaginal ring or transdermal patch in 2007. Use of the vaginal ring increased with age (Table 3). The proportion was 0.1% in girls aged 14 years, 0.5% in those aged 16 and 2.5% in girls aged 18. Use of vaginal ring or transdermal patch was higher in towns (1.2%) than the metropolitan area (0.5%) or rural villages or sparsely populated areas (0.9%); however, the difference was not statistically significant.

**Table 3:** Proportion of teenagers using hormonal contraception in 2007, Adolescent Health and Lifestyle Survey.

Contraception	N	14 yrs n=1105	16 yrs n=998	18 yrs n=909	All N=3012
Oral contraceptives	3009	3.4	17.2	43.2	19.9
Emergency contraception	3012	1.6	14.9	31.5	15.0
Vaginal ring	2984	0.1	0.5	2.5	0.9
Transdermal patch	2960	0.1	0.1	0.2	0.1

## 5.8 Characteristics of vaginal ring users

Use of vaginal ring was reported more frequently among older teenagers, girls living in non-nuclear families, smokers, and alcohol drinkers (Table 4). It was also higher in those with poorer grades compared with those with better grade than class average.

**Table 4:** Age-adjusted odds ratio (OR) of vaginal ring use by background characteristics in teenagers aged 16 or 18, Adolescent Health and Lifestyle Survey, 2007

Characteristic	OR	95% CI
Age (years)		
16	1	
18	5.0	1.9-13.2
Family structure		
Both parents	1	
One parent and one stepparent	3.3	1.1-9.4
Only one parent	0.5	0.1-3.8
Husband and wife	9.5	3.7-24.5
Other guardian	-	-
School achievement		
Better than average	1	
Average	2.2	0.8-5.4
Poorer than average	2.0	0.5-8.0
Father's education		
Low	1	
Middle	0.8	0.3-2.1
High	0.4	0.1-1.3
Mother's education		
Low	1	
Middle	0.6	0.2-2.0
High	0.6	0.2-1.9
Dating		
No	1	
Yes	5.2	1.9-13.9
Smoking		
Never	1	
Seldom	2.6	0.7-9.2
Daily	3.8	1.0-13.7
Alcohol intake		
None or seldom	1	
Monthly	1.0	0.3-2.8
Weekly	2.0	0.7-5.4



## 5.9 Awareness and use of emergency contraception

The awareness of emergency contraception increased with age and over time (Table 5). Awareness of EC was 99.8% in 2007.

In 2007, 15% of adolescents used EC. Of girls using emergency contraception, 8.3% used it once, 4.7% twice and 1.8% three times or more (Table 6). EC use did not change with non-prescription status between 1999 and 2007. The use of EC two or more times slightly increased in 2007.

**Table 5:** Awareness of emergency contraception according to age and year of survey, Adolescent Health and Lifestyle Survey.

Characteristic	Study sample	Awareness	
		N	%
<b>Year</b>			
1999	4326	4005	92.6
2001	3908	3676	94.1
2003	3679	3464	94.2
2007	3003	2999	99.8
<b>Age (1999-2003)</b>			
12	1164	723	62.1
14	3966	3723	93.9
16	3732	3684	98.7
18	3051	3015	98.8
<b>Overall</b>	<b>11913</b>	<b>11145</b>	<b>93.6</b>

**Table 6:** The frequency (%) of emergency contraception use according to year of survey in girls aged 14 to 18 years, Adolescent Health and Lifestyle Survey, 1999-2007.

EC use	Prescription status for EC		Non-prescription status for EC		Population
	1999	2001	2003	2007	
Unaware	4	3	2	0.2	331
Not used	83	85	85	85	11580
Once	9	9	9	8.3	1230
Twice	3	2	3	4.7	456
Three times or more	1	1	1	1.8	155

## 5.8 Characteristics of emergency contraceptive awareness and use

Awareness of EC was higher among smokers and those who had dating. It significantly increased with increments in the level of alcohol consumption. No interaction was found between age and survey year for EC awareness. Girls living in the metropolitan area were less aware of EC than girls who living in provincial towns, rural villages or sparsely populated areas.

Use of EC was higher in smokers and in those who reported drinking alcohol than in non-smokers or non-drinkers (Table 7). Girls living in provincial towns used EC more than girls living in the metropolitan area (Figure 7); however, the association was not statistically significant. Use of EC did not significantly differ by region.

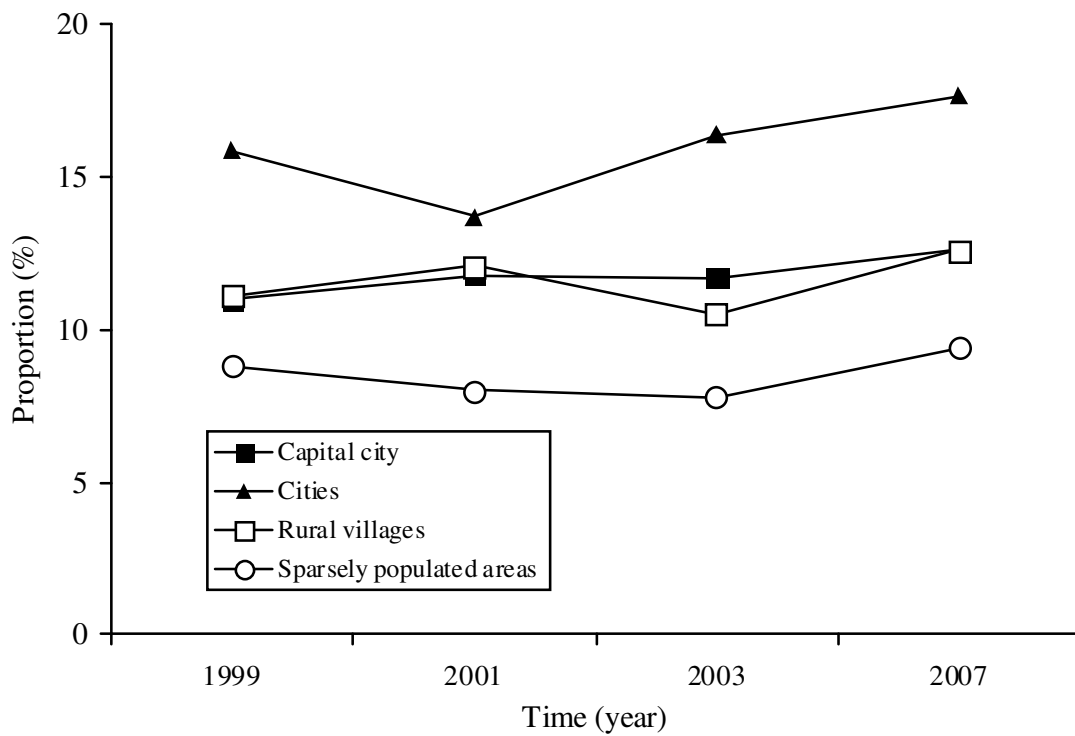
An interaction for EC use was found between age and alcohol consumption ( $p < 0.001$ ). The differences in EC use between alcohol consumption groups were much higher at age 14 than at ages 16 or 18 (Table 8). There was no interaction between age and survey year for EC use.

**Table 7:** The percentage (%) and mutually adjusted odds ratio (OR) of emergency contraceptive use according to background characteristics, Adolescent Health and Lifestyle Survey.

Background characteristic	Sample	%	Age and year-adjusted		Mutually adjusted	
			OR	95%	OR	95% CI
<b>Individual factors</b>						
Age at menarche						
Early	2177	17.9	1		1	
Average	7907	12.2	0.6	0.5-0.7	0.6	0.5-0.7
Late	286	9.4	0.3	0.2-0.4	0.4	0.3-0.7
Educational career (16,18 years old)						
Not in school	393	25.2	1		1	
Vocational school	1852	24.3	1.2	0.9-1.5	2.3	0.8-6.2
High school	4345	16.5	0.7	0.5-0.9	2.0	0.7-5.5
School achievements						
Much better	1464	8.3	1		1	
Slightly better	3180	10.8	1.2	0.9-1.5	1.1	0.8-1.4
Average	4418	14.0	1.5	1.2-1.8	1.1	0.9-1.5
Poorer	1148	17.0	2.2	1.7-2.9	1.3	0.9-1.8
Alcohol consumption						
Not drinking	1965	0.9	1		1	
Less frequently	2952	7.8	6.4	3.9-10.4	4.7	2.7-8.4
Monthly	3622	16.2	11.2	6.7-18.0	6.3	3.6-11.1
Weekly	1936	27.6	19.4	12.0-31.4	9.7	5.4-17.2
Daily smoking						
No	7943	8.3	1		1	
Yes	2609	27.3	3.4	3.0-3.8	2.0	1.7-2.4
Dating						
No	7249	6.2	1		1	
Yes	3367	27.4	3.8	3.3-4.3	3.1	2.6-3.5
<b>Family factors</b>						
Family structure						
Mother-father	7800	11.1	1		1	
One parents and one stepparent	939	16.3	1.7	1.4-2.0	1.3	1.1-1.6
One-parent family	1540	15.3	1.4	1.2-1.7	1.2	1.0-1.5
Husband/wife or cohabiting	246	38.2	2.4	1.8-3.1	1.2	0.8-1.7
Other guardian	48	20.8	1.4	0.7-2.9	1.5	0.6-3.8
Father's education						
Low	2155	13.9	1		1	

Middle	5393	13.5	1.1	0.9-1.2	1.1	0.9-1.4
High	2464	10.8	0.8	0.7-0.9	1.1	0.9-1.4
<b>Father's occupation</b>						
Upper white collar	3724	12.1	1		1	
Lower white collar	2399	13.6	1.2	1.0-1.4	1.0	0.8-1.2
Farmer or forestry	668	9.3	0.7	0.5-0.9	0.9	0.6-1.2
Blue collar	3685	14.0	1.2	1.0-1.4	0.9	0.8-1.1
<b>Mother's education</b>						
Low	1499	14.2	1		1	
Middle	5171	13.8	1.0	0.9-1.2	1.1	0.9-1.3
High	3528	11.3	0.8	0.7-1.0	1.1	0.9-1.5
<b><i>Place of residence</i></b>						
<b>Urbanization level</b>						
Capital city area	1441	11.5	1		1	
Cities	5543	15.3	1.3	1.1-1.4	1.2	0.9-1.6
Rural villages	2317	11.3	1.0	0.8-1.2	1.0	0.7-1.3
Sparsely populated areas	1254	8.2	0.7	0.6-0.9	0.9	0.6-1.2
<b>Region</b>						
Southern	3948	12.1	1		1	
Northern	1664	13.7	1.1	0.9-1.4	1.2	0.9-1.5
Eastern	1336	12.5	1.1	0.9-1.3	1.1	0.8-1.4
Western	3801	13.7	1.2	1.0-1.3	1.2	1.0-1.5

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**Figure 7:** Proportion (%) of emergency contraceptive use by level of urbanization and survey year, Adolescent Health and Lifestyle Survey.

**Table 8:** Proportion of emergency contraceptive use by age and alcohol consumption, Adolescent Health and Lifestyle Survey

Alcohol consumption	Age (years)		
	14	16	18
Not drinking	0.1	1.9	4.1
Less frequently	1.2	10.2	17.7
Monthly	3.4	15.8	25.9
Weekly	10.7	24.9	35.6

## 6 DISCUSSION

The present study investigated trends in sexual behavior and use of hormonal contraception in the Finnish adolescents. Our study showed that non-coital sexual experiences including kissing on the mouth, light petting, and heavy petting as well as coital sexual activity increased between 1996 and 2001 and decreased between 2001 and 2007. The intensity of sexual life followed the same pattern. The proportion of adolescents reporting having had sexual intercourse 10 or more times, three or more sex partners and non-use of contraception increased between 1996 and 2001. The measures of the intensity of sexual life decreased between 2002 and 2007. The use of oral contraceptive almost doubled during the period 1981-1989, while no changes were observed between 1989 and 2007. The use of hormonal contraceptives was reported more frequently among girls not living with both parents, those with lower age at menarche, girls whose mothers or fathers had low educational status, teenagers whose fathers had lower occupational status, and those with poor school grades.

Awareness of emergency contraception among Finnish girls was high. Fifteen percent of adolescents used EC in 2007. The use of EC did not change with non-prescription status. The use of EC was higher in smokers and alcohol consumers than non-smokers or non-drinkers. Only 1% of girls aged 14-18 used the vaginal ring or transdermal patch in 2007. Use of the vaginal ring was reported more commonly in older teenagers, girls living with parents, smokers and alcohol consumers.

### 6.1 Sexual behavior

Teenage abortion rates declined from the 1980s to the mid-1990s in Finland (Gissler 2004, Knudsen et al. 2003, Kosunen et al. 2002). In 1994, the abortion rate among adolescents was remarkably lower in Finland than in other Nordic countries, but after that the abortion rate increased (Gissler 2004, Kosunen et al. 2002). In girls aged 15-17 years, the rate of induced abortion increased between 1995 and 2000. The rising abortion rate from 1995 onwards in young teenagers suggests that unplanned teenage pregnancies have increased in Finland. Increased abortion rate among adolescents raises questions about change in sexual activity, less effective use of contraceptive methods and access to family planning services for this age group. The age

of starting sexual intercourse may have decreased and teenagers' sexual risk-taking behavior may have increased in Finland.

Finnish surveys did not show significant changes in teenage sexual behaviors between the mid-1980s and mid-1990s (Kosunen 2000). In the latter half of the 1990s, adolescent sexual activity increased in Finland (Gissler 2004). Our findings suggest that during the period 1996-2001, the percentages of non-coital sexual experiences, frequent sexual intercourse, having multiple sex partners and the rate of non-use of an appropriate contraceptive method increased in adolescents aged 14-16, but that there were no major changes in the period 2002-2007.

Changes in sexual relationships may help to explain some patterns of reproductive health. For example, older age at first sexual intercourse is linked to increased contraceptive use and reduced risk of a teen birth (Ford et al. 2001, Leitenberg and Saltzman 2000, Manlove et al. 2006, Manning et al. 2000). A great change in adolescent sexual activity and its consequences has been observed in the past few decades. In general, some societal changes may have contributed to the rise in adolescent sexual behaviors. From the early 1990s onwards, a phenomenon called over-erotization or hyper sexualization emerged in all Western societies, most clearly seen in fashion, advertising and public media (Zillmann 2000).

Adolescents are initiating sexual activity at younger ages. The Health Behaviour in School-aged Children (HBSC), 2001/2002 survey in 31 countries showed that the percentage of 15-year-old adolescents who report having had sexual intercourse varies from 15% in Poland to 75% in Greenland (World Health Organization 2001/2002). The HBSC, 2005/2006 survey in 34 countries reported that on average 24% of girls and 30% of boys aged 15-year-old had had sexual intercourse. Greenland had the highest rate (66% of boys and 55% of girls) and Slovakia had the lowest rate (13% of boys and 11% of girls). In this report, 25% of girls and 30% of boys in Finland reported having had intercourse (World Health Organization 2005/2006).

Information on trends of teenagers' sexual activity and their levels of sexual risk-taking behaviors is extremely important. Such trends have an important influence on ongoing sexual risk and the epidemiology of unplanned pregnancy and sexually transmitted infections. No changes in the proportion of being sexually experienced was reported between 1996 and 2001 in Australia (Skinner et al. 2008). Studies in USA showed that the percentage of both girls and boys

aged 15-17 reporting ever having had sexual intercourse did not change between 1991 and 1995 (Warren et al. 1998) or decreased between 1991 and 2002 (Abma et al. 2004, Santelli et al. 2000). However, a study in Norway among young people aged 15 to 24 reported an increase in the proportion of those sexually experienced in 2001 compared with 1997 (Bleidablik and Meland 2004) and the same was reported in Slovenia from 38% in 1996 to 53% in 2004 (Pinter et al. 2009).

## **6.2 Sexual risk-taking behaviors**

The most common sexual risk-taking behaviors in adolescents are early initiations of sexual intercourse, having multiple sex partners, and not using effective contraception (Kangas et al. 2004b, Santelli et al. 2000). These adolescents are at risk of unintended pregnancy and sexually transmitted diseases. Very little is known about changes in adolescent sexual risk-taking behaviors during the last decade, although it is a common belief that the sexual activity of youth has increased and the age of sexual début has decreased.

Adolescent sexual risk behavior is related to adolescent age, gender, race, and pubertal development (Gupta et al. 2008). Adolescents who initiate sexual activity at young ages are more likely to be at greater risk of pregnancy, abortion and sexually transmitted infections. Early sexual intercourse may reflect unsuccessful development and is associated with an increased risk of depression (Kaltiala-Heino et al. 2003). Cross-sectional and prospective studies have reported the following factors as determinants of early initiation of intercourse: earlier physical maturation (Meschke et al. 2000, Siebenbruner et al. 2007), a high rate of sexual activity among peers (Santelli et al. 2004, Sieving et al. 2006), and early or problematic use of alcohol and other substances (Santelli et al. 2004, Siebenbruner et al. 2007).

