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Heterosexuals at risk for HIV: differences between private and commercial partners in sexual behaviour and condom use

Christa Hooykaas, Joop van der Pligt*, Gerard J.J. van Doornum, Mireille M.D. van der Linden and Roel A. Coutinho

To study the prevalence of HIV and other sexually transmitted diseases (STDs), sexual behaviour and condom use among heterosexuals, 193 women and 157 men entered a longitudinal study. Participants were recruited through an STD clinic, and had had five or more heterosexual partners in the preceding 6 months but had no other AIDS risk factors. Participants were divided in groups with respect to private and/or commercial sexual partners. One hundred and thirty-six (71%) women worked as prostitutes and had, on average, 115 customers a month, and 99 (63%) men had visited, on average, eight prostitutes in the past 4 months. One hundred and seventy-one (89%) women (114 prostitutes) had had, on average, four partners, and 112 (78%) men (of whom 64 had visited prostitutes) had had, on average, seven private partners in the past 4 months. Vaginal intercourse was often or always reported by all participants whilst anal contact was seldom reported. Non-high-risk sexual techniques (for example, oro-oral, masturbation) were practised more frequently with private than with commercial partners ($P < 0.001$). Although no differences were found in the frequency of practising high-risk sexual techniques (for example, vaginal, ano-genital), differences were found for frequency of condom use. Condom use during vaginal intercourse was reported more frequently with commercial than with private partners ($P < 0.01$). However, if the number of partners is taken into account, prostitutes had unprotected vaginal intercourse with an estimated average number of 160 partners in 4 months, which is far more than customers (seven) and men and women with private partners only (four). None of the 350 participants was HIV positive, but high prevalence for hepatitis B virus (16%) and syphilis-markers (5%) were found. We conclude that the group under study is at risk for HIV infection, and that prostitutes are the group at highest risk for HIV infection among heterosexuals with multiple sexual partners.

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Keywords: Heterosexuals (male, female), prostitutes, customers of prostitutes, sexual behaviour, condom use, HIV, sexually transmitted diseases.

Introduction

Transmission of HIV — the causal agent of AIDS — is known to occur through sexual contact with infected individuals, after exposure to infected blood or blood products, and perinatally [1,2]. Although the majority of the reported adult AIDS cases in Western countries are men with homosexual contacts and intravenous drug users (IVDUs), a significant increase of AIDS cases among people with heterosexual contacts has occurred recently [3-5]. This change is apparent in both the USA and Europe [6,7]. Most heterosexual AIDS cases occurred among indi-

viduals with a sexual partner belonging to one of the recognized risk groups. Heterosexual partners of IVDUs are especially at risk [8,9].

Apart from sexual contact with (infected) people belonging to high-risk groups, multiple sexual partners and a history of sexually transmitted diseases (STDs) — especially genital ulcerations — are major risk factors for heterosexual transmission of HIV [10,11]. The spread of HIV infection into the heterosexual population in Western countries may first become apparent among heterosexual high-risk groups such as female prostitutes, customers of prostitutes and patients attending STD clinics

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[12-15]. This study investigates the sexual behaviour and the prevalence of HIV and STDs in a high-risk heterosexual group. In a longitudinal study, we will try to monitor the spread of HIV infection in this particular group.

Most of the studies of heterosexual transmission are partner studies, studies among female prostitutes only or studies among (sub)populations of patients attending STD clinics [16-23]. Although these studies give valuable information about efficiency of heterosexual HIV transmission and HIV prevalence in specific groups, data about sexual behaviour collected in those studies are often of a rather general nature. More detailed information is necessary about the lifestyle, sexual behaviour and condom use of heterosexual men and women, especially those with multiple sexual partners.

This paper presents the first results of data collected at entry to a longitudinal study among heterosexual men and women in the Netherlands with multiple sexual partners without other AIDS risk factors. The aim of the paper is to give a detailed description of the group under study, especially with respect to the prevalence of HIV and other STDs, sexual behaviour and condom use with private and commercial sexual partners.

Methods

Subjects

Participants were recruited through one of the STD clinics of the Municipal Health Service of Amsterdam, the Netherlands. All patients at the STD clinic 18 years or older who had had five or more different sexual partners of the opposite sex in the preceding 6 months were asked to participate in the study. Haemophiliacs, men with homosexual contacts and people who had used intravenous drugs in the preceding 5 years were excluded. Participants were informed about the background and purpose of the study before giving informed consent. Participation in the study was on a voluntary basis.

