

ORIGINAL ARTICLE

## Self-reported sexually transmitted infections among female university students

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### ABSTRACT

**Aim:** To investigate the occurrence of self-reported sexually transmitted infections (STIs) and associated factors among female university students requesting contraceptive counselling.

**Material and methods:** Cross-sectional study. Female university students ( $n = 353$ ) completed a waiting-room questionnaire in connection with contraceptive counselling at a Student Health Centre in Uppsala, Sweden.

**Results:** Ninety-three (26.3%) female students had experienced an STI. The three most frequently reported STIs were chlamydia trachomatis, condyloma, and genital herpes. The experience of an STI was significantly associated with the total number of sexual partners (OR 1.060, 95% CI 1.030–1.091,  $P < 0.001$ ), being heterosexual (OR 4.640, 95% CI 1.321–16.290,  $P = 0.017$ ), having experienced an abortion (OR 2.744, 95% CI 1.112–6.771,  $P = 0.028$ ), not being HPV-vaccinated (OR 2.696, 95% CI 1.473–4.935,  $P = 0.001$ ), and having had intercourse on first night without using a condom (OR 2.375, 95% CI 1.182–4.771,  $P = 0.015$ ).

**Conclusions:** Contraceptive counselling should also include information about primary and secondary prevention of STI, such as the importance of correct use of a condom and STI testing, to prevent a further spread of STIs.

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## Introduction

Sexual behaviour among female university students in Sweden has been investigated in repeated surveys over 25 years. The sexual lifestyle of female university students has gradually become more risky over the last decades, with an increased number of sexual partners and, simultaneously, a decrease in condom use and increased experience of unprotected anal intercourse (1–6). Also the general population of Swedish women aged 16–24 years take more risks in their sexual behaviour, and the prevalence of casual sexual intercourse without the use of a condom doubled between 1989 and 2007 (7). Use of a condom is promoted to sexually active adolescents and young people. The compliance with this recommendation is, however, far from perfect. A study among young men in Sweden found that the main barriers to safe sex were interference with spontaneity, pleasure reduction, fear of losing erection, embarrassment or distrust, and difficulties in communicating about safe sex (8).

A goal of contraceptive counselling, according to recommendations from the Medical Products Agency in Sweden, is, in addition to avoiding unwanted pregnancies, to preserve fertility until women want to become pregnant (9). Many female university students live a single life, and due to studies

and future careers they postpone their childbearing. Consequently, some may expose themselves to sexually transmitted infections (STIs) during a prolonged period until they have found a suitable partner to share life with. Further understanding of current trends in sexual behaviour and factors associated with the occurrence of STI is necessary in order to tailor the counselling for this group.

The aim of the study was to investigate the occurrence of self-reported STIs and associated factors among female university students requesting contraceptive counselling.

## Material and methods

Data were collected in Uppsala, a university city in Sweden, during 5 weeks in spring 2014. Swedish-speaking female university students requesting contraceptive counselling at the Student Health Centre were invited to complete a questionnaire while waiting for the appointment with a gynaecologist or a midwife. The gynaecologist and/or the midwife informed them about the study and also handed out an information letter regarding the study purpose and procedure, including information that participation was voluntary and anonymous. Of the 384 women asked to participate, 353 (91.9%) agreed.

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After completion, the questionnaire was put in a sealed box in the waiting room. The medically responsible gynaecologist at the Student Health Centre and the Regional Ethics Committee in Uppsala, Sweden (DNR 98/508) approved the study.

### Definition of risky sexual behaviour

In this study, risky sexual behaviour was defined as vaginal, anal, or oral sex without the use of a condom, having ever regretted sexual activity after the influence of alcohol, and the number of lifetime sexual partners.

### Variables in the questionnaire

The first part of the questionnaire covered demographic information concerning age, the participants' and the parents' country of birth, smoking and snuff habits, relationships, and sexual orientation. The second part included multiple-choice questions focusing on pornography, sexual and contraceptive practices, HPV vaccination, parity, and experiences of abortion and STI. Occurrence of STI was measured by a question asking the student if she had suffered from an STI, with the response alternatives "Yes/No". Those who affirmed were asked to report which STI(s) they had suffered from.