In Finland, there is evidence of an earlier start of teenage sexual activity at the end of the 1990s (Kosunen 2004). We found that the proportion of teenagers being sexually experienced increased during the period 1996-2001, suggesting that the age of sexual début decreased somewhat. The Health Behaviour in School-aged Children (HBSC) survey among European adolescents showed that the mean age of first intercourse ranges between 13.5 and 15.5 years among those who had started sex-life (Ross and Wyatt 2000, Ross et al. 2004). In most countries,



it is slightly lower for boys (13.5–14.5 years) than for girls (13.6–14.9 years) (World Health Organization 2001/2002).

A survey among 14 European countries in 2006 showed that 16% of women aged 15-49 had had their first sexual intercourse at ages 11-15 and 73% at ages 16-20 (mean 17.7 years) (Cibula 2008). The other survey among young adults aged 18–24 years in seven European countries in 2006/2007 showed that median age of commencing sexual activity ranges between 16 and 17 years in boys and 17 and 18 years in girls (Crochard et al. 2009). Moreover, studies in the United Kingdom showed a reduction in age of first intercourse during the period 1990-1996 (Cassell et al. 2006, Ford et al. 1999), which is now stable (Cassell et al. 2006).

In Finland, increased risk-taking health behavior may also have played a role in increased teenage pregnancy and abortion rates. Risk-taking health behavior is associated with engaging in unprotected sexual intercourse and having multiple sex partners (Camenga et al. 2006). Our study also showed an increase in the number of sex partners in the period 1996-2001. An increase in the number of sexual partners was also reported among British young people aged 16-24 in 1990-1996 (Ford et al. 1999) and in Australian students in grade 10 between 1997 and 2002 (Agius et al. 2006). On the other hand, a small study among Danish adolescents in grades 10-12 did not show a change in the number of lifetime sex partners during the period 1996-2001 (Kangas et al. 2004b).

There are several reasons to support of an increase in teenagers' sexual activity and sexual risk-taking behavior in Finland. First, adolescents are frequent media users and the media have been claimed to contribute to adolescents' sexual activity (Escobar-Chaves et al. 2005, L'Engle et al. 2006). There is a strong relationship between the amount of sexual content teens see and their level of sexual activity or their intentions to engage in sexual intercourse. Media use is associated with early adolescents' sexual intentions and behaviors. A study in the United States suggests that media accounted for 8–10% of adolescents' sexual behaviors and 13% of intentions to have sexual intercourse in the near future (L'Engle et al. 2006).

Second, there have been worrying trends in teenage pregnancy and abortion rates in recent years in Finland even though Finland still has had one of the lowest teenage pregnancy and abortion rates in the world (Gissler 2004, Knudsen et al. 2003, Kosunen et al. 2002). Both

teenage pregnancy and abortion rates increased in the period 1995-2000 (Gissler 2004, Kosunen et al. 2002). The abortion rate increased by 66% in girls aged 15-17 years in the period 1995-2000 and the increase was greater in younger than in older teens (Kosunen et al. 2002, <http://www.stakes.fi/EN/index.htm>), but since then the trend has been going down. Rising trends in teen pregnancy and abortion rates may suggest an increase in unprotected sexual activity. Non-use of effective contraception may play an important role. We found in our study that the use of oral contraceptives in teenagers declined in Finland, especially in the metropolitan area between 1993 and 2003.

Third, the incidence of sexually transmitted infections among teenagers increased during the period 1995-2000 in Finland (Hiltunen-Back 2002). This increase was mostly for chlamydia trachomatis infection, which increased by 37% in girls and by 69% in boys in the period 1995-2000. An increase in teen sexually transmitted infections may also suggest an increase in unprotected sexual activity but also improved detection of the disease.

Fourth, in Finland the proportion of adolescents who consume alcohol increased in the 1990s, but has declined since 1999 (Rimpelä et al. 2002). Teens' sexual activity is influenced by the use of drugs and binge alcohol drinking, and these risk-taking health behaviors are associated with engaging in unprotected sexual intercourse and having multiple sex partners (Camenga et al. 2006, Lavikainen et al. 2009).

### **6.3 Use of contraception**

Easy access to family planning services and low costs of contraception have been considered the basic elements in the prevention of teenage pregnancies (Darroch et al. 2001a). The use of contraception among adolescents has increased over the years (Meschke et al. 2002).

In the United Kingdom, 75% of early adolescents and 85% of mid-adolescents of both sexes reportedly used effective contraception at their most recent intercourse (Tripp and Viner 2005). In the 1990s the use of contraceptive at last intercourse in adolescents aged 15-19 years ranged between 32.5% and 67.5% in the developed countries (Darroch et al. 2001b). A study in 14 European countries reported that the average age for starting contraceptive use varied between 16.7 and 19.8 years (Cibula 2008). About 50% of the respondents reported having used

contraception during their first coitus. Many teenagers' pregnancies occur in the first 6 months of sexual activity.

In the USA between 1991 and 1997, condom use increased in adolescents in grades 9 to 12, while the use of birth control pills and withdrawal decreased (Everett et al. 2000). The other US reports showed increases in the use of contraceptives among teenagers and about 3 out of 4 teens used a contraceptive method at their first intercourse (Anderson et al. 2006, Santelli et al. 2006). About 91% of males and 83% of females reportedly used some method at their most recent intercourse in the USA (Abma et al. 2004). A study in the US (Santelli et al. 2006) showed that the risk of pregnancy among girls in grades 9-12 declined by 21% between 1991 and 2003 through use of contraceptive methods.

Inadequate contraceptive use among sexually active adolescents is a worldwide public health problem (Ross et al. 2004). In the Health Behavior in School-aged Children survey, among sexually active adolescents, 11-31% of boys and 2-32% of girls reportedly did not use contraception at the most recent intercourse in 1997/1998 in 13 European countries (Ross and Wyatt 2000). The corresponding figures were 8-27% and 3-32% in 2001/2002 in 30 European countries (Ross et al. 2004).

There was a tendency towards less use of an effective contraceptive method among Danish adolescents in grades 10-12 with no regular partner during the period 1996-2001 compared with the period 1982-1996 (Kangas et al. 2004b). A study in Sweden between 1999 and 2004 showed a tendency over time towards having more sexual partners and using contraception less at first intercourse (Larsson and Tyden 2006). In Slovenia, teenagers around 17 years old had on average 2.2 sexual partners and 14% of them used no effective contraception (Pinter et al. 2009).

### **6.3.1 Use of oral contraceptive pills**

HBSC survey in 2005/2006 among 15-year-old adolescents showed there were wide differences between countries in the use of contraceptive pills at most recent intercourse. OC use ranged from 4% in Spain to 52% in the Netherlands. Among girls, OC use varied from 3% in Slovakia

and Ukraine to 61% in the Netherlands, and among boys from 3% in Romania to 44% in Belgium (World Health Organization 2005/2006).

In Finland, the knowledge of contraceptive methods among teenagers is good (Gissler 2004). The practice of prescribing OC to young Finnish teenagers was adopted in the 1980s (Kosunen 1996). Earlier reports suggest that oral contraceptive use among 16-year-olds increased markedly during the 1980s in Finland. The increase was similar in all parts of the country and in all socioeconomic groups, indicating equal access to contraceptive services (Kosunen et al. 1995). However, our study shows that the use of contraceptive pills more than doubled between 1981 and 1989 and declined in teenagers, especially in the metropolitan area between 1993 and 2003.

The rising trend in adolescent OC use between 1981 and 1989 was primarily due to changes in the pattern of practices in health care. The leveling off of the OC use at the beginning of the 1990s, together with low teenage pregnancy rates, suggests that the need for regular contraception and the use of OC were in balance at that time (Kosunen 1996). Moreover, the rate of abortion decreased by 35% between 1991 and 1995 without a change in oral contraceptive use. Coital activity has increased in Finnish adolescents since the mid-1990s. However, no increase in OC use was found. This probably means that the need for regular contraception was not saturated during the latter half of the 1990s, which may be one reason for the upturn in abortion trends at that time.

To explain why OC use did not increase despite an increase in sexual activity in the late 1990s, reasons other than changes in the health care services also need to be explored. Firstly, it may be related to difficulties in access to health care services. During the economic recession of the first half of the 1990s, several cutbacks were made in public primary health care in Finland, and in services related to preventive care in particular. Absence of these services may reduce access to health care for adolescents who were at risk of pregnancy (Coyne-Beasley et al. 2003, Hagley et al. 2002).

Secondly, a public debate in 1995 voiced concern regarding an increased risk of venous thromboembolism related to the use of third generation OC (Farmer et al. 1997), which led to

reduced OC use in many countries (Iversen and Nilsen 1996, Ramsay 1996). In Finland, discussions in the media were active, too, but reactions were moderate, and, in the short run, Finnish adolescents survived the pill scare with neither a decrease in OC use nor an increase in abortion rates (Kosunen et al. 1997a). Over the next few years, however, the use of OC did not increase as might have been expected on the basis of the increased sexual activity.

The third contributing explanation to be considered is that adolescents used other contraceptive methods than OC in the late 1990s, condoms in particular. Public campaigns to promote condom use were carried out in Finland in the late 1980s after the emergence of HIV (Kosunen 1996). The most remarkable change after the campaigns was that the proportion of adolescents who neglected contraceptive use at first sexual intercourse decreased over the next few years, reflecting an increased use of condoms (Kosunen 1996, Pötsönen 1998). In the 1990s, however, intensified public condom campaigns were not conducted. Probably the perceived threat of HIV also diminished, because the rates of HIV transmission remained low in Finland. As a consequence, use of condoms decreased in the late 1990s (Gissler 2004).

As a fourth explanation, we might consider sex education in schools, which may have further contributed to seeking services to obtain OC. Sex education in schools has varied in quality and quantity, mostly with reductions in sex education (Kosunen et al. 2002, Liinamo 2005), particularly in the mid-1990s. Moreover, the cost of birth control has an impact on contraceptive use most particularly among adolescents and the cost of oral contraceptives increased markedly during the 1990s (Kirkkola 2004).

Adolescents require intense education and ongoing counseling for initiation and continuation of hormonal contraception. Misperception is common among adolescents and may result in reduced compliance. For instance, many adolescents are concerned that OC pills cause weight gain or acne (Shearman 1984).

### **6.3.2 Use of novel contraceptive methods**

Finnish teenagers rarely use the novel hormonal contraceptives. Only 0.5% of girls aged 16 years and 2.5% of those aged 18 years used the vaginal ring. Use of the transdermal patch was even less common.

In order to be able to seek novel hormonal contraceptives, adolescents need to be aware of them. There is limited information available on the awareness of the vaginal ring and the transdermal patch in adolescents. Among American girls aged 14-21 years (Carey et al. 2007), 52% were unaware of the vaginal ring. Of those who were aware of the method, only 35% had sufficient knowledge. Finnish adolescents may have insufficient knowledge about novel contraceptive methods. We did not gather information on the knowledge of Finnish adolescents about the vaginal ring and transdermal patch.

### **6.3.3 Emergency contraception**

#### **Knowledge of emergency contraception**

The School Health Promotion Study in 1996 showed that more than 95% of teenagers knew what emergency contraception is. The proportion of girls who had used emergency contraception increased with age from 2% among girls aged 14 to 15% among those aged 17 (Kosunen et al. 1999). The School Health Promotion Study showed that Finnish adolescents are well aware of EC already many years before sexual relationships are topical; as many as two thirds of the youngest girls aged 12 knew about the method. The present study showed that the proportion of girls who knew about EC increased with age, being 62% among girls aged 12 years and 99% among those aged 18. Awareness of EC increased significantly over time between 1999 and 2003. However, mere awareness of EC is not enough. There is a concern that although adolescents know about EC, they perhaps do not know how to obtain the pills and how to use them (Mawhinney and Dornan 2004). Such detailed knowledge could not be explored in our mailed survey.

#### **Use of emergency contraception**

Our findings demonstrate that only the awareness of EC slightly increased when it became available without prescription (2003-2007) relative to those years when prescription was required (1999-2001). However, the use of EC did not change after it became available without prescription. A small Finnish study in 2002 showed that after making EC available over the counter, the use of EC increased by 62% (Sihvo et al. 2003). A population-based study in USA showed that the use of EC increased by 55% among girls aged 15-19 years after it became

available over the counter (Soon et al. 2005). The number of teenagers requesting EC increased between 2000 and 2001 in Northern Ireland after it became available over the counter, mainly outside local pharmacy opening hours (Mawhinney and Dornan 2004). On the other hand, in the UK in 2001-2002 a significant drop in EC use among girls aged 16-19 years was reported after it became available over the counter (Marston et al. 2005).

Concerning no effect of non-prescription status of EC use, some explanations can be evinced. First, the price of the product is quite high. Perhaps those teenagers most in need of it cannot afford the product. If this is the case, the accessibility of EC has not actually improved despite the change to non-prescription status. Secondly, one of the factors that have been described as limiting more extensive use of EC is the fact that a large proportion of requests occur over the weekend, when family planning clinics and some pharmacies are closed (Lete et al. 2003).

## **6.4 Characteristics of hormonal contraceptive users**

### **6.4.1 Characteristics of oral contraceptive users**

In the present study, individual, family, and regional characteristics were associated with OC use. The associations remained mostly unchanged throughout the study period. Differences in OC use can be explained by maturation, socioeconomic and regional factors. The use of OC was higher among older ages, low age at menarche, and in those with poorer grades in class. The use of OC was more common among girls from families with lower socioeconomic status and with lower educational level. The results are consistent with earlier Finnish studies concerning differences in teenage sexual activity by socioeconomic factors (Kontula 1991). Thus, the variation in OC use reflects the variations in sexual experience between socioeconomic groups and educational levels. Similar socioeconomic differences have been reported in studies on teenage pregnancy. Risk of teenage pregnancy is strongly associated with low socioeconomic status, early initiation of sexual activity, disruption of family structure, larger household size, not living with biological parent, and with deprived areas (Chedraui et al. 2004, Vundule et al. 2001). Higher levels of parental education or family income are related to later onset of sexual behaviours, lower sexual activity, delay of intercourse initiation, greater use of contraception and

lower risk of pregnancy (Maticka-Tyndale et al. 2001). When adolescents are asked where they want to obtain information about sex, they give high priority to their parents (Robinson and Rogstad 2002).

In the present study, OC use differed with the level of urbanization. From 1993 onwards the use of OC decreased in the metropolitan area where the variety of family planning services is wider than in less urbanized places of residence. This result was a surprise, because according to existing studies teenage sexual activity has been equally high in the capital, Helsinki, as in the smaller towns (Kosunen et al. 1998). The decreased OC use in the metropolitan area since 1993 may also reflect difficulties in primary health care service delivery. In the metropolitan area, some of the specialized family planning clinics were closed and contraceptive services were integrated into family doctors' work. On the other hand, the number of family doctors related to the size of population is low there, which may make access to services more difficult in general. Besides the public primary care services, contraceptive services are provided by non-governmental organizations and the private sector, too. If these cuts in the public family planning services played a role in decreasing adolescent use of contraception in the metropolitan area, it suggests that for adolescents other kinds of services (mostly chargeable) cannot replace public family planning services provided free of charge.

#### **6.4.2 Characteristics of emergency contraception awareness and use**

Emergency contraception awareness is positively associated with teens' school curricula and the level of their fathers' education (Ottesen et al. 2002). Girls with higher education are more aware of EC than those with only mandatory education. EC use is higher among girls living in urban areas than in those living in rural areas, and in those who occasionally have unprotected intercourse (Ottesen et al. 2002). EC use is also higher in girls with more than three partners, first love affair before 14 years, regular sexual intercourse, unplanned or unconscious first intercourse, and history of pregnancy (Ottesen et al. 2002).

Our findings show the associations of individual, family, and regional factors with EC awareness and use. The awareness was higher in girls in upper secondary school than in those not at school or in vocational school. EC awareness increased with improved school



achievements, whereas there was no association between EC awareness and family structure, mother's or father's education. In line with other studies (Lete et al. 2003, Ottesen et al. 2002), we found a positive association between EC awareness and the level of teenagers' education, which emphasizes the influence of education on the level of EC awareness. It also stresses that this knowledge is often basic and lacks specificity, such as the time limit for EC use. According to the present study, the use of EC was more common among girls from families with lower socioeconomic status and with lower educational level. We also found that girls living in the capital city were less informed than girls living in towns, rural villages or sparsely populated areas, but other previous study has shown that teenagers in urban areas use EC more often than those in rural areas (Ottesen et al. 2002).