Between October 1987 and September 1988, a total of 638 visitors of the STD clinic met the selection criteria. Three hundred and fifty (55%) heterosexual men and women entered the study and 288 (45%) refused to participate. Unfortunately, only a limited amount of information was available about the refusers. One hundred and fifty-seven (45%) of the male visitors who met the criteria participated and 202 (55%) refused; 193 (70%) of the female visitors participated and 86 (30%) refused. Participating men were older than refusers (32.7 years versus 29.6, $P < 0.001$), but participating women did not differ significantly in age from those refusing to participate (28.1 versus 27.4 years).

Data collection

All participants were asked to return every 4 months for follow-up study. Questions about sexual behaviour and condom use therefore refer to the preceding 4 months. The present paper deals with data collected at entry to the study.

Beside demographic characteristics, participants were interviewed about (1) the number of private and/or commercial sexual partners (men and women can have sex-

ual contact with commercial partners. Men should be assumed to have prostitutes as partners, and women to have customers as partners; men with commercial partners are referred to as customers, women with commercial partners are referred to as prostitutes), (2) frequency of practising different sexual techniques and condom use, and (3) history of STDs. Questions referred to the preceding 5 years and/or 4 months. All participants were also examined for STDs. Direct microscopy was done for gonorrhoea (men and women), trichomoniasis and candidiasis (women only); cultures were taken for gonorrhoea and *Chlamydia trachomatis* (men and women), and trichomoniasis and candidiasis (women only). Further laboratory examination for STDs (for example, herpes simplex) was done if indicated. Blood samples were taken for serological testing for antibodies against HIV, hepatitis B virus (HBV) and syphilis.

Serological methods

A commercially available enzyme-linked immunosorbent assay (ELISA, Abbott Laboratories, North Chicago, USA) was used to analyse blood samples for antibodies against HIV. Reactive and borderline samples were retested by ELISA and in a confirmational Western blot (Du Pont, Wilmington, USA). Testing for HBV markers hepatitis B surface antibody and hepatitis B core antibody was performed using Ausab-enzyme immunoassay (EIA) and Corzyme (Abbott). Samples reactive for hepatitis B core antibody only were also tested for hepatitis B surface antigen using Auszyme (Abbott). Screening for syphilis was performed using the *Treponema pallidum* haemagglutination assay (TPHA), and reactive or borderline results were confirmed with the Venereal Disease Research Laboratory (VDRL) test and fluorescent *Treponema* antibody absorption test (FTA-Abs).

Data analyses and statistical methods

With respect to private and commercial sexual partners in the preceding 4 months, absolute numbers were requested from participants. With reference to the type of sexual partners (private and commercial), the frequency of practising different sexual techniques and condom use in the preceding 4 months was assessed. This frequency was measured on a five-point scale: (1) never, (2) sometimes, (3) half the time, (4) often, and (5) always practising sexual technique or using condoms.

Although detailed data were collected, some data reduction was performed. Data concerning demographic characteristics (for example, country of birth, nationality, history of STDs) were dichotomized. To analyse the prevalence of vaginal STDs, all diagnosed STDs which could be transmitted through vaginal intercourse — syphilis, gonorrhoea, *Chlamydia trachomatis*, trichomoniasis, herpes genitalis and condylomata acuminata — were added.

To analyse the overall frequency of different sexual techniques, the arithmetic mean was computed for each technique, with private and/or commercial partners. We then attempted to estimate the number of private and/or commercial partners with whom unprotected vaginal intercourse was practised. To do so, the number of partners was weighted. This weight was computed by first transforming the five-point frequency scale to a five-point interval scale ranging from 0 to 1 (0, 0.25, 0.5, 0.75, 1).

Subsequently, these transformed frequency scores on sexual technique were multiplied with transformed scores on condom use. In other words, 'always' using a condom was weighted as 0, 'often' as 0.25, and 'never' as 1. Higher scores indicated more risk for HIV infection [for example, the weight for a participant 'often' practising vaginal intercourse (transformed score 0.75) and 'often' using condoms (transformed score 0.25) is $0.75 \times 0.25 = 0.1875$. Assuming this participant had seven private partners in the preceding 4 months, the estimated number of partners with whom unprotected vaginal intercourse was practised is $1.3 (7 \times 0.1875)$].