### Statistical analyses

Categorical data are presented as frequencies and percentages,  $n$  (%), whereas discrete and continuous data are given as means and standard deviations (SD). Based on the reported history of STI, the sample was divided into an STI group and a non-STI group. For categorical data, tests of differences between the STI and non-STI groups were calculated with Pearson's chi-square test or Fisher's exact test. For discrete and continuous data, the Mann-Whitney  $U$  test was used. Pearson's chi-square test was used for a comparison of the percentage of women with a reported history of STI in 2014 with the corresponding figures for 2004 and 2009.

Univariate and multivariate logistic regression models were used to examine the strength of the association between sexual behaviour and ever having had an STI (Yes/No), with results reported as odds ratios (OR) with 95% confidence intervals (CI). Ever having had an STI (reference category: No) was used as an outcome variable in the regression models, and sexual behaviour and background data were used as predictors. In the regression analysis, univariate logistic regression models were first run separately for all variables with  $P$  values  $<0.20$  from the univariate tests of differences between the STI and non-STI groups. In a second step, all variables with  $P$  values  $<0.20$  from the univariate logistic regression models were entered into a basic multivariate logistic regression model. Through a backward selection procedure, the variable with the highest  $P$  value was deleted from the latter model, and the model was rerun until only variables with  $P$  values  $<0.20$  remained in the model. The final multivariate logistic regression model was retained and used for examining the strength of the association between sexual behaviour and ever having experienced an STI.

Table I. Self-reported STIs by female university students.

STI	2004	2009	2014
Experience of STI	$n = 64/315$ (20%)	$n = 101/350$ (29%)	$n = 93/353$ (26%)
Reported infections <sup>a</sup>	$n$	$n$	$n$
Chlamydia trachomatis	28	57	52
Condyloma	29	49	39
Genital herpes	10	5	11
Gonorrhoea	–	1	3
Mycoplasma genital	–	–	1

<sup>a</sup>Some participants reported more than one STI.

All statistical analyses were performed using IBM SPSS Statistics 20/22 (IBM, Armonk, NY, USA). For all statistical tests, a two-sided  $P$  value  $<0.05$  was considered statistically significant.

## Results

### Reported STIs

Of the 353 participating women, 93 (26.3%) had experienced at least one STI, and among those students with a history of STI 16 (17.2%) reported they had experienced more than one STI (Table I). The reported history of STI was somewhat higher compared with what was found in 2004 and slightly lower compared with what was found in 2009, when 64 (20.3%) and 101 (28.9%), respectively, reported a history of STI. Neither of these differences was, however, statistically significant ( $P = 0.067$  compared with 2004 and  $P = 0.456$  compared with 2009).

### Sexual behaviour

Women in the STI group were older than the non-STI group. Having experienced an induced abortion was more common in the STI group than in the non-STI group, as was being a daily smoker and/or using Swedish snuff (Table II). Women with a history of an STI displayed a more risky sexual behaviour with less condom use and more sexual partners. Among the 137 students who were HPV-vaccinated, 66 (48.2%) had been vaccinated before their first sexual intercourse, with a significantly ( $P = 0.011$ ) lower proportion of vaccination before the first sexual intercourse in the STI group ( $n = 4$ , 21.1%) than in the non-STI group ( $n = 62$ , 52.5%).

### Regression modelling

Having experienced anal sex was more common in the STI group compared with the non-STI group (Table III). Total number of sexual partners, being heterosexual, having experienced an abortion, not being HPV-vaccinated, and having had sexual intercourse on the first night without condom use were associated with the experience of an STI. However, the association with regretting sex under the influence of alcohol did not attain statistical significance in the multivariate model. The OR of 1.060 for the variable 'Total number of sex partners' in the final multivariate model (Table III) indicates that for each additional sexual partner a