Our findings showed that alcohol consumption has the strongest effect on EC awareness and use. This shows that those in need also know better and use them more often. Our finding is consistent with those of earlier studies (Porter 2001, Shawe et al. 2001, Walker et al. 2005) showing that smokers and alcohol consumers are in greater need of EC than non-smokers or non-drinkers. The proportion of adolescents who smoke or consume alcohol increased in Finland between 1981 and 1999 (Lintonen et al. 2000). Teens' sexual activity is influenced by the use of drugs and alcohol, and these risk-taking health behaviors are associated with engaging in unprotected sexual intercourse and having multiple sex partners (Camenga et al. 2006). Adolescents do more sex and engage in unprotected sex under the influence of alcohol or drugs (Bartlett et al. 2005). Early dating and the early initiation of sex are also related to cigarette smoking and alcohol consumption (Martin et al. 2007). Women smokers reporting sexual intercourse before the age of 15 are more likely to become heavy alcohol drinkers a few years later than smokers with a sexual *début* after the age of 18 (Morgen et al. 2008).

## **6.5 Methodology**

Sexual behaviour differs due to the matters of social, cultural, religious, moral and legal norms. Confidentiality is an important issue in studies on sexual health. Even in countries with open-minded attitudes to sex, young people keep their personal sex lives private (Jones et al. 1985). A sex survey should measure individual and population behavior patterns precisely. Willingness to

report sensitive behaviours, recall bias and participation bias cause measurement error in studies on sexual health (Fenton et al. 2001). Methods are needed to minimize measurement error.

Structured questions are suitable in large studies. Our study used self-administered questionnaires for data collection. Firstly, this method was selected for reasons of economy, because face-to-face interviews are expensive to organize. Especially in studies on adolescent sexual behavior, large samples are needed to get a sufficient number of subjects with coital experience to make data analysis possible. Secondly, data collection methods that need a personal contact with the respondents (face-to-face or telephone interview) are hardly applicable among young people. Adolescents spend so much time outside the home. Moreover, a telephone interview may be problematic in a survey on sexual behavior, because it is impossible to guarantee the adolescent's privacy, which affects the responses (Kosunen 1996). The use of self-administered questionnaires for gathering information on sensitive issues such as sexual behavior has been recommended for methodological reasons because in a face-to-face interview respondents are likely to give socially more acceptable responses (Davoli et al. 1992). On the other hand, personal interview has some advantages, such as the option to ask follow-up questions and to make sure that the questions was correctly understood. Postal surveys on sexual behavior produce low response rates (50-60%), but the response rate can be increased with certain methods (Biggar and Melbye 1992).

In the School Health Promotion Study, questions about coital behavior were completed at school during ordinary lessons. Confidentiality was emphasized in the introductory talk and by providing envelopes in which the respondents enclosed the questionnaires before returning them to the research assistants (Kosunen 1996).

The Adolescent Health and Lifestyle Survey was based on highly comparable national surveys, which have maintained similar data collection methods, samples and questions for years. The adolescent girls answered questions concerning their knowledge and use of OC, EC, the vaginal ring, and the transdermal patch, and the repeatability of the questions on OC was high.

## **6.6 Reliability and validity of information derived from the adolescent surveys**

Valid and reliable information on adolescent sexual behavior is important for planning effective sexual health programs and services (Mitchell et al. 2007). Collecting reliable data on sexual behavior is difficult. Misreporting sensitive topics is quite common (Tourangeau and Yan 2007). Respondents may over-report socially desirable behaviours and may underreport socially undesirable behavior. When the questions are self-administered, they are less likely to over-report desirable behaviours and to underreport undesirable behavior

Only few studies have assessed the reliability or validity of questions on sexual health. The reliability of questions on age at first intercourse and the number of sexual partners among young women has been studied by interviewing them at a few months' intervals (Rohan et al. 1994, Schlecht et al. 2001). Rohan's study showed high correlations between the responses, while Schlecht's study showed a very low correlation. Age, ethnicity, and education are the predictors of reporting error for sexual history markers (Mitchell et al. 2007).

Among secondary school students, a high level of agreement was found between personal interviews and self-administered questionnaires for age at first intercourse and sexual intercourse (Davoli et al. 1992). Findings for non-use of contraception were similar, with slightly lower agreement levels than the other questions on sexual behavior. Face-to-face in-depth interview is more effective than self-administered questionnaire for obtaining truthful answers (Mitchell et al. 2007). Computerized self-administration is recommended to encourage honest answers (Tourangeau and Yan 2007).

The reliability of questions on sexual health is probably high among Finnish adolescents. Earlier studies have shown a high repeatability of questions regarding contraception. In the Adolescent Health and Lifestyle Survey, retests for controlling the reliability of the responses have been carried out, e.g. in 1993, 2003. A similar questionnaire about oral contraception was mailed 3-4 weeks after the main survey to a random sample of girls who had answered the first inquiry. The cover letter to the questionnaire did not mention the purpose of studying the reliability of the responses, but said that the purpose was to study short-term variability in

lifestyle. Test-retest reliability of OC use showed a substantial level of agreement beyond chance between the two questionnaires.

## **6.7 Strengths of the study**

Information on trends in sexual activity, sexual risk-taking behaviors and the use of hormonal contraceptives allowed us to evaluate the changes in adolescents' sexual behaviors over time. This knowledge is important for producers of family planning services and in preventing adolescent pregnancies and abortions.

The response rates to both the Adolescent Health and Lifestyle Survey, and the School Health Promotion Study were high. The populations of these studies are likely to be a representative sample of Finnish adolescents. In the Adolescent Health and Lifestyle Survey, information on adolescent OC use was collected by using a similar design from year to year over a long period of time. It was based on national samples of teenagers. The response rates showed a slight tendency to decline during the study period, but remained at a reasonably high level compared with most international studies. The School Health Promotion Study has focused on 8<sup>th</sup> and 9<sup>th</sup> graders' adolescent health and health behavior. Data were collected in even-numbered years in some provinces and odd-numbered years in the other provinces of Finland. Thus the collected data in two consecutive years cover the whole country.

## **6.8 Weaknesses of the study**

Questions concerning coital behavior were not included in the postal questionnaires in the Adolescent Health and Lifestyle Survey. Moreover, information regarding the awareness of Finnish adolescents of the vaginal ring and transdermal patch has not been collected. Only information on the awareness of EC has been gathered, which is not enough. There is concern that although adolescents know about EC, they perhaps do not know how to obtain the pills and how to use them (Mawhinney and Dornan 2004).

The response rate to the Adolescent Health and Lifestyle Survey has declined over time. The response rate may remain low because adolescents may be afraid that their parents may see

their replies. In this survey we may have underestimated the use of OC, particularly in girls aged 14 years. The analysis of late responders showed no significant difference in OC use among girls aged 16 or 18 years, whereas the use of OC was higher in late-respondents aged 14 years. The use of oral contraceptives was 2.0% in girls aged 14 who responded to original questionnaire, 3.5% in those who responded to first reminder and 7.9% in girls aged 14 who returned the second reminder.

In the School Health Promotion Study, the schools joined the study on a voluntary basis. The number of participating schools increased during the study period, but the data here was derived only from those schools participating in every survey since 1996/1997. This allowed us to study changes in sexual experiences and risky sexual behavior over a period of 11 years. There were minor differences in the sexual behavior of the students of the schools that joined the study at the very beginning in 1996/1997 compared with the sexual behavior of students of the schools that joined the study in later years. The proportion of students reporting sexual intercourse was slightly lower in adolescents from the schools that joined the study at the beginning (22.5%) than in students reporting sexual intercourse from the schools that joined the study in later years (23.4%). The difference was found from 2002 onwards. Therefore, we may have underestimated the proportion of sexual activity and sexual risk-taking behaviours.

## 7 SUMMARY

Induced abortion rates decreased markedly in the period 1991-1994 and increased by 66% in the period 1995-2000 among girls aged 15-19 years in Finland. So far little is known about the trends in sexual experience, sexual risk-taking behavior, and contraceptive use in the adolescent population from the mid-1990s onwards. Using the School Health Promotion Study from 1996 to 2007, we found that non-coital sexual behavior increased from 1996 to 2001 and decreased from 2001 to 2007. Sexual activity and the intensity of sexual life followed the same pattern. The proportion of adolescents engaging in sexual intercourse, those having sexual intercourse 10 or more times, having three or more sex partners and non-use of contraception increased in the period 1996-2001. The measures of the intensity of sexual life decreased in the period 2001-2007.

Using the Adolescent Health and Lifestyle Survey from 1981 to 2007, we found that the use of oral contraceptives doubled between 1981 and 1989, while no changes were observed between 1991 and 2007. The use of oral contraceptives was reported more frequently among older teenagers, girls living with both parents, girls with lower age at menarche, girls whose mothers or fathers had low educational status, girls whose fathers had lower occupational status, and girls with poor school grades. In 2007 only 1% of girls aged 14-18 used the vaginal ring or transdermal patch. Finnish girls were aware of emergency contraception. Fifteen percent of girls aged 14-18 years used it in 2007. The use of emergency contraception did not change when it became available over the counter (2003-2007) relative to those years when prescription was required (1999-2001). The use of emergency contraception was higher in smokers and alcohol consumers than non-smokers or non-drinkers.

The entire range of non-coital and coital sexual experiences, having multiple sex partners and not using contraception increased in the period 1996-2001. The findings suggest that effective use of contraception did not grow apace with increasing sexual activity. Moreover, the novel contraceptive methods have not been adopted in family planning services. Therefore, increase in sexual activity, intensity of sex life and not using effective contraceptive methods contributed to an increase in teenage abortions.

## 8 CONCLUSIONS

This study showed that sexual experiences, frequent sexual intercourse, having multiple sex partners and non-use of an appropriate contraceptive method increased during the period 1996-2001, but not in the period 2002-2007. Variation in sexual activity trend was parallel to variation in abortion trend. Among sexually active teenagers, sexual behavior shifted towards more risky practices in the period 1996-2001, suggesting that increased risky sexual behaviors contributed to increased teenage abortion rates during the period 1996-2001.

In Finland, adolescent oral contraceptive use increased in the 1980s but not in the late 1990s despite an increase in sexual activity. Awareness and use of EC increased slightly between 1999 and 2003. Selling EC over-the-counter did not have an effect on EC use. The novel hormonal contraceptives were unexpectedly rarely used by adolescents. The sociodemographic differences in OC use, EC awareness and use remained mostly stable during the study period.

The increase in the number of adolescents reporting sexual intercourse once or more along with less frequent use of contraceptives seemed to contribute to the increased abortion rates in Finland in the 1990s. An increase in adolescent abortion rates and a decrease in use of birth control indicate changes in provision of or access to family planning services in Finland. Adolescents should have a free access to family planning services. Moreover, family planning services should be developed to adopt innovations in contraceptive technology more quickly.

Provision of sex and contraception education should reach young people before they begin sexual activity. Parents and schools should teach accurate sex education and contraceptives including new methods to teenagers. Close relationships between parents and teenagers enable parents to exert influence over teens' sexual decision-making. Teens having a close relationship with their parents are more likely to delay the onset of sexual intercourse, to use birth control and to be aware of the negative consequences of sexual activity, such as early pregnancy. Since contraceptives are expensive and teenagers cannot afford to buy them, parents should provide financial aid to teenagers for buying contraceptives.

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# Adolescent Sexual Behavior During Periods of Increase and Decrease in the Abortion Rate

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**OBJECTIVE:** To study changes in adolescent sexual behavior in periods of increase (1994–2000) and decrease (2001–2007) in the abortion rate.

**METHODS:** School surveys with self-administered questionnaires were carried out annually among eighth graders (mean age 14.8 years) and ninth graders (mean age 15.8 years) (N=286,665) in 1996/1997 and 2006/2007. Schools participated biennially. The proportions of respondents reporting noncoital (kissing, light petting, heavy petting) and coital (ever had sexual intercourse, intercourse at least 10 times, at least three partners) sexual experience and nonuse of contraception were studied.

**RESULTS:** Among adolescents, both coital and noncoital sexual experiences and the proportion of those not using contraception increased between 1996–1997 and 2000–2001 ( $P$  for trend  $<.01$ , all) and decreased from 2000–2001 onward ( $P<.001$ , all), except the proportion of at least 10 coital events, which did not decrease. Among sexually experienced adolescents, a similar increase in coital experiences (intercourse at least 10 times from 38.2% to 41.5%, at least three partners from 27.8% to 30.7%,  $P<.001$ ) and in not using contraception (from 17.2% to 19.1%,  $P=.002$ ) was seen before 2000–2001, but

after that the only significant change was a further increase in the proportion of those reporting intercourse at least 10 times (from 41.5% to 47.8%,  $P<.001$ ).

**CONCLUSION:** The proportion of adolescents reporting noncoital sexual experiences, intercourse, or not using contraception increased in the 1990s and decreased in the 2000s, reflecting the changes in the abortion rate. However, as the abortion rate decreased, the intensity of sexual activity further increased among sexually experienced adolescents, suggesting that the fall in the abortion rate may be due to contraception and more effective sexual education.

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**LEVEL OF EVIDENCE: III**

The abortion rate in Finland was among the lowest in Europe<sup>1</sup> after a long and steady decline in the 1980s and early 1990s. However, between 1994 and 2000, the abortion rate among girls age 15–17 years increased from 7.4/1,000 to 12.3/1,000 (66%) (Fig. 1).<sup>2</sup> Since 2000, teenage abortion statistics again have shown a downturn; birth rates have remained steady (Fig. 1). These changes were specific to the age group. Among 20-year-olds to 24-year-olds, the abortion rate increased slightly and continued to do so until 2007; in older age groups the abortion rate remained steady.<sup>3</sup>

The changes in abortion rates among adolescents indicate changes in their sexual behavior but also may indicate a decline in choosing abortion. So far, little is known about the changes in sexual behavior reflected in increased abortion and pregnancy rates among adolescents. Although most 15-year-olds to 17-year-olds have not yet experienced sexual intercourse, a larger proportion of teenagers engaged in sexual activity could explain the increased abortion rate. On the other hand, even if the proportion of teenagers who are sexually active does not increase, teenagers may engage in more frequent intercourse, use contra-

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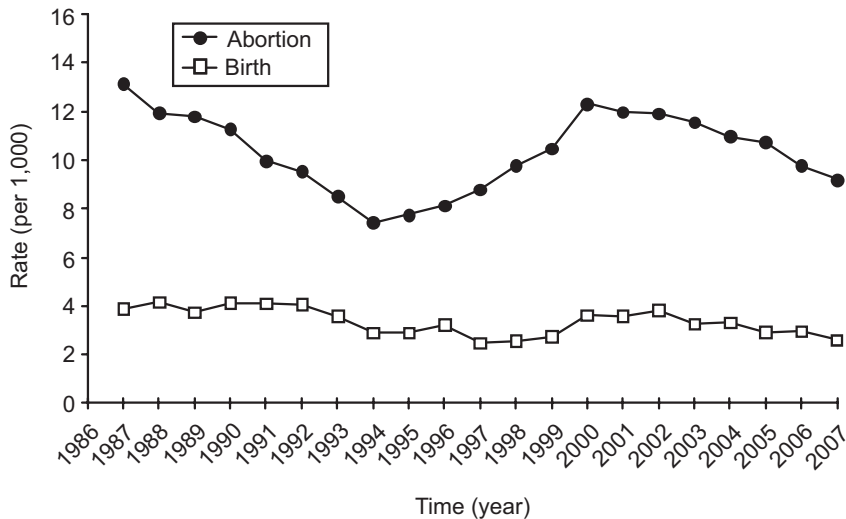
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**Fig. 1.** Induced abortion and birth rates (per 1,000) in girls aged 15–17 years in Finland in 1987–2007. Data from THL National Institute for Health and Welfare: Register on Induced Abortions and Sterilizations (unpublished statistics).

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ceptives less effectively, or have more sexual partners, thus increasing the risk of pregnancy.