Participants were first divided into three groups on the basis of sexual contact with private and/or commercial sexual partners in the preceding 4 months: those with (1) private partners only, (2) commercial partners only, and (3) both private and commercial sexual partners. Participants with both private and commercial partners did not differ in sexual behaviour with private or commercial partners from those participants having private or commercial partners only. Therefore, data were analysed with gender (male versus female) and type of partner (private versus commercial) as independent variables.

Data were analysed using chi-square, analysis of variance (ANOVA) and two-sided t-tests (paired and for two independent samples). For multiple comparisons, individual significance levels were adjusted using the Bonferroni criterion [24] so that the overall test had a significance level no greater than 95%.

Results

Between October 1987 and September 1988, 157 men (mean age 32.7 years) and 193 women (mean age 28.1 years) entered the study (Table 1). More women than men were born in the Netherlands ($P < 0.05$) and had Dutch nationality ($P < 0.05$). Most participants lived in Amsterdam (80%) and had an average education level, according to Dutch standards. Fifty-five per cent were previous patients of the STD clinic. Generally, both men and women had a history of STDs in both the preceding 5 years and the preceding 4 months.

Women

Figure 1 shows the distribution among women and men with respect to the type of partners they had in the preceding 4 months. Fifty-seven (29%) of the women were not prostitutes. One hundred and thirty-six (71%) women had worked as prostitutes in the preceding 4 months, having an average of 115 customers per month. Seventy-one prostitutes worked in sex clubs and 45 worked 'behind windows' (this a typical method of prostitution in 'red-light' districts in the Netherlands, in which prostitutes display themselves behind a window marked with a red light to attract customers) in the 'red-light' (prostitution) district. Prostitutes working in sex clubs had far less customers per month (mean = 54) than those working 'behind windows' (mean = 221; $P < 0.001$). Sexual contact with bisexual customers in the preceding 4 months was reported by 11 of the 136 prostitutes.

Table 1. General characteristics of 350 heterosexual men and women with multiple sexual partners, at entry of the study

	Men (n = 157) n (%)	Women (n = 193) n (%)	Total (n = 350) n (%)
Born in Netherlands	81 (52)	124 (64)	205 (59)
Dutch nationality	108 (69)	156 (81)	264 (75)
Living in Amsterdam	130 (83)	149 (78)	279 (80)
Previous visit STD clinic	80 (51)	113 (58)	193 (55)
≥ 1 STD in 5 years*	84 (54)	105 (54)	189 (54)
≥ 1 STD in 4 months*	27 (17)	19 (10)	46 (13)
Previous HIV-test†	19 (12)	64 (33)	83 (24)
Mean (s.d.) age in years	32.7 (10)	28.1 (7)	30.2 (9)

*Self reported; sexually transmitted diseases (STDs): syphilis, gonorrhoea, *Chlamydia trachomatis* and herpes genitalis. †, All seronegative.

Sexual contact with one or more private sexual partners in the preceding 4 months was reported by 171 (89%) women, of whom 114 were prostitutes. Prostitutes had, on average, two private partners and the other women, seven in the preceding 4 months ($P < 0.001$). Ninety-two women (of whom 74 were prostitutes) had a regular partner. In the preceding 4 months, 14 of the 171 women had had bisexual private partners, and seven had had private partners using drugs intravenously.

Men

Ninety-nine (63%) men reported having visited prostitutes during the preceding 4 months, and during this period visited on average eight different prostitutes. Twenty-two men visited prostitutes in sex clubs and 61 visited prostitutes 'behind windows'. In the preceding 4 months, 13 men visited intravenous-drug-using prostitutes.

Sexual contact with private partners in the preceding 4 months was reported by 122 (78%) men (of whom 64 also visited prostitutes) with, on average, seven partners. Forty-four men (of whom 18 had also visited prostitutes) had a regular partner. In the preceding 4 months, seven of the men had had private partners who used drugs intravenously.