**Table II.** Background data and sexual behaviour according to STI status in female university students.

Variable	Total	Ever had STI?		P <sup>a</sup>
		Yes n = 93 (26.3%)	No n = 260 (73.7%)	
Age (years), mean (SD)	23.6 (2.5)	24.2 (2.5)	23.4 (2.5)	0.001
Born in Sweden, n (%)	331 (93.8)	87 (93.5)	244 (93.8)	0.919
Daily smoker and/or using Swedish snuff, n (%)	74 (21.0)	27 (29.0)	47 (18.1)	0.026
Heterosexual, n (%)	323 (91.5)	89 (95.7)	234 (90.0)	0.091
Have a steady relationship, n (%)	199 (56.4)	57 (61.3)	142 (54.6)	0.265
Used emergency contraceptive, n (%)	258 (73.1)	67 (72.0)	191 (73.5)	0.791
Experienced induced abortion, n (%)	26 (7.4)	14 (15.1)	12 (4.6)	0.001
Ever consumed pornography, n (%)	249 (70.5)	62 (66.7)	187 (71.9)	0.340
HPV-vaccinated, n (%)	137 (38.8)	19 (20.4)	118 (45.4)	<0.001
Age at first intercourse (years), mean (SD)	16.7 (2.1)	15.9 (1.8)	16.9 (2.2)	<0.001
Total number of sexual partners, mean (SD)	12.1 (12.1)	18.9 (16.7)	9.7 (8.8)	<0.001
Number of sexual partners last 12 months, mean (SD)	2.8 (2.7)	3.4 (3.7)	2.5 (2.1)	0.056
Experienced giving oral sex, n (%)	341 (96.6)	92 (98.9)	249 (95.8)	0.196 <sup>b</sup>
Received oral sex, n (%)	345 (97.7)	92 (98.9)	253 (97.3)	0.686 <sup>b</sup>
Experienced anal sex, n (%)	165 (46.7)	52 (55.9)	113 (43.5)	0.039
Regretted sexual activity after alcohol consumption, n (%)	162 (45.9)	58 (62.4)	104 (40.0)	<0.001
Used condom during first intercourse, n (%)	253 (71.7)	64 (68.8)	189 (72.7)	0.477
Used condom during latest intercourse, n (%)	148 (41.9)	28 (30.1)	120 (46.2)	0.007
Used condom during first intercourse with latest partner, n (%)	98 (27.8)	19 (20.4)	79 (30.4)	0.066
First-date sexual activity without the use of a condom, n (%)	233 (66.0)	79 (84.9)	154 (59.2)	<0.001

<sup>a</sup>P values from Pearson's chi-square test or Fisher's exact test for categorical data and from Mann-Whitney test for discrete and continuous data.

<sup>b</sup>P values from Fisher's exact test.

**Table III.** Univariate and multivariate logistic regression models for the outcome 'Ever experienced an STI' (yes/no).

Variable	Univariate models		Basic multivariate model <sup>a</sup>		Final multivariate model <sup>b</sup>	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Total number of sex partners	1.074 (1.047–1.103)	<0.001	1.058 (1.019–1.099)	0.003	1.060 (1.030–1.091)	<0.001
Heterosexual	2.472 (0.839–7.285)	0.101	4.405 (1.260–15.390)	0.020	4.640 (1.321–16.290)	0.017
Experienced induced abortion	3.662 (1.626–8.246)	0.002	2.261 (0.898–5.691)	0.083	2.744 (1.112–6.771)	0.028
Not HPV-vaccinated	3.236 (1.848–5.667)	<0.001	2.547 (1.343–4.827)	0.004	2.696 (1.473–4.935)	0.001
Ever had intercourse at first night without using a condom	3.884 (2.089–7.219)	<0.001	2.341 (1.117–4.905)	0.024	2.375 (1.182–4.771)	0.015
Experienced intercourse under the influence of alcohol and regretted it later	2.486 (1.526–4.047)	<0.001	1.463 (0.826–2.590)	0.192	1.450 (0.826–2.547)	0.195
Age	1.127 (1.029–1.235)	0.010	1.060 (0.936–1.199)	0.357	Not in model	
Age at first intercourse	0.782 (0.687–0.890)	<0.001	0.920 (0.786–1.077)	0.298	Not in model	
Number of sexual partners last 12 months	1.121 (1.027–1.223)	0.010	0.962 (0.851–1.086)	0.527	Not in model	
Daily smoker and/or using Swedish snuff	1.854 (1.071–3.207)	0.027	0.988 (0.512–1.907)	0.972	Not in model	
Experienced giving oral sex	4.064 (0.517–31.922)	0.182	2.247 (0.229–22.008)	0.487	Not in model	
Experienced anal sex	1.650 (1.023–2.659)	0.040	0.976 (0.550–1.731)	0.933	Not in model	
Did not use condom during latest intercourse	1.990 (1.199–3.300)	0.008	1.258 (0.652–2.428)	0.493	Not in model	
Did not use condom during first intercourse with latest partner	1.700 (0.962–3.004)	0.068	1.284 (0.612–2.693)	0.508	Not in model	

Results for female university students are given as odds ratios (OR) with 95% confidence intervals (CI) and accompanying P values.