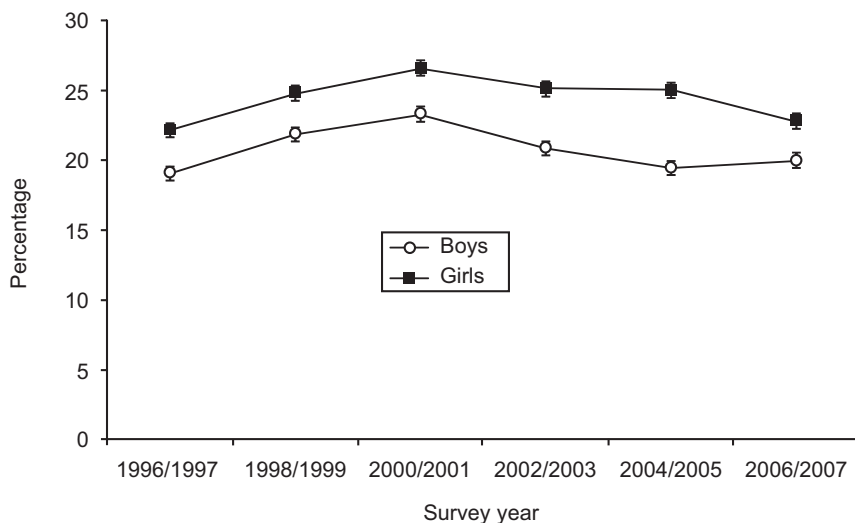
The aim of this article is to study changes in the sexual behavior of Finnish adolescents from 1996 to 2007 using two time periods. The first period (from 1996 to 2000) is characterized by a higher abortion rate and the second period (from 2000 to 2007) by a lower abortion rate. Data on sexual behavior were available for the age group of 14 to 16 years (Fig. 2).

### MATERIALS AND METHODS

The School Health Promotion Study is an anonymous survey that has been carried out annually in Finland since 1996. The survey elicits adolescents' living conditions, school experiences, health, health behavior, health knowledge, and experiences of student welfare services. The data were collected in the

provinces of Southern Finland, Eastern Finland, and Lapland in even-numbered years and in the provinces of Western Finland and Oulu in odd-numbered years.<sup>4</sup> Hence, the collected data in two consecutive years cover the whole country. The study was approved by the ethics committee of Tampere University Hospital.

Schools' participation was voluntary. Their number increased during the study period, but the data here were derived only from those schools participating in every survey since 1996/1997. There were only minor differences in sexual behavior between the schools joining the study in 1996/1997 and those joining later. Slightly less sexual intercourse was reported by adolescents from the schools that joined the study at the beginning (22.5%) than by adolescents from the schools joining the study later (23.4%). The difference was found only from 2002 onward.



**Fig. 2.** Sex-specific proportion (%) and 95% confidence interval of adolescents reporting at least one sexual intercourse experience by survey year.

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Eighth and ninth graders completed the questionnaire during an ordinary school lesson under the supervision of their teachers. Student participation was voluntary, but virtually all chose to participate. To emphasize the confidentiality of the study, all completed questionnaires were sealed in an envelope addressed to the research group. Pupils who were absent on the survey day (on average 5–10%) were not contacted. In the eighth grade, the mean age was 14.8 years (standard deviation  $\pm 0.3$  years), and in the 9th grade it was 15.8 years (standard deviation  $\pm 0.3$  years). The biennial numbers of participants are presented in Table 1. Participants totalled 296,453, of whom 9,788 were excluded owing to missing information on sexual activity. In all, the analysis included 286,665 adolescents (143,843 boys and 142,822 girls).

Sexual experiences were investigated by asking whether the respondent had ever experienced kissing on the mouth, light petting (fondling on top of clothes), heavy petting (fondling under clothes or naked), and sexual intercourse. The response choices for each item were yes and no. The first three items described noncoital behaviors. Adolescents who had experienced sexual intercourse were asked to provide data on the intensity of their sexual activity: “How many times have you had intercourse?” (response choices once, 2–4 times, 5–9 times, 10 times or more); “How many sexual partners have you had altogether?” (one, two, three or four, five or more); and “Which contraceptive method did you use in your most recent intercourse?” (none, condom, oral contraceptives, condom and oral contraceptives, other methods). The prevalence of other methods ranged from 0.2% to 0.4% in the total population and from 1% to 1.6% in sexually active adolescents. Because the responses in the category “other methods” generally included only methods of natural family planning (withdrawal, calendar method), which do not provide reliable contraception, this category together with the option “none” were reclassified as “no contraception.”

Tests for trend (linearity) were conducted with logistic regression by including the survey year as a continuous variable in the models and a binary sexual behavior variable as an outcome. We used a logistic regression model with the cluster option. We used the schools as the cluster variable and adjusted the standard errors and *P*-values for trends for the clusters. For proportions, 95% confidence intervals were calculated. We used Stata 10 software (Stata Corporation, College Station, TX) to analyze the data.

## RESULTS

All measures of noncoital sexual experiences showed an increase between 1996/1997 and 2000/2001 and thereafter a decrease (Table 1). The measures of sexual activity and its intensity followed the same pattern. The proportion of adolescents reporting experience of sexual intercourse increased from 20.5% to 24.9% between 1996/1997 and 2000/2001 (Fig. 1, Table 1). In parallel the proportion of those reporting sexual intercourse at least 10 times increased from 7.7% to 10.2%, at least three sex partners from 5.7% to 7.6%, and nonuse of contraception from 3.5% to 4.7%. The measures of intensity of sexual activity decreased between 2000/2001 and 2006/2007. The only exception was the proportion of those reporting sexual intercourse at least 10 times, which did not decrease between 2000/2001 (10.2%) and 2006/2007 (10.0%) (Table 1).

The results were similar for both sexes between 1996/1997 and 2000/2001 (Table 1), with the exception of kissing on the mouth, which did not increase in girls. In the period 2000/2001–2006/2007, there were small sex differences in the measures of intensity of sexual activity. In boys, the proportion of those reporting sexual intercourse at least 10 times, at least three partners, or nonuse of contraceptives decreased between 2000/2001 and 2004/2005 (*P* for trend  $< .001$ , all), but in 2006/2007, the proportions returned to the level of 2000/2001; in girls the decrease continued throughout the period.

### Changes in the Total Population

Between 1996/1997 and 2000/2001, the intensity of sexual activity increased significantly among those who had already experienced sexual intercourse, measured by reporting sexual intercourse at least 10 times (from 38.2% to 41.5%) and by reporting at least three partners (from 27.8% to 30.7%). Correspondingly, the proportion of those reporting no contraception at last intercourse increased significantly from 17.2% to 19.1% (Table 2). In the sex-specific analysis, the trends were statistically significant in both sexes (Table 2).

During the period 2000/2001–2006/2007, the proportion of adolescents reporting sexual intercourse at least 10 times continued to increase (from 41.5% to 47.8%) (Table 2). The proportions of those reporting at least three sexual partners (from 30.7% to 30.3%), or no contraception at last intercourse (from 19.1% to 18.6%) did not change. The results were similar for both sexes.



**Table 1. Proportions and 95% Confidence Intervals of Adolescents With Noncoital and Coital Sexual Experiences and Nonuse of Contraception by Survey Year and *P*-Values for Trend From 1996/1997 to 2000/2001 and From 2000/2001 to 2006/2007**

Sexual Experience	1996/1997 (n=49,843)	1998/1999 (n=49,023)	2000/2001 (n=47,525)	2002/2003 (n=46,743)
Noncoital sexual experience				
Kissing on mouth				
Boys	63.4	64.6	65.3	64.4
Girls	70.5	70.5	70.8	67.8
All	66.9	67.6	68.1	66.1
All	66.5–67.3	67.2–68.0	67.7–68.5	65.6–66.5
Light petting				
Boys	54.9	56.2	57.7	56.2
Girls	58.3	59.2	59.8	55.4
All	56.5	57.8	58.9	55.8
All	56.1–57.0	57.4–58.3	58.4–59.3	55.3–56.3
Heavy petting				
Boys	34.5	36.7	38.8	34.6
Girls	39.6	41.5	43.5	40.0
All	37.0	39.4	41.4	37.3
All	36.6–37.5	38.9–39.8	40.9–41.8	36.8–37.8
Coital experience				
Ever sexual intercourse				
Boys	19.0	21.8	23.2	20.8
Girls	22.1	24.7	26.5	25.1
All	20.5	23.3	24.9	22.9
All	20.2–20.9	22.9–23.6	24.5–25.3	22.5–23.3
Intensity of sexual activity				
Sexual intercourse at least 10 times				
Boys	5.9	7.5	8.5	7.8
Girls	9.4	10.9	11.9	11.8
All	7.7	9.2	10.2	9.8
All	7.4–7.9	8.9–9.5	9.9–10.5	9.5–10.1
At least 3 partners				
Boys	5.6	6.6	7.4	6.6
Girls	5.7	6.3	7.8	7.4
All	5.7	6.5	7.6	7.0
All	5.5–5.9	6.2–6.7	7.3–7.8	6.7–7.2
Contraception				
No contraception at the latest intercourse				
Boys	3.5	4.6	4.8	4.5
Girls	3.5	4.3	4.7	4.3
All	3.5	4.4	4.7	4.4
All	3.3–3.7	4.2–4.6	4.5–4.9	4.2–4.6

Data are % or 95% confidence interval unless otherwise specified.

## DISCUSSION

A shift to an earlier age of starting sexual activity was observed in the 1990s, when the proportion of teenagers reportedly engaged in sexual activities increased. At the same time, the use of effective contraception decreased, and, on average, the adolescent population had more partners and more coital events. In light of these results, the increase in the abortion rate is no surprise.

The years 2001–2002 were a turning point for the decline in the number of adolescents with sexual experience and those who had not used effective contraception. As could be expected, this was reflected in a

declining abortion rate. However, contrary to expectations, the number of coital events in the total population, when measured by the proportion of those reporting sexual intercourse at least 10 times, remained steady. Furthermore, the sexual activity of those reporting intercourse was more intense when measured by the above-mentioned number of coital events. Further studies are needed to understand this development.

By comparison, younger age at first sexual intercourse in the 1990s also has been observed and studied in other Western countries: the United Kingdom,<sup>5–8</sup> Denmark,<sup>9</sup> France,<sup>5,6</sup> Latvia,<sup>5,6</sup> and the United States.<sup>10</sup>



2004/2005 (n=46,707)	2006/2007 (n=46,824)	P for Trend	
		1996/1997–2000/2001	2000/2001–2006/2007
63.8	62.3	<.001	<.001
67.3	66.1	.55	<.001
65.6	64.1	.009	<.001
65.1–66.0	63.7–64.6		
55.0	52.5	<.001	<.001
53.7	50.9	.007	<.001
54.4	51.7	<.001	<.001
54.0–54.9	51.2–52.1		
32.7	32.2	<.001	<.001
38.5	35.5	<.001	<.001
35.8	34.0	<.001	<.001
35.4–36.3	33.5–34.4		
19.4	19.9	<.001	<.001
25.0	22.7	<.001	<.001
22.2	21.3	<.001	<.001
21.8–22.5	21.0–21.7		
7.0	8.7	<.001	.72
12.3	11.4	<.001	.36
9.6	10.0	<.001	.36
9.3–9.9	9.7–10.3		
5.5	6.6	<.001	<.001
7.5	6.2	<.001	<.001
6.5	6.4	<.001	<.001
6.3–6.7	6.2–6.6		
3.7	4.2	<.001	<.001
4.4	3.7	<.001	<.001
4.1	3.9	<.001	<.001
3.9–4.2	3.8–4.1		

The more explicit treatment of sexual matters in the media, advertisements, and fashion, called overerotization or hypersexualization,<sup>11</sup> throughout the Western world is likely to have aroused more interest in sexual experiences<sup>12,13</sup> and contributed to earlier sexual activity. Moreover, the greater number of partners probably reflects the same phenomenon, as does the increase in noncoital sexual experiences. Although this phenomenon contributed to the increase in the 1990s, it is common knowledge that expression of overt sexuality in the media has not diminished in the 2000s.

Decrease in sexual experiences at an early age starting in the first years of the new millennium has not been reported in other countries, thus it is not possible to conclude whether this is a country-specific phenomenon or whether a similar trend can be detected in other Western countries. Some of the explanatory factors are most likely country-specific for both periods.

The greater number of adolescents reporting no contraception in the 1990s may reflect difficulties in easy access to products. In an earlier study, we reported diminishing use of oral contraceptives among Finnish



**Table 2. Proportions and 95% Confidence Intervals of Adolescents With Coital Sexual Experiences and Nonuse of Contraception Among Those Reporting Sexual Intercourse**

Sexual Experience	1996/1997 (n=10,239)	1998/1999 (n=11,407)	2000/2001 (n=11,825)	2002/2003 (n=10,708)
Intensity of sexual activity				
Sexual intercourse at least 10 times				
Boys	32.3	35.7	37.2	38.6
Girls	43.1	45.3	45.1	47.6
All	38.2	40.8	41.5	43.5
All	37.2–39.2	39.9–41.7	40.6–42.4	42.5–44.5
At least 3 partners				
Boys	30.0	31.2	32.2	32.0
Girls	26.0	26.1	29.5	29.6
All	27.8	28.4	30.7	30.7
All	27.0–28.7	27.6–29.3	29.9–31.6	29.8–31.6
Contraception				
No contraception at the latest intercourse				
Boys	18.7	21.4	20.9	21.6
Girls	15.8	17.4	17.7	17.2
All	17.2	19.2	19.1	19.2
All	16.4–17.9	18.5–20.0	18.4–19.9	18.5–20.0

Data are % or 95% confidence interval unless otherwise specified.

girls at the end of the 1990s.<sup>14</sup> The use of oral contraceptives can be considered an indicator of the access to family planning services. In the 1990s, as a consequence of reorganizations and a severe economic recession, several municipalities made cutbacks in their school health service and family planning clinics, which earlier provided adolescents with easy access to contraceptive counseling.<sup>14,15</sup> Too little is known about changes in contraceptive counseling in school health service or family planning clinics in the 2000s to draw any conclusions as to whether these contributed to the decreased abortion rate.

Sex education covering the entire age group is important in providing correct and proper information on sexual matters, including contraception and media literacy skills against the hypersexual media information. Health education, the school subject in which sex education is taught, was not compulsory in Finnish schools in the 1990s. When taught, it was integrated into other school subjects. The amendment of the Basic Education Act<sup>16</sup> defined health education as its own compulsory school subject from 2004. The national curriculum that all schools have to follow strengthened the role of sex education.<sup>17</sup> As a consequence of these changes and the lively discussion in the preparation phase of the legislative proposal, the number of sex education lessons increased in the 2000s compared with the 1990s.<sup>18</sup> Well-informed teenagers acquiring their knowledge through school health education may be one of the explanations for the positive changes in sexual behavior and the abortion rate in the 2000s.

Toward the end of the 1990s, actions and media discussion of school-aged children's health in Finnish society was very active when research results showed deteriorating health and health behavior in this age group. For the first time, local research results were available to municipalities, schools, and parents (the present School Health Promotion Study). This activated health-promotion actions targeted at adolescents and likely was to activate parental care and monitoring of teenagers' activities. The growing concern about adolescent health resulted in increased activity and active discussions in the media and among health professionals, teachers, and school authorities as well as the general public and politicians.<sup>19</sup> This may have contributed to adolescents' sexual behavior and further to the lower abortion rate.

In Finland, most abortions are performed for what are known as social reasons. These cases require written permission from two physicians. However, if a girl is younger than 17 years old at the time of conception, permission from one physician is enough.<sup>20</sup> Abortions are performed in public hospitals in all parts of the country as part of public health care at low cost. During the 1990s and 2000s, the legislation concerning abortions has not changed and neither have the facilities where abortions are performed.

Finally, we should consider the role of alcohol use in adolescents' sexual experiences. Increased alcohol use and binge drinking among teenagers in the 1990s<sup>21</sup> may have contributed to the increased unprotected sex and multiple partners<sup>22,23</sup>; a decrease in alcohol use



2004/2005 (n=10,355)	2006/2007 (n=9,987)	P for Trend	
		1996/1997–2000/2001	2000/2001–2006/2007
37.1	44.5	<.001	<.001
49.7	50.7	.052	<.001
44.2	47.8	<.001	<.001
43.3–45.2	46.8–48.8		
28.9	33.6	.035	.83
30.2	27.5	<.001	.10
29.6	30.3	<.001	.33
28.8–30.5	29.4–31.2		
19.5	21.4	.034	.84
17.6	16.2	.015	.12
18.4	18.6	.002	.21
17.7–19.2	17.8–19.4		

and binge drinking in the 2000s<sup>21</sup> may have had an opposite effect.

This study was based on highly comparable national surveys maintaining similar data collection methods, samples, and questions over the years. The response rates to the current surveys were high, and the 5–10% of pupils who were absent on the survey day, most often because of sickness, would hardly differ from those who responded to the questionnaire. In the analyses, we included only those schools participating in all surveys. There were only minor differences in sexual indicators between the schools joining the study at the very beginning and those joining it later. Our data may underestimate the proportion of sexually active adolescents in the population somewhat. However, if there is a small selection bias, the bias is most likely similar over time and thus has no effect on the comparisons between the surveys. The same applies to the reliability of the questions on sexual behavior. Earlier studies have shown a high repeatability of questions regarding contraception.<sup>14</sup> Adolescents report their sexual behavior and contraceptive use reliably over a 6-month interval.<sup>24</sup> However, the reliability of self-reported sexual behaviors decreases with the increasing duration of the recall period. If sexual behaviors were underreported in the current study, the underreporting was most likely similar over time and thus has no effect on the comparisons.