Sexual behaviour and condom use

Women

Significant differences in average score on a scale of 1-5 of sexual techniques of prostitutes with customers (n = 136) versus women with private partners (n = 171) were found for oral contact (2.2 versus 4.3, $P < 0.001$), oro-vaginal contact (2.3 versus 2.7, $P < 0.001$), oro-anal contact (1.0 versus 1.3, $P < 0.0001$), passive masturbation (2.5 versus 3.2, $P < 0.001$), active masturbation (2.9 versus 2.1, $P < 0.001$), vaginal intercourse (4.3 versus 4.6, $P < 0.001$) and ano-genital contact (1.1 versus 1.3, $P < 0.001$), but not for the other sexual techniques (Table 2). Prostitutes working in sex clubs or elsewhere had a similar mean frequency pattern of sexual techniques with customers, but they differed from prostitutes working 'behind windows'. Differences between sexual techniques of prostitutes in sex clubs and 'behind windows' were found for oral contact (2.6 versus 1.2, $P < 0.001$), oro-vaginal contact

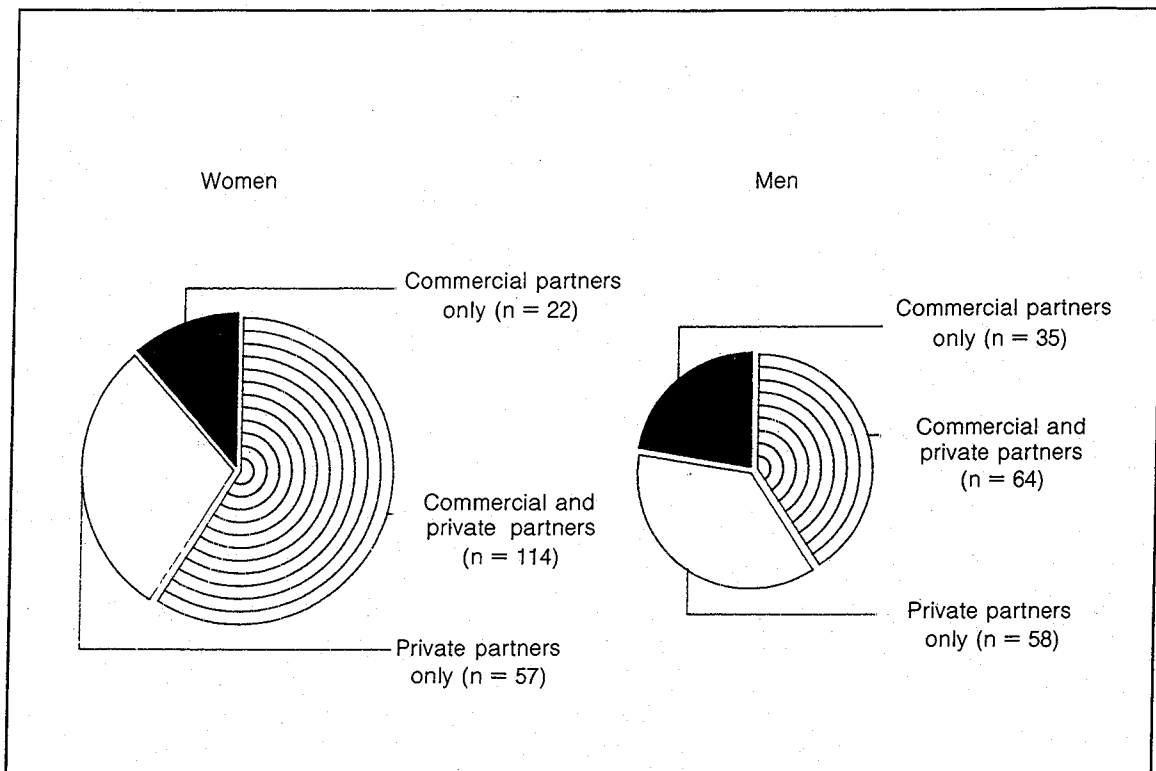


Fig. 1. Type of partners (private and commercial) of heterosexual women (n = 193) and men (n = 157) with multiple sexual partners, in the preceding 4 months.

Table 2. Average score on a scale of 1-5* for different sexual techniques of women with commercial and private partners in the preceding 4 months.

	Commercial partners (n = 136)		Private partners (n = 171)		P†‡
	Mean	s.d.	Mean	s.d.	
Oro-oral	2.2	1.4	4.3	1.1	<0.001
Oro-vaginal (passive)	2.3	1.2	2.7	1.4	<0.001
Oro-anal (active)	1.2	0.5	1.3	0.8	NS
Oro-anal (passive)	1.0	0.2	1.3	0.8	<0.001
Masturbation (passive)	2.5	1.3	3.2	1.4	<0.001
Masturbation (active)	2.9	1.2	2.1	1.1	<0.001
Oro-genital (active)	3.4	1.2	3.2	1.3	NS
Vaginal (passive)	4.3	0.8	4.6	0.8	<0.001
Vaginal during menses (passive)	2.0	1.4	2.1	1.4	NS
Ano-genital (passive)	1.1	0.3	1.3	0.6	<0.001

* (1) Never, (2) sometimes, (3) half the time, (4) often, (5) always practising sexual technique; † non-parametric tests confirmed these results; ‡ according to the Bonferroni criterion, the P value had to be < 0.005 for each individual test in order to achieve an overall test of significance at the 0.05 level.