<sup>a</sup>Nagelkerke pseudo R<sup>2</sup> = 0.301; n = 353 (100.0%) of the participants included in the analysis.

<sup>b</sup>Nagelkerke pseudo R<sup>2</sup> = 0.284; n = 353 (100.0%) of the participants included in the analysis.

female student has had during her lifetime the risk of contracting an STI increases by 6.0%.

## Discussion

In our study one out of four women reported a history of STI, and chlamydia was most common, which is in line with previous results from Sweden (10). The fact that chlamydia is the most prevalent experienced STI does not come as a surprise as women are offered chlamydia screening when they visit clinics for contraceptive counselling. Testing for gonorrhoea is now being reintroduced as part of routine STI screening as well. Two cases were reported in the present study, and given the number of sexual partners a spread of gonorrhoea to reach the high incidence reported in the 1970s cannot be excluded. The incidence of gonorrhoea in Sweden has increased with 20% the past year (10). Presently, due to the

increasing prevalence of antibiotic-resistant gonorrhoea, The Medical Product Agency recommends treatment, follow-up, and contact tracing to take place in STI clinics (10). In the present study women with a history of an STI revealed a more risky sexual behaviour, and others have reported that few women considered themselves at risk of contracting STI despite low condom use (11). Interestingly, we found that the risk of contracting an STI increased by 6% for every new sexual partner, and women who had experienced an STI had a mean number of 18.9 sexual partners, compared with 9.7 partners in the non-STI group. A British cross-sectional web survey found a similar association between STI and the number of sexual partners among university students (12). We believe that the increased risk of 6% for every new sexual partner can easily be communicated to young people and thereby be a useful tool for health professionals in counselling sessions. Furthermore, cross-sectional studies have been

repeated every fifth year in this clinic since 1989, and the number of partners has gradually increased, while the self-reported STI experience has fluctuated between 14% and 29%. It was lowest after the massive campaigns promoting 'safe sex' to prevent the spread of HIV/AIDS (3,6). HIV can nowadays be managed fairly well by pharmaceutical drugs and is therefore no longer perceived as a deadly threat, which may partly explain the increased risky sexual behaviour.

In the present study, female students who were HPV-vaccinated reported less experience of STIs. The reason for this might be a higher awareness of STIs in general or that they are more cautious. This finding is, however, in contrast to another study among 18-year-old high school students where no differences in sexual behaviour were found between the HPV-vaccinated and non-vaccinated groups, except for 'one-night stands', which were more common in the non-vaccinated group (13). Almost all female students in the present study had given or received oral sex: mostly without condom use, which may imply a risk of contracting oral HPV. In a Swedish study of 483 male and female youths who visited a Youth Clinic (15–23 years old), 9.3% were positive for oral HPV (14). The female youths who had a cervical HPV infection were more often positive for oral HPV compared with females without cervical HPV infection (14).

The proportion of students who had ever regretted having sexual intercourse after alcohol intake has been stable around 30%–40% in our previous studies, and this was also found in the present survey. College drinking is a public health problem, and Swedish students are, on average, at high risk of alcohol abuse (15). In a Swedish study from 2008, Johnsson and co-workers reported that 16% of the total sample ( $n = 359$  students) had stable risky alcohol consumption (16). Likewise, among British female university students as much as 12.1% reported that they drank alcohol four times a week or more, and 37.1% two to three times a week (12). The problem with college drinking is the negative consequences that result from it, such as unprotected sexual intercourse (15). This is also supported by an interview study where university students' lifestyle with the freedom of living away from parents and high alcohol use contributed to a risky sexual lifestyle (17).