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Original article

# The Use of Oral Contraceptives Among Finnish Teenagers from 1981 to 2003

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**Abstract:**

**Purpose:** The teenage abortion rate has increased in Finland since 1995, after a long-term decrease. We studied changes in the use of oral contraceptives (OC) among 14–18-year-old Finnish girls from 1981 to 2003.

**Methods:** A self-administered questionnaire (the Adolescent Health and Lifestyle Survey) was sent biennially to a representative sample of 14–18-year-olds from 1981–2003. Numbers of respondents varied between 1200 and 4100 and response rates between 77% and 90%. Altogether, 35,939 girls participated. OC use, and individual, family, and place of residence factors were examined. Logistic regression models were run separately for 1981–1991 and 1993–2003.

**Results:** The proportion of OC users doubled from 1981 to 1991, from 9.5% to 19.3%. The rising trend leveled off after 1991 and settled down at around 19% to 20%. During both periods, OC use was higher among girls with early age at menarche, still in school at age 16–18 years, poor school achievement, living in one-parent families or with a stepparent, and girls whose parents had a low level of education. OC use decreased in the capital area in the early 1990s, unlike in other areas.

**Conclusions:** Adolescent OC use increased in the 1980s. A decade later, despite known increase in sexual activity, OC use remained unchanged. This was probably a result of deteriorated access to contraceptive counseling after changes in health service, and may have contributed to the increased abortion rate. Except for a decrease in OC use in the capital area, the association of individual, family, and regional factors with OC use remained mostly stable during 1981–2003. © 2006 Society for Adolescent Medicine. All rights reserved.

**Keywords:** Adolescent; Oral contraceptives; Trend

Induced abortions among 15–19-year-old Finnish girls started to increase in the mid-1990s after a long-term and constant decrease (Figure 1) [1]. From 1994 to 2002, the abortion rate increased by 50%, although, in international comparison, the rate was still low [2]. The sharp increase among adolescents raises questions about changes both in

the use of contraception and in the effectiveness of family planning services for this age group.

Easy access to family planning services combined with low costs of contraception has been considered the fundamental element in prevention of teenage pregnancies [3]. In Finland, health services are offered equally to all citizens. The Primary Health Care Act of 1972 stipulated that every municipality has to provide basic preventive services, including family planning, to all its citizens free of charge [4,5]. Since then, visits to municipal family planning clinics, including the first method of contraception (usually a few packages of oral contraceptives [OC] or condoms) have

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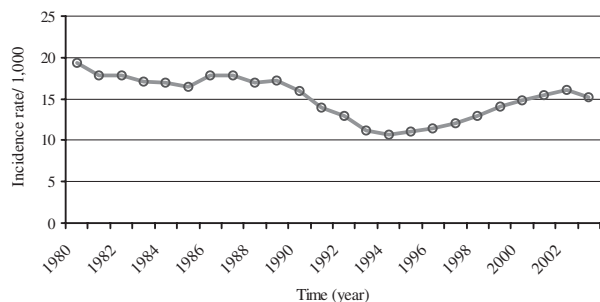


Figure 1. Trends of abortion rates in girls below 20 years of age in Finland, National Research and Development Center for Welfare and Health (STAKES) [1].

been free of charge. A second option for school-aged girls has been the school health services, which offer an easy access to contraceptive counseling free of charge. Adolescent access to both types of services has been confidential, requiring no parental consent.

The goal of the Finnish Primary Health Care Act was to guarantee equal access to health services, including family planning services, regardless of the place of residence and socioeconomic status [4]. Previous findings suggest that, in family planning, these goals were effectively reached during the 1980s. Oral contraceptive use among 16-year-olds increased steeply during that decade, and the increase was similar in all parts of the country and in all socioeconomic groups, indicating an equal access to contraceptive services [6].

Two reforms in the 1990s may have contributed to the deterioration of family planning services in Finland and, consequently, to a decrease in OC use and increase in abortion rates. First, in the beginning of the 1990s, a health-care reform from a centralized, state governed system to a decentralized, municipality governed system shifted the power of planning and funding of services to local authorities. Owing to simultaneous economic recession in the country, several municipalities decided to reduce preventive services, including family planning and school health services, which resulted in regional inequality in service accessibility and quality. Second, since the mid-1990s, local authorities were given more power to decide on their school curricula. Because health education was not a mandatory subject at that time, the quality and quantity of sex education in schools varied [7].

The aims of this study were to investigate changes in the use of oral contraceptives among Finnish 14–18-year-old girls from 1981 to 2003; and to determine the association between individual, family, and place of residence factors and oral contraceptive use among Finnish 14–18-year-old girls from 1981 to 2003.

## Materials and Methods

In the Adolescent Health and Lifestyle Survey (AHLS), data have been collected every second year since 1977 by

postal inquiry to national samples of 12-, 14-, 16-, and 18-year-old Finnish adolescents. Use of oral contraceptives has been asked about since 1981. Self-administered questionnaires, using personally addressed envelopes, are mailed in February, with two re-inquiries to nonrespondents at three and seven weeks. The timing of the study, sampling and data collection methods were similar throughout the study period. The cover letter mentions that if parents want to see the questionnaire, they should do so before answering. The number of respondents varied from 1200 to 4100 and the response rates from 77% to 90% (Table 1). Twelve-year-olds were excluded from the current study, because only three girls reported OC use during the study years. A total of 448 subjects were excluded due to missing data on oral contraceptive use. Altogether, 35,939 girls aged 14, 16 or 18 years were included. The AHLS study protocol has been approved by the Ethical Committee of the Department of Public Health of the University of Helsinki.

*Use of oral contraceptives.* Subjects were asked, “Are you currently using oral contraceptives?” with response options “Yes” and “No.” Individual, family, and place of residence factors were collected on study participants, and their association with contraceptive use was examined.

*Individual factors.* Age at menarche was categorized in three groups; early (11 years or under), average (12 to 13 years), and late (14 years or older). Educational career for 16- and 18-year-old girls was classified: not in school, in vocational school, and in high school. Because all 14-year-old girls are in comprehensive school, they were not included in this variable. School achievement based on pupil’s own assessment of his or her position in class according to latest report was categorized: much better and slightly better (than average), average, and poorer (than average). The majority of 16- and 18-year-old girls were still in school,

Table 1  
Adolescent Health and Lifestyle Survey response rates (%) by year of survey and age of respondent

Survey year	Age (years)			Overall	
	14	16	18	%	n
1981	92	91	88	90	1601
1983	86	91	87	88	1500
1985	88	87	83	86	1393
1987	90	89	84	87	3887
1989	90	82	80	84	1218
1991	86	86	82	85	3712
1993	86	87	83	85	3953
1995	85	88	86	86	4083
1997	84	87	83	85	4141
1999	85	85	80	83	3962
2001	79	82	76	79	3599
2003	78	79	74	77	3338
Overall	75	87	83	86	1601

and nearly 90% reported their latest school achievement in this age group.

**Family factors.** Parents' level of education was gathered in 1981–1993 and in 1997 by a single question on father's or other guardian's education, whereas in 1995 and in 1999–2003, *mother's education* and father's education were asked separately. A variable comparable over the years, *father's or other guardian's education* was formed using father's education for 1995 and 1999–2003, and, if that was missing, mother's education was used. In 1981–1987, two questions were asked eliciting whether the parents were alive and whether they lived together, but in 1989–2003, a question on who is residing in your home was used. Two variables were formed: *living with parents* (with mother and father, other family type) for all survey years, and *family structure* (mother and father, mother/father and stepparent, one-parent family, husband/partner, other guardian) for 1989–2003.

**Factors describing the place of residence.** The country was divided into four geographical regions: south, north, east, and west according to the provinces. *Urbanization level* of the place of residence was defined by population density of the municipality in four categories: capital area (Helsinki and adjoining towns), other cities, rural villages, and sparsely populated rural areas (isolated homesteads in rural municipalities).

Statistical significance test (two-tailed,  $p$  value  $\leq .05$ ) for a linear trend in the proportions of OC use was used in untransformed data. Logistic regression analysis was used to determine whether there were statistically significant differences in OC use by individual or family factors, or factors describing the place of residence. The data were analyzed separately in two 10-year periods, 1981–1991 and 1993–2003. Models were fitted separately for each explanatory variable after excluding cases with missing data for the variable concerned. To improve the goodness of fit of the logistic regression models, 14- and 16-year-olds were combined. In each case, age was first constrained into the model, next, the survey year was fitted, and then the variable of interest. To test changes in OC use by individual or family factors, or factors describing the place of residence, the interaction term of the survey year and each explanatory variable were fitted into the above models.

To study repeatability, a sub-sample of 14- and 16-year-olds ( $n = 407$ ) was randomly selected from the original subject series of 2003. Of these, 329 (80%) girls had responded to the inquiry. An identical questionnaire was mailed to these 329 girls approximately four weeks after receipt of the original one; 278 of them (68%) returned the second questionnaire. Test-retest reliability of OC use was tested with  $\kappa$ -coefficient. The  $\kappa$  was .82, which indicates a substantial agreement beyond chance between the two questionnaires.

To analyze nonrespondents, the data were divided into three categories according to questionnaire return date. It was assumed that the later the person answered (original questionnaire, first re-inquiry, or second re-inquiry) the more she resembled a nonrespondent. There was no statistically significant difference in OC use between early and late respondents among girls aged 16 ( $p = .60$ ) or 18 ( $p = .17$ ), whereas the prevalence of OC use was higher in late-respondents aged 14 years ( $p = .004$ ). In girls aged 14 years, the prevalence of oral contraceptive use was 2.0% among the 860 respondents to the original questionnaire, 3.5% among the 286 respondents to first re-inquiry, and 7.9% among the 89 respondents to the second re-inquiry.

## Results

The prevalence of OC use doubled from 1981 to 1991, from 9.5% to 19.3% (Figure 2). A test for the linear trend of OC use between 1981 and 1991 showed statistical significance among girls aged 14, 16 or 18 years ( $p \leq .001$ , all). The proportion of adolescents aged 18 years taking OC increased from 22.0% in 1981 to 41.4% in 1991. The corresponding figures for 16-year-olds were 6.6% and 17.7% and for 14-year-olds 0.2%, and 2.5%, respectively.

The rising trend leveled off after 1991, and the proportion of users settled down at around 19–20%. The proportion of adolescents aged 18 years taking OC increased from 38.2% in 1993 to 40.1% in 2003. The corresponding figures for 16-year-olds were 16.7% and 20.8%, respectively, and for 14-year-olds 1.6%, and 2.8%, respectively. The trend in OC use between 1993 and 2003 was statistically significant among girls aged 16 years ( $p = .01$ ), but nonsignificant in those aged 14 ( $p = .09$ ), and 18 ( $p = .12$ ) (Figure 2).

To find out the determinants of the differences in OC use, the analyses were performed separately for the two study periods, 1981–1991 and 1993–2003.

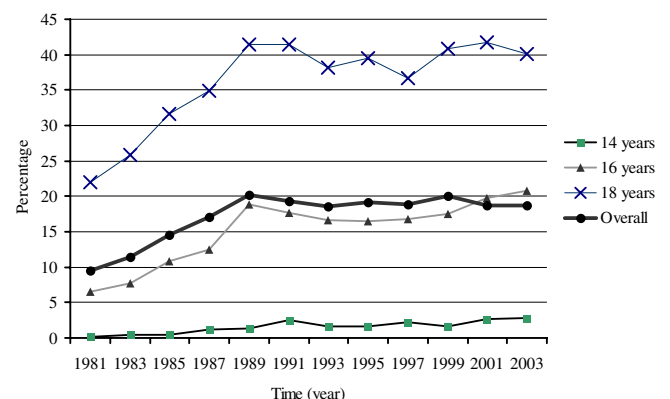


Figure 2. Percentage (%) of oral contraceptive users by age and survey year.

### OC use in different population groups

**Individual factors.** Age at menarche, educational career, and school achievement were related to OC use during 1981–1991 and 1993–2003 (Table 2). The use was higher in girls with early age at menarche and lower in girls with late age at menarche, compared to those with average age at menarche. Girls in vocational or high school were more frequent users of OC compared with girls not in school. The proportion of OC users was higher in adolescents with poor

school achievement than in those with good achievement (Table 2).

**Family factors.** Living with parents, family structure and parents' education were strongly associated with OC use in both periods (Table 2). OC use was less common in girls who lived with both parents than in other types of families. In 1993–2003, when more accurate information on family structure was gathered, OC use was more frequent in girls living with father/mother and stepparent, or in a one-parent

Table 2

Odds ratio (OR) of oral contraceptive use according to individual, family, and place of residence variables (adjusted for age and time of survey) in the years 1981–1991 and 1993–2003

Background characteristic	Study sample	Oral Contraceptive users	(%)	1981–1991		1993–2003	
				OR	95% CI	OR	95% CI
<b>Age at menarche</b>							
Average	16,133	2886	17.9	1		1	
Early	3618	845	23.4	1.5	1.3–1.7	1.5	1.3–1.7
Late	4610	650	14.1	.6	.5–.7	.6	.5–.7
<b>Educational career (16–18-year-olds)</b>							
Not in school	999	194	19.4	1		1	
Vocational school	6528	2124	32.5	2.0	1.8–2.3	1.6	1.5–1.8
High school	13,256	2973	22.4	1.8	1.3–2.4	1.4	1.1–1.7
<b>School achievement</b>							
Much better	4916	588	12.0	1		1	
Slightly better	10,373	1601	15.4	1.4	1.2–1.7	1.2	1.1–1.4
Average	14,004	2683	19.2	1.9	1.5–2.2	1.5	1.3–1.7
Poorer	3732	696	18.6	1.9	1.5–2.5	1.8	1.5–2.1
<b>Living with parents</b>							
Living with mother and father	26,817	4123	15.4	1		1	
Other family type	8817	2261	25.6	1.9	1.7–2.1	1.8	1.7–1.9
<b>Family structure</b>							
Mother-father	20376	3315	16.3	a	a	1	
One parent; one stepparent	2260	551	24.4			1.8	1.6–2.0
One-parent family	3815	850	22.3			1.5	1.4–1.7
Husband/wife or partner	732	441	6.2			3.6	3.0–4.3
Other guardian	174	48	27.6			1.2	.8–1.8
<b>Father's or other guardian's education</b>							
Low	22,821	4392	19.2	1		1	
Middle	6071	992	16.3	.8	.7–.9	.8	.7–.9
High	5316	757	14.2	.7	.6–.8	.7	.6–.7
<b>Mother's education</b>							
Low	7142	1569	22.0	b	b	1	
Middle	2483	449	18.1			.8	.7–.9
High	4506	697	15.5			.7	.6–.8
<b>Urbanization level</b>							
Capital area	3982	668	16.8	1		1	
Cities	18,276	3616	19.8	.9	.8–1.1	1.4	1.2–1.6
Rural villages	8379	1458	17.4	.8	.7–1.0	1.3	1.1–1.5
Sparsely populated areas	4824	649	13.5	.6	.5–.7	.9	.8–1.1
<b>Region</b>							
Southern	12,868	2363	18.4	1		1	
Northern	5544	976	17.6	.9	.8–1.0	1.0	.9–1.1
Eastern	4587	728	15.9	.7	.6–.8	.9	.8–1.0
Western	12,937	2394	18.5	.9	.8–1.0	1.0	1.0–1.2

OR = odds ratio; CI = confidence interval.

<sup>a</sup> Not measured between 1981 and 1987.

<sup>b</sup> Measured from 1995 to 2003.

family. Girls whose parents had a high educational level used OC less often than girls whose parents had a low educational level.

*Place of residence.* OC use was somewhat less common in the eastern part of the country than elsewhere over the first period (Table 2). From 1981 to 1991, the prevalence of OC use was significantly lower in sparsely populated areas compared with capital area. It was nonsignificantly lower in cities and rural villages over this period, but, during 1993–2003, OC use increased in cities and rural villages relative to the capital area (Table 2).

#### Trends in OC use in different population groups

To study variations in OC use between different population groups, the interaction term of the survey year and each explanatory variable were introduced into the models of Table 2. The interaction term showed statistical significance only with respect to urbanization level, and the goodness-of-fit of the logistic regression models improved after including the interaction term. Between 1981 and 1991, OC use in cities and rural villages was almost identical to that of the capital area, whereas OC use in sparsely populated rural areas was below that of cities or rural villages (Figure 3). OC use in the capital area decreased in the beginning of the 1990s. From 1993 to 2003, compared with the capital area, OC use was more common in cities and rural villages, but similar in sparsely populated rural areas.