(2.6 versus 1.7, $P < 0.001$), passive masturbation (2.9 versus 1.7, $P < 0.001$), vaginal intercourse during menses (1.7 versus 2.5, $P < 0.005$), and ano-genital passive (1.1 versus 1.0, $P < 0.005$; see Table 3).

Prostitutes reported using condoms with customers more frequently than women with private partners (Fig.

2). Far less condoms were used for oro-genital contact ($P < 0.01$) and vaginal intercourse ($P < 0.01$) with private than with commercial partners. The percentage of prostitutes always using condoms with customers was very high (oro-genital 57%, vaginal 71%), compared with women al-

Table 3. Average score on a scale of 1-5* for different sexual techniques of prostitutes working in sex clubs and 'behind windows' with customers in the preceding 4 months.

	Prostitutes in sex clubs (n = 71)		Prostitutes 'behind windows' (n = 45)		P†‡
	Mean	s.d.	Mean	s.d.	
Oro-oral	2.6	1.4	1.2	0.4	<0.001
Oro-vaginal (passive)	2.6	1.3	1.7	0.8	<0.001
Oro-anal (active)	1.2	0.4	1.1	0.3	NS
Oro-anal (passive)	1.0	0.2	1.0	0.0	NS
Masturbation (passive)	2.9	1.3	1.7	1.1	<0.001
Masturbation (active)	2.9	1.1	3.0	1.3	NS
Oro-genital (active)	3.4	1.3	3.6	1.0	NS
Vaginal (passive)	4.2	0.8	4.6	0.7	NS
Vaginal during menses (passive)	1.7	1.1	2.5	1.6	<0.005
Ano-genital (passive)	1.1	0.3	1.0	0.0	<0.005

* (1) Never, (2) sometimes, (3) half the time, (4) often, (5) always practising sexual technique; † non-parametric tests confirmed these results; ‡ according to the Bonferroni criterion, the P value had to be < 0.005 for each individual test in order to achieve an overall test of significance at the 0.05 level.

ways using condoms with private partners (oro-genital 5%, vaginal 7%). No significant differences were found between reported condom use of prostitutes working in sex clubs, 'behind windows' or elsewhere.

Men

Significant differences in average score on a scale of 1-5 of sexual techniques of customers with prostitutes (n = 99) and men with private partners (n = 122) were found for oral contact (2.0 versus 4.1, $P < 0.001$), oro-vaginal contact (1.5 versus 2.2, $P < 0.001$), active masturbation (2.1 versus 3.3, $P < 0.001$) and vaginal intercourse during menses (1.1 versus 1.6, $P < 0.001$; Table 4). No differences in the mean frequency for the other sexual techniques were found between men with commercial and private partners. No differences were found in the frequency patterns of sexual

techniques of customers with prostitutes working in sex clubs, 'behind windows' or elsewhere.

Customers reported using condoms with prostitutes more often than men with private partners (Fig 2). This holds for both oro-genital contact ($P < 0.05$) and vaginal intercourse ($P < 0.05$). The percentage of customers always using condoms with prostitutes is high (oro-genital 21%, vaginal 42%) compared with men always using condoms with private partners (oro-genital 3%, vaginal 7%). No significant differences were found in frequency of reported condom use of customers with prostitutes in sex clubs, 'behind windows' or elsewhere.

Women versus men

No differences between men and women were found in average score on a scale 1-5 of sexual techniques with private partners. Prostitutes and customers differed