Another worrying issue is the trend we have seen in previous studies regarding an increase in the experience of anal sex among female university students and often without the use of a condom. In 1999 27.0%, 2004 32%, 2009 39.0%, and 2012 46.0% had experienced anal sex (1–6). Condoms during anal sex were only used in 31% in 2009 and in 41% in 2014 (2,6). The increasingly widespread practice of heterosexual anal sex and the relatively low rates of condom use for these behaviours were also reported by Leichter et al. (18) and are of importance for STI prevention.

Our results show that the need for STI education is apparent, as previously advocated by Ekstrand et al. based on studies among women and men visiting youth clinics in Sweden (8,19). There is a trend in Sweden, and perhaps also in many other countries, that young men place much of the responsibility for sexual and reproductive health on young women. Therefore, we suggest that young people should be informed about STI and its consequences, and also learn that preventive efforts, such as HPV vaccination, condom use, and STI screening, are

important. It is, however, hard to influence young people to practise a safer sexual behaviour, but some interventions on sexual health have reduced STIs such as gonorrhoea, HIV, and HPV through more frequent condom use (20–22). An intervention study on education about sexual behaviour found health education more effective when combined with a sexual health service, e.g. STI testing (23). The World Health Organization has created a framework where they point out that sexuality education must use interactive and student-oriented methods to equip and empower young people with information, skills, and positive values to understand and enjoy their sexuality, and to take responsibility for their own and other people's sexual health and well-being (24). Additionally, due to the increasing prevalence of antibiotic-resistant gonorrhoea (9), an STI-prevention programme combined with a mass media campaign might be useful to increase students' knowledge about STI and encourage students to do STI check-ups. That approach was used in a university setting in the 1990s and succeeded in putting STI on the agenda and starting a discussion among the students. However, it was hard to encourage students to turn up to a recommended STI clinic for testing (25). Therefore, we acknowledge the recommendation from The Medical Product Agency that all young women (and men) should be offered STI screening in connection with contraceptive counselling (9).

Regarding the strengths and limitations of the present study, one limitation was that it relied on self-reported STIs. It would have been beneficial to have the female students tested for different STIs, including HPV, since women have more STIs than they are aware of (26). It would also have been interesting to have data on male students. To this end, the authors are in the planning phase of a similar study on men. The high response rate was the main strength of this study.

Finally, to protect future fertility and health it is important to offer women screening for STIs and inform them about the importance of using condoms consistently and correctly. This requires continuing efforts to identify factors that contribute to effective communication about sexual health to teenagers and young adults.

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## Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

## References

1. Larsson M, Tyden T. Increased sexual risk taking behavior among Swedish female university students: repeated cross-sectional surveys. *Acta Obstet Gynecol Scand.* 2006;85:966–70.
2. Stenhammar C, Ehrsson YT, Akerud H, Larsson M, Tyden T. Sexual and contraceptive behavior among female university students in Sweden - repeated surveys over a 25-year period. *Acta Obstet Gynecol Scand.* 2015;94:253–9.