## Discussion

Our findings demonstrate that OC use among adolescents more than doubled in the 1980s, whereas only minimal increases in OC use were evident in the 1990s. Differences in the use between population groups remained mainly stable over time. However, from 1993 onward, OC use decreased in the capital area compared with other areas.

Two methods of contraception are commonly recommended and used for adolescent contraception in Finland. Condoms (with emergency contraception in case of failure) are recommended if coital experiences are infrequent and

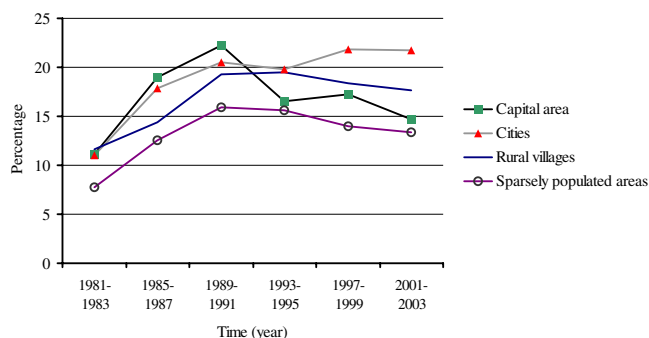


Figure 3. Percentage (%) of oral contraceptive users by level of urbanization and survey year in girls aged 14–18 years.

casual, and OC (alone or combined with condoms) are recommended if sexual activity is more regular. The proportion of adolescents with coital experience generally reflects the need for contraception (condoms or OC) among that population. The proportion of adolescents who are sexually active on a regular basis reflects the need for OC [8,9].

Finnish surveys did not show significant changes in teenage sexual behavior between the mid-1980s and mid-1990s [10]. Therefore, the rising trend in adolescent OC use between 1981 and 1991 was primarily due to changes in the pattern of practices in health care. The practice of prescribing OC to young teenagers was adopted in Finland in the 1980s [4]. The leveling off of OC use at the beginning of the 1990s together with low teenage pregnancy rates suggest that the need for regular contraception and OC use were in balance at that time [4]. In the latter half of the 1990s, adolescent sexual activity increased in Finland [11]. However, the present study did not show a respective increase in OC use, which may be one reason why abortion trends reversed upwards at that time.

That OC use did not grow consistently with increasing sexual activity in the 1990s was most likely related to cuts in municipal family planning services and school health services, which previously provided an easy access to contraceptive counseling for that age group. These services were reduced in the early 1990s [12,13], partly owing to economic recession, and partly as a result of comprehensive reorganization of the public primary care services. In 1995, a separate family planning clinic with specialized personnel remained only in one-third of the municipalities, whereas one-third integrated family planning services into family doctors' work, and one-third offered these services in a more or less mixed way [13]. Unlike many other countries, there was no parallel organization of youth clinics in Finland to replace the reduced services. As other studies have shown, students prefer school-based health services for sexual health counseling, and, hence, deterioration of these services represents a missed opportunity to provide health care to adolescents, and a substantial risk of pregnancy [14,15]. The fact that in the mid-1990s particularly, sex education in schools was of varying quality and quantity [7], may have further contributed to OC use staying stable and the increased abortion rate.

To explain why OC use did not increase despite an increase in sexual activity in the late 1990s, reasons other than changes in the health care services need also to be explored. Firstly, a public debate in 1995 voiced a concern of an increased risk of venous thromboembolism related to the use of the third-generation OC [16,17], which led to reduce OC use in many countries [18,19]. In Finland, discussions in the media were active too, but reactions were moderate, and, in the short run, Finnish adolescents survived the pill scare with neither a decrease in OC use nor an increase in abortion rates [20]. Over the next few years, however, the use of OC did not increase as might have been

expected on the basis of the increased sexual activity. Only guesses can be made as to whether this media discussion had a long-term effect on doctors' prescription behavior or teenagers' demand for OC.

The second contributing explanation to be considered is that adolescents used contraceptive methods other than OC in the late 1990s, condoms in particular. Public campaigns to promote condom use were carried out in Finland in the late 1980s after the emergence of human immunodeficiency virus (HIV) [4]. The most remarkable change after the campaigns was that the proportion of adolescents who neglected contraceptive use at first sexual intercourse decreased over the next few years, reflecting an increased use of condoms [4,21]. In the 1990s, however, intensified public condom campaigns were not conducted. Probably the perceived threat of HIV also diminished, because the rates of HIV transmission remained low in Finland. As a consequence, use of condoms decreased in the late 1990s [11]. As a third explanation, we might consider sex education in schools, which has been found to be of varying quality and quantity [7], particularly in the mid-1990s, and which may have further contributed to seeking services to obtain OC.

The association of individual, family, and regional characteristics with OC use remained mostly unchanged over the study period. The lower OC use in the capital area after 1993 may also reflect difficulties in primary health care service delivery. Besides reductions described above, the number of family doctors there is low compared with the size of the population, which may generally hinder access to the services. On the other hand, provision of private and nongovernmental services is wider in the capital area than anywhere else in the country. Assuming that the reductions in the public family planning services played a role in decreasing adolescent use of contraception in the capital area, it suggests that other kinds of services (mostly chargeable) cannot replace the free-of-charge public family planning services for adolescents. Changes in the ethnic structure of the population in the capital area were relatively small in the 1990s and cannot explain the changes in OC use [22]. According to previous studies, teenage sexual activity has been equally high in the capital of Helsinki as in the smaller towns [23].

This study had several advantages. Similar data collection methods, samples, and questions guaranteed comparability of the surveys over the years. Questions concerning present use of OC were answered by adolescent girls, and the repeatability of the questions was high. If there is a declaration bias, it is similar over the study years, without affecting the comparability of the years. A limitation of the study was that the inquiry was sent to home addresses. Consequently, sexual behavior was not asked, as this might have lowered the response rates. The fall in response rates over time has been a general phenomenon in all surveys in Finland. Our indirect analysis of nonrespondents suggested that there were no differences between respondents and

nonrespondents among the 16- and 18-year-olds, but among the 14-year-olds, the number of OC users may show a slight underestimation. However, even here the bias is likely to be similar throughout the study period, without affecting the comparisons over time.

In summary, OC use did not increase in the 1990s, but sexual activity rates and abortion rates went up. Our conclusion is that the deterioration of municipal family planning and school health services contributed to a decrease in OC use and, consequently, to an increase in abortion rates. In the efforts to control abortion rates among teenagers, provision of family planning services is important, with a special emphasis on easy access to adolescent clients.

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# The use of the vaginal ring and transdermal patch among adolescent girls in Finland

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**ABSTRACT** **Objective** Little is known about the use of the vaginal ring and transdermal patch in representative adolescent populations although these contraceptives are supposed to be a good option for that age group. The aim of this study was to determine the use of the vaginal ring and that of the transdermal patch and to compare these with the use of oral contraceptives (OCs) and emergency contraception in adolescent girls residing in Finland. **Methods** As part of the Adolescent Health and Lifestyle Survey a questionnaire was mailed to a representative sample of girls aged 14, 16 or 18 years residing in Finland. Of these 3029 (72%) responded. **Results** The use of the vaginal ring (0.9%) and that of the transdermal patch (0.1%) were uncommon whereas OCs were commonly resorted to (20%). Only 0.6% of girls aged 16 and 2.5% of those aged 18 used the vaginal ring or the transdermal patch. Fifteen percent of girls had ever used emergency contraception. **Conclusion** The vaginal ring and the transdermal patch are rarely used by adolescents. Our findings suggest that these novel contraceptive methods have not been adopted by family planning services.

**KEYWORDS** Adolescents, Finland, Oral contraceptives, Prevalence, Transdermal patch, Vaginal ring

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## INTRODUCTION

Oral contraceptives (OCs) constitute an established method of preventing pregnancy in adolescents; emergency contraception (EC) can be used in case of failure of regular contraception<sup>1</sup>. The vaginal ring (NuvaRing<sup>®</sup>) and the transdermal patch (Evra<sup>®</sup>) are novel hormonal contraceptives which became available on the Finnish market in 2003. They were supposed to be a better option for adolescents than pills as they do not require adherence to a daily regimen. Adolescents may show greater compliance with these methods<sup>1,2</sup>.

Easy access to family planning (FP) services and the low cost of contraception contribute greatly to the prevention of teenage pregnancies. In Finland, the Primary Health Care Act of 1972 stipulated that every municipality must provide basic preventive services, including FP, to all its citizens at no cost<sup>3</sup>. Next to municipal FP clinics, school health services are another option for school-aged girls, as they offer an easy access to contraceptive counselling which is also free of charge. Adolescent access to both types of services is confidential, requiring no parental consent.

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To date very little is known regarding the use of the vaginal ring and transdermal patch in representative adolescent populations. A study among British girls aged 16–19 years in 2007–2008 showed that the transdermal patch is not used (0%)<sup>4</sup>. In Finland, OC use of 14 to 18-year-old girls doubled from 9.5% to 19.3% between 1981 and 1991, and levelled out at around 19–20% between 1991 and 2003<sup>5</sup>. During the period 2003–2007, OCs have been prescribed to 22–36% of girls aged 14–19 years in the United States, UK and Lithuania<sup>4,6–8</sup>.

Hormonal EC has been available in Finland since 2002 for women aged 15 and more. In 2003, it had been used by 2% of girls aged 14 years, 15% of those aged 16, and 29% of those aged 18 years<sup>9</sup>. In theory, the use of both the vaginal ring and the transdermal patch could diminish the need for EC because of their greater compliance.

The aim of this study was to determine the prevalence of use of hormonal contraceptives, particularly that of OCs, the vaginal ring and the transdermal patch among girls residing in Finland.

## METHODS

The present study is a part of the Adolescent Health and Lifestyle Survey, which was conducted in 2007. It assessed national samples of 14, 16 or 18-year-old girls residing in Finland<sup>5,9</sup>. The samples were obtained from the Population Register Centre and based on selected dates of birth in June, July and August (16

days for 16 and 18-year-olds, 15 days for 14-year-olds), so that all girls born on the given days were included.

Self-administered questionnaires with personally addressed envelopes were mailed to 4,195 girls, with three reminders to non-respondents. It was mentioned in the cover letter that participation in the survey was voluntary and that if parents wanted to see the questionnaire, they should do so before it was completed by the adolescent concerned. Of all those to whom the questionnaire was sent, 3029 (72%) girls responded. Twenty-six girls who did not provide information on hormonal contraception were excluded, leaving 3003 eligible subjects. The study protocol was approved by the ethical committee of the Pirkanmaa Hospital District.

Information on the use of hormonal contraceptives was gathered by means of the following four questions: (1) 'Are you nowadays using oral contraceptives?' (2) 'Are you nowadays using the vaginal ring?' (3) 'Are you nowadays using the transdermal patch?' The response alternatives were 'No' and 'Yes' for each. (4) 'Have you ever used an emergency contraceptive?' with response alternatives 'I do not know what emergency contraception is', 'No, I have not', 'Yes, and I have used it ... times'.

Questions concerning the use of depot-medroxyprogesterone acetate and of contraceptive implants were not included in this survey because these methods are very seldom prescribed to adolescents in Finland.

**Table 1** Distribution of current use of oral contraceptives, the vaginal ring and the transdermal patch, and ever use of emergency contraception by age in girls residing in Finland in 2007

	<i>18 years</i>	<i>16 years</i>	<i>14 years</i>	<i>All</i>	
	<i>n = 905</i>	<i>n = 995</i>	<i>n = 1103</i>	<i>N = 3003</i>	
<i>Hormonal contraception</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>%</i>	<i>95% CI</i>
Current use of hormonal contraception					
Oral contraceptives	43.2	17.3	3.3	20.0	18.5–21.4
Vaginal ring	2.4	0.5	0	0.9	0.5–1.2
Transdermal patch	0.1	0.1	0	0.1	0–0.2
No hormonal contraception	54.3	82.1	96.7	79.1	77.6–80.6
Ever use of emergency contraception	31.3	14.9	1.5	14.9	13.6–19.2

CI, confidence interval.



## RESULTS

Overall 21% of the girls were current users of a pill, the vaginal ring or the transdermal patch (Table 1). The use of OCs was much more commonly reported than that of the vaginal ring or the transdermal patch. The use of all hormonal contraceptives, except that of the transdermal patch, increased with age.

Among current users of hormonal contraceptives ( $N=627$ ), 100% of girls aged 14 years, 96.6% of those aged 16 years and 94.7% of those aged 18 used an OC. Only 3.4% of girls aged 16 and 5.3% of those aged 18 used the vaginal ring or transdermal patch.

Fifteen percent of girls had (ever) used EC. Among the current users of hormonal contraceptives, 43.2% had ever resorted to EC.

## DISCUSSION

The main finding of this study is that the vaginal ring and the transdermal patch are rarely used by adolescent girls in Finland. Only 0.5% of girls aged 16 years and 2.4% of those aged 18 years used the vaginal ring. The use of the transdermal patch was even less common.

OCs have retained their position. Overall, their prevalence of use among Finnish girls has remained stable between 2003 (19%)<sup>5</sup> and 2007 (20%). The availability of the vaginal ring and the transdermal patch has not led to a reduction of the market share of OCs in the age group concerned.

A survey of contraceptive use by women aged 15–49 years in 14 European countries other than Finland in 2006 showed similar results<sup>10</sup>. OCs were used by 28% (range 15–49%), the transdermal patch by 1% (range 0.2–4%) and the vaginal ring by 1% (range 0.1–2%). Women of any reproductive age seldom use the latter two methods.

The use of novel contraceptives depends on the awareness of both the clients and the service providers. Regarding FP service provision, a previous study from Finland suggests that primary care has been slow in adopting the latest recommendations and new prescription practices (Sannisto T and Kosunen E, unpublished). This may explain, in part, why the vaginal ring and transdermal patch are used so infrequently. In the present study, information

regarding knowledge of girls about the ring and the patch was not obtained. Among American girls aged 14–21 years<sup>11</sup>, 52% were unaware of the existence of the vaginal ring. Of those who were, only 35% had sufficient knowledge. Further studies on awareness of these new methods among potential users are needed.

There may be other reasons for the infrequent use of the vaginal ring and the transdermal patch. Their higher cost may reduce their appeal, particularly among adolescents, and they have been available on the Finnish market only since 2003, which is a relatively short period of time.

Every third 18-year-old and every seventh 16-year-old girl had used EC at least once in 2007. The figures were similar to those in 2003 that we reported previously<sup>9</sup>. Obviously, the use of the patch and that of the ring were so infrequent that they could not possibly have affected the need for EC.

Our study had strengths and limitations. The sample represented the entire country and the response rate was relatively high. We gathered information on the current use of OCs, the vaginal ring and the transdermal patch by adolescent girls. The questionnaire used in the Adolescent Health and Lifestyle Survey was sent to the participants' homes and was also intended for 12-year-olds. Therefore, we could not gather information about sexual behaviour and other contraceptive methods. Even though we cannot exclude the possibility of underreporting, the comparison with the use of OCs gives a reliable estimate of the low use of the two novel forms of hormonal contraception concerned.

In summary, the vaginal ring and the transdermal patch are seldom used by adolescent girls in Finland. Our findings suggest that FP services may need to adopt innovations in contraceptive technology faster.

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Research article

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## Emergency contraception among Finnish adolescents: awareness, use and the effect of non-prescription status

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### Abstract

**Background:** Adolescents need to be aware that there is a method of preventing pregnancy even after an unprotected intercourse. Limited information is available on the awareness of young adolescents and the effects of selling emergency contraception (EC) over-the-counter, and the findings are controversial. The aims of this study were to investigate awareness and use of EC among Finnish girls aged 12–18 years in 1999–2003, and to assess the effect of the 2002 non-prescription status on the use.

**Methods:** A self-administered questionnaire was sent to a population-based sample of 12–18-year-olds girls in 1999, 2001, and 2003. Response rate was 83% in 1999 (N = 4,369), 79% in 2001 (N = 4,024) and 77% in 2003 (N = 3,728), altogether N = 12,121. Logistic regression model was used to examine the association of unawareness and use of EC with socio-economic background and health behaviour.

**Results:** In 2001, nearly all 14–18-year-olds and a majority of 12-year-olds were aware of EC. Among 12–14-year-olds, a slight increase in awareness between 1999 and 2003 was observed but this was not related to non-prescription status. Health-compromising behavior (alcohol use, smoking), dating and having good school achievement were related to higher awareness of EC.