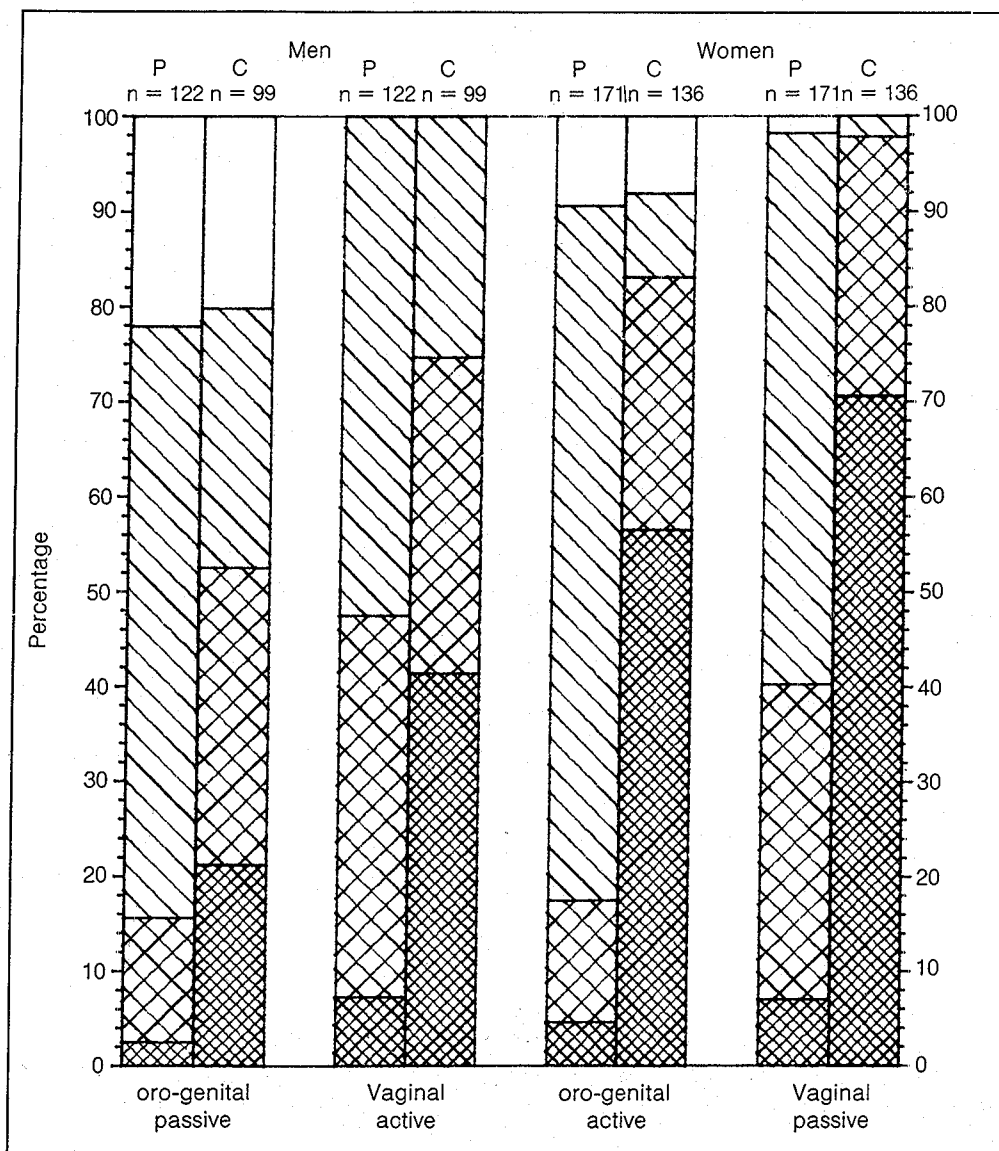


Fig. 2. Percentage practising sexual technique and frequency of condom use* in the preceding 4 months: 122 men with private partners and 99 customers with prostitutes; 171 women with private partners and 136 prostitutes with customers. □, % never practising sexual technique *The frequency of condom use of participants who practised the sexual technique was divided into 3 categories: (1) % never using condoms □, (2) % irregularly using condoms (sometimes, half the time and often) ▨, and (3) % always using condoms ▩. P, private partner; C, commercial partner

Table 4. Average score on a scale of 1-5* for different sexual techniques of men with commercial and private partners in the preceding 4 months.

	Commercial partners (n = 99)		Private partners (n = 122)		P†‡
	Mean	s.d.	Mean	s.d.	
Oro-oral	2.0	1.2	4.1	1.4	<0.001
Oro-vaginal (active)	1.5	1.0	2.4	1.5	<0.001
Oro-anal (passive)	1.1	0.3	1.3	0.8	NS
Oro-anal (active)	1.1	0.4	1.3	0.8	NS
Masturbation (active)	2.1	1.3	3.3	1.5	<0.001
Masturbation (passive)	1.7	0.9	1.9	1.2	NS
Oro-genital (passive)	3.0	1.4	2.9	1.4	NS
Vaginal (active)	4.6	0.8	4.7	0.7	NS
Vaginal during menses (active)	1.1	0.4	1.6	1.0	<0.001
Ano-genital (active)	1.2	0.6	1.3	0.7	NS