3. Tyden T, Bjorkelund C, Olsson SE. Sexual behavior and sexually transmitted diseases among Swedish university students. *Acta Obstet Gynecol Scand.* 1991;70:219–24.
4. Tyden T, Bjorkelund C, Odland V, Olsson SE. Increased use of condoms among female university students: a 5-year follow-up of sexual behavior. *Acta Obstet Gynecol Scand.* 1996;75:579–84.
5. Tyden T, Olsson S, Haggstrom-Nordin E. Improved use of contraceptives, attitudes toward pornography, and sexual harassment among female university students. *Womens Health Issues.* 2001;11:87–94.
6. Tyden T, Palmqvist M, Larsson M. A repeated survey of sexual behavior among female university students in Sweden. *Acta Obstet Gynecol Scand.* 2012;91:215–9.
7. Herlitz CA, Forsberg M. Sexual behaviour and risk assessment in different age cohorts in the general population of Sweden (1989–2007). *Scand J Public Health.* 2010;38:32–9.
8. Ekstrand M, Tyden T, Larsson M. Exposing oneself and one's partner to sexual risk-taking as perceived by young Swedish men who requested a Chlamydia test. *Eur J Contracept Reprod Health Care.* 2011;16:100–7.
9. Läkemedelsverket [Medical Products Agency, Sweden]. <http://www.lakemedelsverket.se>; 2014 [accessed 2015 Mar 2].
10. Folkhälsomyndigheten [The Public Health Agency of Sweden]. <http://www.folkhalsomyndigheten.se>; 2014 [accessed 2015 Jan 21].
11. Hickey MT, Cleland C. Sexually transmitted infection risk perception among female college students. *J Am Assoc Nurse Pract.* 2013;25:377–84.
12. Vivancos R, Abubakar I, Hunter PR. Sex, drugs and sexually transmitted infections in British university students. *Int J STD AIDS.* 2008;19:370–7.
13. Mattebo M, Grun N, Rosenblad A, Larsson M, Haggstrom-Nordin E, Dalianis T, et al. Sexual experiences in relation to HPV vaccination status in female high school students in Sweden. *Eur J Contracept Reprod Health Care.* 2014;19:86–92.
14. Du J, Nordfors C, Ahrlund-Richter A, Sobkowiak M, Romanitan M, Nasman A, et al. Prevalence of oral human papillomavirus infection among youth, Sweden. *Emerg Infect Dis.* 2012;18:1468–71.
15. Larsson M, Tyden T, Hanson U, Haggstrom-Nordin E. Contraceptive use and associated factors among Swedish high school students. *Eur J Contracept Reprod Health Care.* 2007;12:119–24.
16. Johnsson KO, Leifman A, Berglund M. College students' drinking patterns: trajectories of AUDIT scores during the first four years at university. *Eur Addict Res.* 2008;14:11–8.
17. Chanakira E, O'Cathain A, Goyder EC, Freeman JV. Factors perceived to influence risky sexual behaviours among university students in the United Kingdom: a qualitative telephone interview study. *BMC Public Health.* 2014;14:1055.
18. Leichter JS, Chandra A, Liddon N, Fenton KA, Aral SO. Prevalence and correlates of heterosexual anal and oral sex in adolescents and adults in the United States. *J Infect Dis.* 2007;15:1852–9.
19. Ekstrand M, Engblom C, Larsson M, Tyden T. Sex education in Swedish schools as described by young women. *Eur J Contracept Reprod Health Care.* 2011;16:210–24.
20. DiClemente RJ, Wingood GM, Rose ES, Sales JM, Lang DL, Caliendo AM, et al. Efficacy of sexually transmitted disease/human immunodeficiency virus sexual risk-reduction intervention for African American adolescent females seeking sexual health services: a randomized controlled trial. *Arch Pediatr Adolesc Med.* 2009;163:1112–21.
21. DiClemente RJ, Wingood GM, Sales JM, Brown JL, Rose ES, Davis TL, et al. Efficacy of a telephone-delivered sexually transmitted infection/human immunodeficiency virus prevention maintenance intervention for adolescents: a randomized clinical trial. *JAMA Pediatr.* 2014;168:938–46.
22. Wingood GM, DiClemente RJ, Robinson-Simpson L, Lang DL, Caliendo A, Hardin JW. Efficacy of an HIV intervention in reducing high-risk human papillomavirus, nonviral sexually transmitted infections, and concurrency among African American women: a randomized-controlled trial. *J Acquir Immune Defic Syndr.* 2013;63(Suppl 1):S36–43.
23. Wolfers M, Kok G, Looman C, de Zwart O, Mackenbach J. Promoting STI testing among senior vocational students in Rotterdam, the Netherlands: effects of a cluster randomized study. *BMC Public Health.* 2011;11:937.
24. WHO Regional Office for Europe/BzGA. Sexuality education in Europe: a framework for policy makers, education and health authorities and specialists. Köln: BzGA; 2010. Available at: <http://www.bzga.de/pdf.php?id=bee0ab940b9862d6497de00b01ab285b>. [accessed 2015 Feb 6].
25. Tyden T, Bergholm M, Hallen A, Odland V, Olsson SE, Sjoden PO, et al. Evaluation of an STD-prevention program for Swedish university students. *J Am Coll Health.* 1998;47:70–5.
26. Jonsson M, Karlsson R, Rylander E, Boden E, Edlund K, Evander M, et al. The silent suffering women—a population based study on the association between reported symptoms and past and present infections of the lower genital tract. *Genitourin Med.* 1995;71:158–62.