Nine percent of 14–18-year-olds had used EC once and 1% three times or more. No statistically significant change in EC use was found after non-prescription status. EC use increased with increasing alcohol consumption, particularly at age 14. Smoking, dating, and poor school achievement were related to increased use as well as not living in nuclear family. A lower use was observed if living in rural area or father's education was high. Mother's education was not related to use.

**Conclusion:** Adolescent girls were well aware of the existence of emergency contraception even before the non-prescription status. Over-the-counter selling did not increase the use.

## Background

The availability of emergency contraception is important for adolescents in particular. A condom is the most frequently used contraceptive method in early stages of sexual activity, but also failures in the use are frequent. In addition, completely unprotected sexual encounters are more usual in early years of sexual career than in adult age [1].

Hormonal emergency contraception (EC) has been known for over three decades. The first commercial product contained both estradiol and levonorgestrel (Yuzpe method). Because of the potential side effects of the estrogen component, a doctor's prescription was required for obtaining it. After the levonorgestrel-only method was introduced on the market, and showed to be more effective with less side-effects compared to the Yuzpe method [2], many countries accepted selling it over-the-counter without a prescription in order to improve availability. In Finland, over-the counter sales to those aged 15 or older was accepted in 2002. Adolescents do not need parental consent for buying EC from pharmacies and access to family planning services is confidential.

Limited information is available on the effects of selling EC over-the-counter, and the findings are controversial. A study among girls aged 16 to 19 years in UK concluded that over-the-counter sales had no effect on the use of EC [3] while a study in Canada among girls aged 15–19 years showed an increase [4]. In Finland, sale figures of EC products increased 62% in 2002 when EC change to non-prescription status was carried out [5]. No detailed analysis of the effects of the change in prescription status or on socioeconomic and regional distribution in the adolescent EC use has been published.

Among sexually active girls aged 14–20 years the life-time use of EC has ranged from 10% in England to 28% in Sweden [6-11]. In Finland, 6.6% of all girls aged 14–17 years had used EC in 1996 [9]. Most studies on the EC use have been carried out under circumstances where the product was not available without a doctor's prescription. Under such circumstances, the use of EC reflects to a great extent how easy the access to services is. It is well known that access to services has a strong impact on adolescent contraceptive use.

To be able to seek EC, adolescents need to be aware that there is a method of preventing pregnancy even after an unprotected intercourse. The awareness of EC in adolescent population has been studied in some countries. The prevalence has varied a great deal, from 28% in the USA to 81% in the UK [6,8,10-14]. A few studies have also shown that even if adolescents were aware of EC, only a small proportion knew of the time limits within which EC

is effective [8,10,12,14]. In Finland, the first study on awareness of EC in 1996 showed that over 90% of 14–16-year-old adolescents knew about the method [9].

Early sexual activity is related to many factors reflecting risk-taking life-style like having multiple sex partners, smoking and drinking [6,15]. There is limited information available on the associations between life-style factors and EC use in adolescence. In the Swiss study, EC use was higher in girls with more than three partners, first love affair before 14 years, regular sexual intercourse, unplanned or unconscious first intercourse and a history of pregnancy [6]. Teenagers who consumed alcohol took EC more frequently than non-consumers [16]. Alcohol intake is often connected with unplanned, unprotected intercourse [15,17].

In this study, we investigate the use and awareness of the emergency contraception as well as their variation by individual and family factors and place of residence, among Finnish girls aged 12–18 years. The impact of allowing easier access to the product through over-the-counter status is studied by comparing the years 1999–2001 with the year 2003.

## Methods

### Participants

In the Adolescent Health and Lifestyle Survey (AHLS), data have been collected every second year since 1977 by postal inquiry to national samples of 12, 14, 16 or 18 years residing in Finland. The use of emergency contraceptive was asked in 1999, 2001 and 2003. The cover letter mentions that if parents want to see the questionnaire, they should do so before answering. The samples were obtained from the population register centre and based on selected dates of birth (July in some years and dates from June and August included too), so that all Finns born on the given days were included. Self-administered questionnaires were mailed in February with two re-inquiries to non-respondents. The timing of the study, sampling and data collection methods were similar throughout the study period.

Response rate was 83% in 1999 (N = 4,369), 79% in 2001 (N = 4,024) and 77% in 2003 (N = 3,728). Subjects (N = 208) with missing information on emergency contraception were excluded and 11,913 girls aged 12, 14, 16 or 18 years included in the study. For the analyses of the characteristics of emergency contraceptive use, girls aged 12 years were excluded because none of them used EC and finally 10,899 were included.

The AHLS study protocol has been approved by the ethical committee of the Department of Public Health of the University of Helsinki.

### Measures

The awareness and use of emergency contraceptive was investigated with the question: Have you ever used emergency contraceptive? The responses alternatives were:

- I do not know what emergency contraception is
- No, I have not used
- Yes, how many times altogether \_\_\_\_\_

The outcomes of the study were the unawareness (or awareness) and use of emergency contraception. Unawareness (awareness) was defined as not knowing (knowing) what emergency contraception is and EC use defined as taking it at least once.

### Background characteristics

Background characteristics were divided into three groups; individual, family factors and factors describing the place of residence.

#### Individual factors

*Educational career* for girls aged 16 or 18 years was classified in: not in school, vocational school or high school. *School achievement* based on pupil's own assessment of his or her position in class according to latest report was categorized: much better and slightly better (than average), average, and poorer (than average). The majority of 16 and 18-year-old girls were still in school, and nearly 90% reported their latest school achievement in this age group. *Daily smoking* was defined as using tobacco every day. Information on the frequency of *alcohol consumption* was asked by a question: How often do you use alcohol? The answers were classified: 1) never 2) less than monthly 3) monthly and 4) weekly. *Dating* was a dichotomized variable.

#### Family factors

*Fathers' education* as well as *mother's education* was classified into three categories: low, middle and high. Variable *family structure* describes people living in the participant's family (mother and father, mother or father and a stepparent, one-parent family, husband/partner, other guardian). Open question on *father's occupation* was categorized into upper white collar, lower white collar, farmer or forestry, and blue collar.

#### Factors describing the place of residence

The country was divided into four geographical *regions*: south, north, east and west. The *urbanization level* of the place of residence was defined by population density: capital city area (the capital Helsinki and the adjoining towns), other towns, villages in rural municipality, and

sparsely populated rural areas (isolated homesteads in rural municipalities).

### Statistical methods

Statistical significance (two-tailed  $p$ -value  $< 0.05$ ) for a linear trend in the proportion of emergency contraceptive awareness or use was used in untransformed data. Logistic regression models were run to study the characteristics of emergency contraceptive awareness and use in the data set emerging all three survey years. To perform efficiently a logistic regression model, unawareness of emergency contraception was used as an outcome of interest because the proportion of girls aware of EC was very high.

Odds ratios (OR) and 95% of confidence intervals (CI) of the unawareness and use according to background characteristics were estimated. First, age and survey year adjusted models were fitted separately for each explanatory variable after excluding cases with missing data for the variable concerned. Second, all background variables significant ( $< 0.20$ ) in the previous models were included in the multivariate models.

Finally, logistic regression models were run separately for prescription (1999–2001) and non-prescription (2003) periods in order to see whether over-the-counter status had any effect on variation of the awareness or use. For the unawareness, the models were run separately for 12–14 and 16–18 years old.

To study repeatability of the questions, a sub-sample of 14- and 16-year-olds ( $n = 407$ ) was randomly selected from the original subject series of 2003. Of these, 327 (80%) girls had responded to the inquiry. An identical questionnaire was mailed to these 327 girls approximately four weeks after receipt of the original one; 274 of them (67%) returned the second questionnaire. Test-retest reliability of EC use was tested with  $\kappa$ -coefficient. The  $\kappa$  was .74, which indicates a substantial agreement beyond chance between the two questionnaires.

For the analysis estimation of the effects of non-respondents, the data was divided into three categories according to the return date of the questionnaire. It was assumed that the later a person answers (original questionnaire/first re-inquiry/second re-inquiry) more she resembles as a non-respondent. EC use was 10.8% among 8,761 respondents to original questionnaire, 13.6% among 2,429 respondents to first re-inquiry and 16.0% among 723 girls who returned the second re-inquiry. There was no statistically significant difference in EC use among girls aged 14 years ( $p = 0.37$ ) whereas EC use was higher in late-respondents aged 16 ( $p = 0.007$ ) or 18 years ( $p = 0.003$ ).

## Results

### Prevalence and trend

#### Awareness of emergency contraception

In 2003, 61% of girls aged 12 years knew about EC and 98% of those aged 18 (Table 1). Among 16–18-year-olds, the awareness did not change between 1999 and 2003. Among 12-year-olds the increase in the awareness was seen before the non-prescription status in 2001, and in 14-year-olds, a small increase was seen both before and after.

#### Emergency contraception use

In 2003, 2% of girls aged 14 years had ever used EC. For those aged 16 and 18, the percentages were 15% and 29% (Table 1). No statistically significant increase in EC use was found in any of the age groups over time. One year after the change to non-prescription status, there was a slight increase from 13% to 15% in girls aged 16. The corresponding figures were 24% and 29% for those aged 18, but the increasing trend existed already before the change in non-prescription status.

### Characteristics

#### Unawareness of emergency contraception

Among girls aged 12–14 years, EC unawareness was associated with alcohol consumption, smoking, dating, school achievements and urbanization level, but not with socio-economic background and region (Table 2). EC unawareness was lower among alcohol drinkers, smokers and those who had a dating relationship, and were higher in girls with school achievements much better than average. Girls from rural villages or sparsely populated areas were less often unaware of EC than those from capital city area.

In multivariate analysis controlled for all covariates significant in previous model as well as age and survey year, only alcohol consumption and school achievement were statistically significantly associated with the unawareness (Table 2). EC unawareness decreased with increment in the level of alcohol consumption. Compared to girls whose school performance was much better than average, the unawareness of EC was higher in girls whose school achievements were slightly better than average, average, or poorer than average.

Among girls aged 16–18 years, EC unawareness was less among alcohol consumers, smokers, those with dating relationship or whose mothers had high education, girls at high school or lived in cities or rural villages (Table 3). The lack of knowledge was high in girls living with guardians other than their own parents, and was lower in the eastern than in the southern of Finland. Family structure, father's occupation, father's education and the level of urbanization were not related to EC unawareness.

In multivariate analysis controlled for all covariates significant in previous model as well as age and survey year, alcohol consumption, educational career and family structure remained statistically significant (Table 3). EC unawareness decreased with increment in the level of alcohol intake, and was less in girls who were at high school compared with those who were not at school at all. Teens living with guardians other than their own parents were more often unaware of EC than the teens lived with their parents. Girls living in rural villages had less often lack of knowledge than girls lived in the capital city.

Characteristics of EC unawareness were similar in prescription (1999–2001) and non-prescription (2003) periods.

#### Emergency contraception use

After adjustment for age and year of survey, the use of EC among girls aged 14–18 years increased with alcohol consumption, daily smoking and dating relationship (Table 4). EC use was higher in girls whose school achievements were average or poorer than average compared with those whose school achievements were much better than average. Girls who did not live with nuclear family used EC more frequently than girls living with both parents. However, girls having other guardians than own parent did not differ from girls with a nuclear family. EC intake was lower in teens whose fathers had high education relative to those whose fathers had low education. Girls whose fathers were farmers or forestry workers used EC less than other groups. Girls lived in cities used more often EC than those lived in the capital city. On the other hand, teens lived in sparsely populated areas used EC least often.

In addition among girls aged 16–18 years, EC use was lower in girls who were at high school compared with those were not at school (OR adjusted for age and year = 0.7, 95% CI 0.5–0.9). However, the difference in EC use was not statistically significant after adjustment for other covariates.

In multivariate analysis after adjustment for all covariates significant in previous model as well as age and survey year, EC use increased by the level of alcohol consumption, daily smoking and dating. The higher the use of alcohol, the more common EC use was. Girls lived with one parent with or without a stepparent used EC more frequently than those lived with both parents. It was higher in the western than in the southern of Finland. The use of EC was not associated with educational career, school achievement, father's education and occupation, mother's education and urbanization level.

An interaction was found between age and alcohol consumption for the use of EC ( $p < 0.001$ ) (Figure 1). The dif-

**Table 1: Age-specific percentage of adolescents who were aware of emergency contraception and those who had used EC according to the year of survey**

Emergency contraception	Prescription status for EC		Non-prescription status for EC	N	p-value *
	1999	2001	2003		
Awareness of EC					
Age					
12	58	67	61	1164	0.02
14	91	94	96	3966	<0.001
16	98	99	99	3732	0.18
18	99	99	98	3051	0.29
EC use					
Age					
14	2	3	2	3966	0.22
16	13	13	15	3732	0.24
18	24	26	29	3051	0.09

\* Test for trend

ferences in the EC use between alcohol use groups were much higher at age 14 than at age 16 or 18. There was no interaction between age and survey year for EC unawareness or use.

When logistic regression models were run separately for 1999–2001 (prescription status) and 2003 (non-prescription status), the associations of individual, family and regional factors with EC use did not differ between these two periods.

## Discussion

Our findings demonstrate that the awareness of EC is high among Finnish adolescent girls. The use of EC did not increase after providing EC without prescription when compared to those years when prescription was needed. Alcohol consumption was strongly associated with higher EC awareness and use. The association of individual, family, and regional factors with EC awareness and use remained mostly stable during 1999–2003.

This study showed a high level of EC awareness. Public discussion in media in connection with the change to non-prescription status seems not to have increased it any more. The high level of EC awareness was shown already in 1996 in the Finnish School Health Promotion Study [9], which showed that more than 95% of 14–17 year-olds knew what emergency contraception is. In Finland, sex education has been an integral part of school curriculum, which probably explains partly the high level of awareness.

Teenagers should have knowledge of contraception, including EC, already before engaging in sexual relationships. EC is, first of all, a back-up method for those who

use condoms as their contraception. Adolescents are an essential group of users, because condoms are a popular contraception at the early stages of sexual career. The present study showed that Finnish adolescents are highly aware of EC already many years before sexual relationships are topical; even two thirds of the youngest girls aged 12 knew about the method. However, only awareness of EC is not enough. There is a concern that although adolescents know about EC, they perhaps don't know how to obtain the pills and how to use them [18]. This kind of detailed knowledge could not be explored in our mailed survey, where the respondents could have checked the facts.

In our study, the variation of awareness by socio-economic characteristics of the family was not large while there were larger differences according to health behaviour. In line with other studies [6,19] we found a positive association between EC awareness and teenagers' school performance, which emphasizes the influence of educational, and sociodemographic factors. Unlike another study [6] we found no association between EC awareness and the level of father's education. A Swiss study showed a positive association with teens' scholastic curriculum so that girls with higher education are more aware of EC than those with mandatory school, and on girls whose fathers had higher education are more aware of EC than those whose fathers have low education [6].