* (1) Never, (2) sometimes, (3) half the time, (4) often, (5) always practising sexual technique; † non-parametric tests confirmed these results; ‡ according to the Bonferroni criterion, the *P* value had to be <0.005 for each individual test in order to achieve an overall test of significance at the 0.05 level.

on the average score for oro-vaginal contact (2.3 versus 1.5, $P < 0.001$), masturbation of men (2.9 versus 1.7, $P < 0.001$) and vaginal intercourse during menses (2.0 versus 1.1, $P < 0.001$). These differences between prostitutes and their customers persisted after controlling for worksite of the prostitutes. Gender differences in condom use were found only for commercial partners. Prostitutes reported always using condoms in oro-genital contact ($P < 0.001$) and vaginal intercourse ($P < 0.01$) more often than customers. The same results were found when prostitutes and customers at sex clubs or 'behind windows' were com-

pared: prostitutes reported always using condoms more frequently ($P < 0.01$).

Prostitutes had many more sexual partners than both customers, and men and women with private partners only. As summarized in Table 5, inconsistent adherence to condom use with high numbers of partners indicates that prostitutes had unprotected vaginal intercourse with more partners than the other participants. Differences between prostitutes with and without private partners did not reach significance, because of the small number of prostitutes without private partners. Customers with and without private partners did not differ in the number of partners with whom they had unprotected vaginal intercourse. Men with private partners only had unprotected vaginal intercourse with more partners than women with private partners only ($P < 0.05$). Prostitutes working in sex clubs had far less commercial partners with whom they had unprotected vaginal intercourse than prostitutes working 'behind windows' ($P < 0.01$).

Laboratory results

None of the participants were found to be infected with HIV. Men were more often found to be positive for HBV markers (22%) than women (11%; Table 6). When participants born outside the Netherlands were excluded, 26% of the men and 9% of the women had positive HBV-markers ($P < 0.05$). Blood samples of 5% of the participants were positive for TPHA.

Men were more often diagnosed as having gonorrhoea than women ($P < 0.01$). As can be expected, trichomoniasis and candidiasis were more often found among women. More women (61%) than men (48%) visited the STD clinic because of complaints ($P < 0.01$). No differences were found for STDs which could be transmitted through vaginal intercourse, and no differences were found in frequency of STDs between participants with private and/or commercial partners.

Table 5. Estimated mean number of partners with whom 350 heterosexual men and women had unprotected vaginal intercourse in the preceding 4 months.

	n	Commercial partners		Private partners		Total partners	
		Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
Women with commercial only	22	54.1	(100)*	-	-	54.1	(100)*
+ private	114	39.2	(100)*	1.5	(2)	40.7	(100)*
private only	57	-	-	3.4	(4)	3.4	(4)
Men with commercial only	35	7.2	(12)	-	-	7.2	(12)
+ private	64	1.8	(3)	4.5	(12)	6.3	(13)
private only	58	-	-	5.2	(5)	5.2	(5)
Prostitutes†							
in sex club	71	26.8	(64)*	-	-	26.8	(64)*
'behind windows'	45	56.6	(113)*	-	-	56.6	(113)*
elsewhere	20	61.5	(155)*	-	-	61.5	(155)*

*To compare prostitutes with other participants over the same period, the number of customers per month was multiplied by 4; † regardless of whether they had private partners.

Table 6. Self-reported and laboratory results of sexually transmitted diseases among 350 heterosexual men and women with multiple sexual partners.

	Men (n = 157) n (%)	Women (n = 193) n (%)	Total (n = 350) n (%)
Self-reported STDs in preceding 5 years*			
Syphilis	6 (4)	6 (3)	12 (3)
Gonorrhoea	66 (42)	75 (39)	141 (40)
<i>Chlamydia trachomatis</i>	12 (8)	63 (33)	75 (21)
Herpes genitalis	12 (8)	21 (11)	33 (9)
Genital ulcers	9 (6)	13 (7)	22 (6)
≥ 1 STD in 5 years†	84 (54)	105 (54)	189 (54)
Diagnosed STDs at entry*			
Syphilis	1 (1)	0 (0)	1 (0)
Gonorrhoea	21 (13)	8 (4)	29 (8)
<i>Chlamydia trachomatis</i>	16 (10)	21 (11)	37 (11)
Trichomoniasis	5 (3)	19 (10)	24 (7)
Candidiasis	4 (2)	29 (15)	33 (9)
Herpes genitalis	3 (2)	2 (1)	5 (1)
Condylomata acuminata	6 (4)	5 (3)	11 (3)
Other	41 (26)	26 (14)	67 (19)
≥ 1 vaginal STD‡	33 (21)	42 (22)	75 (21)
Serology at entry			
Anti-HIV-positive	0 (0)	0 (0)	0 (0)
HBV-marker-positive	34 (22)	21 (11)	55 (16)
TPHA-positive	9 (6)	8 (4)	17 (5)