We found no significant increase in EC use over time, while studies from other countries [7,20] have shown an increase in use over time. Indeed, there was no remarkable change in EC use after making EC available over the counter either. The results are consistent with the results of the Finnish School Health Promotion Study, which showed

**Table 2: The proportion and odds ratio (OR) of unawareness of emergency contraceptive according to background characteristics in girls aged 12–14 years**

Background characteristic	Sample	% of unawareness	Adjusted for age and survey year			Multivariate *	
			OR	95%	P value	OR	95% CI
<i>Individual factors</i>							
<i>Alcohol consumption</i>							
Not drinking	2243	22.0	1			1	
Less than monthly	1386	7.9	<b>0.6</b>	<b>0.4–0.7</b>		<b>0.4</b>	<b>0.3–0.6</b>
Monthly	979	3.4	<b>0.3</b>	<b>0.2–0.4</b>		<b>0.3</b>	<b>0.2–0.4</b>
Weekly	360	3.9	<b>0.3</b>	<b>0.2–0.6</b>	<0.001	<b>0.3</b>	<b>0.1–0.6</b>
<i>Daily smoking</i>							
No	4462	14.5	1			1	
Yes	557	3.8	<b>0.5</b>	<b>0.3–0.8</b>	0.005	0.9	0.5–1.6
<i>Dating</i>							
No	4428	14.5	1			1	
Yes	620	5.0	<b>0.5</b>	<b>0.3–0.8</b>	0.001	0.9	0.5–1.4
<i>School achievements</i>							
Much better than average	864	10.4	1			1	
Slightly better than average	1667	13.4	1.2	0.9–1.6		<b>1.7</b>	<b>1.1–2.5</b>
Average	1979	15.0	<b>1.4</b>	<b>1.1–1.8</b>		<b>2.2</b>	<b>1.5–3.3</b>
Poorer	507	10.8	1.4	0.9–2.1	0.01	<b>2.2</b>	<b>1.3–3.9</b>
<i>Family factors</i>							
<i>Family structure</i>							
Mother-father	3872	13.2	1				
One parent and one stepparent	480	15.4	1.2	0.9–1.6		..	..
One-parent family	690	12.0	1.0	0.7–1.2			
Other	21	14.3	1.0	0.3–3.8	0.94		
<i>Father's education</i>							
Low	898	13.8	1				
Middle	2598	13.5	0.9	0.7–1.2		..	..
High	1196	12.5	0.9	0.7–1.2	0.52		
<i>Father's occupation</i>							
Upper white collar	1773	12.4	1				
Lower white collar	1147	14.1	1.3	0.9–1.6		..	..
Farmer or forestry	317	13.6	1.1	0.7–1.6			
Blue collar	1747	13.1	1.1	0.9–1.3	0.82		
<i>Mother's education</i>							
Low	606	14.4	1				
Middle	2381	13.2	0.8	0.6–1.0		..	..
High	1812	13.5	0.8	0.6–1.1	0.52		

*Factors describing the place of residence*



**Table 2: The proportion and odds ratio (OR) of unawareness of emergency contraceptive according to background characteristics in girls aged 12–14 years (Continued)**

Urbanization level							
Capital city area	704	14.9	1			1	
Cities	2435	13.8	0.8	0.6–1.1		0.9	0.6–1.3
Rural villages	1098	11.3	<b>0.7</b>	<b>0.5–0.9</b>		0.7	0.5–1.1
Sparsely populated areas	751	13.4	<b>0.7</b>	<b>0.5–0.9</b>	0.03	0.7	0.4–1.1
Regions							
Southern	1853	14.4	1			..	..
Northern	802	13.0	0.8	0.6–1.0			
Eastern	661	12.1	0.8	0.6–1.0			
Western	1814	12.8	0.8	0.7–1.0	0.10		

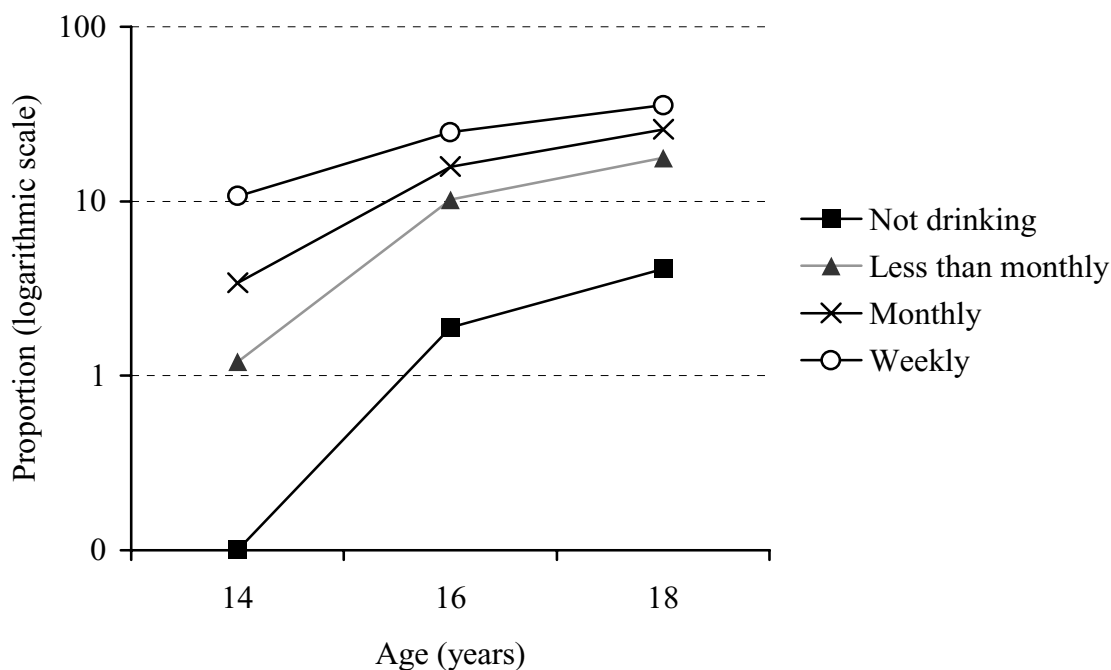
Statistically significant ORs are bolded

\*Adjustment for age, survey year, age at menarche and the significant variables of the previous model.

.. Not included in the multivariate model

no change either among girls aged 14–18 years in 1996–2005 [21]. An explanation for the mild effect may be that access to emergency contraception was quite easy already before the non-prescription period. The Yuzpe method had been available since 1987, and it was reasonably easy

to get a prescription from family planning clinics, school and student health services, and health centres [9]. Consistent with our study, making EC available over the counter did not lead to an increase in its use in Great-Britain [3]. On the other hand, a population-based study in Can-



**Figure 1**  
Proportion (%) of emergency contraceptive users according to alcohol consumption and age.

**Table 3: The proportion and odds ratio (OR) of unawareness of emergency contraceptive for background characteristics in girls aged 16–18 years**

Background characteristic	Sample	% of unawareness	Adjusted for age and survey year			Multivariate *	
			OR	95%	P value	OR	95% CI
<i>Individual factors</i>							
<i>Alcohol consumption</i>							
Not drinking	658	5.2	1			1	
Less than monthly	1716	1.3	<b>0.2</b>	<b>0.1–0.4</b>		<b>0.3</b>	<b>0.1–0.6</b>
Monthly	2677	0.4	<b>0.1</b>	<b>0.04–0.2</b>	<0.001	<b>0.1</b>	<b>0.05–0.3</b>
Weekly	1582	0.7	<b>0.1</b>	<b>0.06–0.3</b>		<b>0.1</b>	<b>0.03–0.3</b>
<i>Daily smoking</i>							
No	4614	1.4	1			1	
Yes	2055	0.6	<b>0.4</b>	<b>0.2–0.8</b>	0.007	0.5	0.2–1.1
<i>Dating</i>							
No	3921	1.5	1			1	
Yes	2790	0.8	<b>0.5</b>	<b>0.3–0.9</b>	0.01	0.6	0.3–1.1
<i>School achievements</i>							
Much better than average	777	1.5	1				
Slightly better than average	1924	1.0	0.7	0.3–1.4		..	..
Average	2925	0.9	0.6	0.3–1.1	0.82		
Poorer	699	2.0	1.3	0.6–2.8			
<i>Educational career</i>							
Not in school	393	3.1	1			1	
Vocational school	1852	2.4	0.8	0.4–1.5		0.8	0.3–1.7
High school	4345	0.5	<b>0.2</b>	<b>0.1–0.3</b>	<0.001	<b>0.2</b>	<b>0.1–0.4</b>
<i>Family factors</i>							
<i>Family structure</i>							
Mother-father	4819	1.2	1			1	
One parent and one stepparent	572	1.0	0.9	0.4–2.0		0.7	0.2–2.5
One-parent family	989	1.5	1.3	0.7–2.3		1.5	0.8–3.0
Husband/wife or cohabiting	238	0.4	0.4	0.1–2.7		0.5	0.1–3.8
Other guardian	40	7.5	<b>6.8</b>	<b>2.0–22.8</b>	0.26	<b>6.9</b>	<b>1.8–26.7</b>
<i>Father's education</i>							
Low	1449	1.1	1				
Middle	3409	1.0	0.9	0.5–1.7	0.80	..	..
High	1523	1.2	1.1	0.5–2.1			
<i>Father's occupation</i>							
Upper white collar	2358	0.8	1				
Lower white collar	1493	1.3	1.5	0.8–2.8		..	..

**Table 3: The proportion and odds ratio (OR) of unawareness of emergency contraceptive for background characteristics in girls aged 16–18 years (Continued)**

Farmer or forestry	428	1.9	2.2	0.9–5.1			
Blue collar	2337	1.1	1.3	0.7–2.3	0.45		
Mother's education							
Low	1008	1.8	1			1	
Middle	3349	1.1	0.6	0.3–1.1		0.9	0.5–1.8
High	2139	0.8	<b>0.4</b>	<b>0.2–0.9</b>	0.02	0.8	0.3–1.7
Factors describing the place of residence							
Urbanization level							
Capital city area	890	2.4	1			1	
Cities	3669	1.1	<b>0.5</b>	<b>0.3–0.8</b>		0.5	0.2–1.2
Rural villages	1432	0.4	<b>0.2</b>	<b>0.1–0.4</b>		<b>0.2</b>	<b>0.1–0.7</b>
Sparsely populated areas	704	2.0	0.8	0.4–1.6	0.14	1.0	0.4–2.6
Regions							
Southern	2507	1.6	1			1	
Northern	1060	1.1	0.7	0.4–1.4		1.2	0.5–2.7
Eastern	825	0.5	<b>0.3</b>	<b>0.1–0.9</b>		0.4	0.1–1.3
Western	2391	1.2	0.8	0.5–1.3	0.19	1.1	0.5–2.3

Statistically significant ORs are bolded

\*Adjustment for age, survey year, age at menarche and the significant variables of the previous model.

.. Not included in the multivariate model

ada showed an increase of 55% in EC use in girls aged 15–19 years after allowing EC to be sold over the counter [4].

Concerning the minimal effect of use after the change to non-prescription status, some other explanations could be possible. First, the price of the product is relatively high, currently about 16–24 euros (20–30 US dollars) per one-time package. Perhaps teenagers most in need of this service cannot afford the product. If this is the case, the accessibility of EC has not actually improved despite the change to non-prescription status. One of the factors that have been described as limiting a more extensive use of emergency contraception is the fact that a large proportion of requests occur over the weekend, when the family planning clinics and most of the pharmacies are closed [19]. Furthermore, one year after making EC available over the counter is a short period to see the effect of non-prescription status. It may increase EC use in a longer period.

Some previous studies [4,6] have shown that teenagers in urban areas use EC more often than those in rural areas, which may reflect easier access to health services in urban areas. In the present study, the use of EC did not differ between urban and rural areas. A consistent result has been reported from Sweden [10], which like Finland is a large country with long distances to services in rural areas.

However, equal access to services is an essential goal in health care, and arrangements in services have been carried out according to this principle.

An interesting finding was that the awareness of EC as well as its use was higher among those who used alcohol and smoked than among non-drinkers and non-smokers. This shows that those in need also know better and use them more often. Our finding is consistent with earlier studies [16,22,23] which have shown that smokers and alcohol consumers are at higher need of EC than non-smokers or non-drinkers. Smoking and alcohol drinking are associated with early sexual activity [24,25]. Moreover, teenage smokers or drinkers are even more likely to engage in risky sexual behaviour and have unprotected intercourse than non-smokers or non-drinkers [17,26]. A Swedish study [17] has reported that alcohol consumption is an important contributing factor for not using condom. Nonusers of condom therefore are more likely to take EC.

The current study was based on highly comparable national surveys, which have maintained similar data collection methods, samples and questions over the years. The repeatability of the questions on EC use and awareness was high. Unfortunately, questions on sexual behaviour could not be included in surveys posted to home, as this might have lowered the response rate. The analysis of

**Table 4: The prevalence and odds ratio (OR) of emergency contraceptive use according to background characteristics in girls aged 14, 16 or 18 years**

Background characteristic	Sample	%	Adjusted for age and survey year		Multivariate *	
			OR	95%	OR	95% CI
<i>Individual factors</i>						
<i>Alcohol consumption</i>						
Not drinking	1965	0.9	1		1	
Less than monthly	2952	7.8	<b>6.4</b>	<b>3.9–10.4</b>	<b>4.7</b>	<b>2.7–8.4</b>
Monthly	3622	16.2	<b>11.2</b>	<b>6.7–18.0</b>	<b>6.3</b>	<b>3.6–11.1</b>
Weekly	1936	27.6	<b>19.4</b>	<b>12.0–31.4</b>	<b>9.7</b>	<b>5.4–17.2</b>
<i>Daily smoking</i>						
No	7943	8.3	1		1	
Yes	2609	27.3	<b>3.4</b>	<b>3.0–3.8</b>	<b>2.0</b>	<b>1.7–2.4</b>
<i>Dating</i>						
No	7249	6.2	1		1	
Yes	3367	27.4	<b>3.8</b>	<b>3.3–4.3</b>	<b>3.1</b>	<b>2.6–3.5</b>
<i>School achievements</i>						
Much better than average	1464	8.3	1		1	
Slightly better than average	3180	10.8	1.2	0.9–1.5	1.1	0.8–1.4
Average	4418	14.0	<b>1.5</b>	<b>1.2–1.8</b>	1.1	0.9–1.5
Poorer	1148	17.0	<b>2.2</b>	<b>1.7–2.9</b>	1.3	0.9–1.8
<i>Family factors</i>						
<i>Family structure</i>						
Mother-father	7800	11.1	1		1	
One parent and one stepparent	939	16.3	<b>1.7</b>	<b>1.4–2.0</b>	<b>1.3</b>	<b>1.1–1.6</b>
One-parent family	1540	15.3	<b>1.4</b>	<b>1.2–1.7</b>	<b>1.2</b>	<b>1.0–1.5</b>
Husband/wife or cohabiting	246	38.2	<b>2.4</b>	<b>1.8–3.1</b>	1.2	0.8–1.7
Other guardian	48	20.8	1.4	0.7–2.9	1.5	0.6–3.8
<i>Father's education</i>						
Low	2155	13.9	1		1	
Middle	5393	13.5	1.1	0.9–1.2	1.1	0.9–1.4
High	2464	10.8	<b>0.8</b>	<b>0.7–0.9</b>	1.1	0.9–1.4
<i>Father's occupation</i>						
Upper white collar	3724	12.1	1		1	
Lower white collar	2399	13.6	<b>1.2</b>	<b>1.0–1.4</b>	1.0	0.8–1.2
Farmer or forestry	668	9.3	<b>0.7</b>	<b>0.5–0.9</b>	0.9	0.6–1.2
Blue collar	3685	14.0	<b>1.2</b>	<b>1.0–1.4</b>	0.9	0.8–1.1
<i>Mother's education</i>						
Low	1499	14.2	1		1	
Middle	5171	13.8	1.0	0.9–1.2	1.1	0.9–1.3
High	3528	11.3	<b>0.8</b>	<b>0.7–1.0</b>	1.1	0.9–1.5
<i>Factors describing the place of residence</i>						
<i>Urbanization level</i>						

**Table 4: The prevalence and odds ratio (OR) of emergency contraceptive use according to background characteristics in girls aged 14, 16 or 18 years (Continued)**

Capital city area	1441	11.5	1			
Cities	5543	15.3	<b>1.3</b>	<b>1.1–1.4</b>	1.2	0.9–1.6
Rural villages	2317	11.3	1.0	0.8–1.2	1.0	0.7–1.3
Sparsely populated areas	1254	8.2	<b>0.7</b>	<b>0.6–0.9</b>	0.9	0.6–1.2
Region						
Southern	3948	12.1	1		1	
Northern	1664	13.7	1.1	0.9–1.4	1.2	0.9–1.5
Eastern	1336	12.5	1.1	0.9–1.3	1.1	0.8–1.4
Western	3801	13.7	<b>1.2</b>	<b>1.0–1.3</b>	<b>1.2</b>	<b>1.0–1.5</b>

Statistically significant ORs are bolded

\*Adjustment for age, survey year, age at menarche and the significant variables of the previous model.

the non-respondents indicated that the use of emergency contraception was higher among late responders aged 16 or 18 years. Therefore, non-respondents may have used more likely EC than responders, and we may have underestimated the proportion of EC use. We asked only about knowledge of the existence of the method and the results do not indicate that adolescents were well informed of details of its use.

In Finland, teenage sexual activity has increased between 1997 and 2001 [27] and abortion rate between 1994 and 2002 [28]. However, EC use did not increase and only a minimal increase was observed in the use of oral contraceptives during 1990–2003 [29]. It seems that despite the high level of awareness, EC is underused in Finland. This may have contributed to the rising trend in teenage abortions in Finland after the mid-1990s, together with insufficient use of regular contraception. Further research is needed to follow trends in the use of EC and examine the role that EC plays in the total contraceptive behavior of adolescents. Knowledge of EC among boys and their role in the use of the method are poorly understood and are considered important targets for further research.

## Conclusion

The awareness and use of EC did not increase after providing EC without prescription. Alcohol consumption is strongly associated with EC awareness and use. The characteristics of EC awareness and use remained stable over time.

## Abbreviations

EC emergency contraception

CI confidence interval

OR odds ratio

## Competing interests

The author(s) declare that they have no competing interests.

## Authors' contributions

AR designed and conducted the study. KFH and RS performed the statistical analyses. All authors interpreted the results. KFH drafted the manuscript. AR and EK critically revised the manuscript. All authors read and approved the final manuscript.

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