STD, sexually transmitted disease; HBV, hepatitis B virus; TPHA, *Treponema pallidum* haemagglutination assay. *Participants can have more than one STD; thus percentages do not add up to 100%; †STDs: syphilis, gonorrhoea, *Chlamydia trachomatis* and herpes genitalis; ‡vaginal STDs: syphilis, gonorrhoea, *Chlamydia trachomatis*, trichomoniasis, herpes genitalis and condylomata acuminata.

Discussion

Although participants were selected on criteria considered to be risk factors for HIV transmission [10], none of the participants was infected with HIV. However, during follow-up, one man (a customer of IVDU prostitutes) seroconverted, and one man (no risk factors, except multiple sexual partners) and one woman (prostitute, using drugs intravenously before 1982) who entered the study after September 1988 were HIV-positive. High prevalences were found for previous HBV and syphilis infection, and 20% of the participants had had one or more vaginal STD. These results are in agreement with reported studies about prevalence of HIV, HBV and STDs among heterosexual visitors of STD clinics [21–23,25,26], and indicate that this group is at risk — although at present in the Netherlands the risk is low — for HIV infection. However, the results should be interpreted cautiously, because of the high proportion of refusers for whom no information about HIV-antibody status was available. Hull *et al.* [27] reported a much lower HIV prevalence among visitors to an STD clinic consenting to than those declining HIV-antibody testing.

The participants engaged very frequently in vaginal intercourse, while anal contact was infrequently reported. Differences in the frequency of sexual techniques of women with private and commercial sexual partners were found for techniques which can be classified as non-high risk with respect to HIV transmission. These techniques were less frequently practised with commercial than with private sexual partners which can probably be attributed to the attitude prostitutes have about their work: it seems necessary

to distinguish private sexual contacts from those with customers. The sexual techniques on which differences were found are associated with a more intimate character of sexual contact. Sexual contact with private partners was most intimate; in sex clubs it had a medium level of intimacy and least intimacy was found in sexual contact 'behind windows'. Similar differences in frequency of sexual techniques of men with private and commercial partners were also found. Sexual contact with private partners had a more intimate character than that with commercial partners.

Results about condom use indicate that the risk for HIV infection per sexual contact is much higher with private than with commercial partners. Condoms are more frequently used with commercial partners. Self-reported condom use can be expected to be influenced by biases, such as social desirability. We believe, however, that the reported frequencies are reasonably reliable, because of the substantial differences in reported frequency of condom use with commercial versus private partners. However, differences in reported condom use of prostitutes and customers are puzzling, but could be because customers participating in our study did not visit the prostitutes in our sample. Most of the prostitutes worked in sex clubs, while most customers visited prostitutes 'behind windows'.

When the number of partners is taken into account, prostitutes are most at risk for HIV infection. Despite their more frequent condom use, the total number of partners with whom they had had unprotected vaginal intercourse is much higher than that of other men and women with multiple commercial and/or private partners. The participants

can be ranked from highest to lowest risk for HIV infection, using the number of sexual partners with whom they had had unprotected vaginal intercourse: first, prostitutes working 'behind windows', followed by prostitutes working in sex clubs, men with commercial (and/or private) partners, men with private partners only and women with private partners only. The possible spread of HIV through heterosexual contacts also depends on the prevalence of other risk factors (for example, sexual contact with IVDUs, bisexual men). The high frequencies of unprotected vaginal intercourse reported here underline the risk potential for HIV infection among heterosexuals with multiple sexual partners.

Condom use is important to prevent further spread of HIV infection among heterosexuals with multiple sexual partners. From this study it appears that condom use is accepted in sexual contact with commercial partners, but far less with private sexual partners. In prevention campaigns, a different approach may therefore be necessary to promote condom use among heterosexuals with multiple private sexual partners.

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