



Factors associated with heterosexual transmission of HIV to individuals without a major risk within England, Wales, and Northern Ireland: a comparison with national probability surveys

V L Gilbert, C H Mercer, S Dougan, A J Copas, K A Fenton, A M Johnson and B G Evans

Sex. Transm. Inf. 2006;82;15-20
doi:10.1136/sti.2004.014191

Updated information and services can be found at:
<http://sti.bmjournals.com/cgi/content/full/82/1/15>

These include:

Rapid responses

You can respond to this article at:
<http://sti.bmjournals.com/cgi/eletter-submit/82/1/15>

Email alerting service

Receive free email alerts when new articles cite this article - sign up in the box at the top right corner of the article

Topic collections

Articles on similar topics can be found in the following collections

[HIV Infection/AIDS](#) (1153 articles)
[Sexually Transmitted Infections](#) (1179 articles)

Notes

To order reprints of this article go to:
<http://www.bmjournals.com/cgi/reprintform>

To subscribe to *Sexually Transmitted Infections* go to:
<http://www.bmjournals.com/subscriptions/>

HIV

Factors associated with heterosexual transmission of HIV to individuals without a major risk within England, Wales, and Northern Ireland: a comparison with national probability surveys

V L Gilbert, C H Mercer, S Dougan, A J Copas, K A Fenton, A M Johnson, B G Evans

Sex Transm Infect 2006;**82**:15–20. doi: 10.1136/sti.2004.014191

Objective: To compare the prevalence of HIV risk behaviours reported by heterosexuals without major risks for HIV acquisition diagnosed with HIV in England, Wales, and Northern Ireland, with those of the heterosexual general population.

Methods: Demographic and sexual behaviour data for heterosexuals (without major risks for HIV) aged 16–44 from the British National Surveys of Sexual Attitudes and Lifestyles in 1990 and 2000 were compared to 139 HIV infected individuals without major risks for HIV aged 16+ at diagnosis, interviewed between December 1987 and March 2003. Comparisons were made overall and separately for the early and late 1990s.

Results: HIV infected heterosexual men without major risks were significantly more likely to report first heterosexual intercourse before age 16 (adjusted odds ratio (AOR): 2.75; 95% confidence interval (CI), 1.65 to 4.57), while both HIV infected heterosexual men and women reported greater partner numbers (AOR: men 2.44; CI, 1.4 to 4.05; AOR women 2.17; CI, 1.28 to 3.66) and never using condoms (AOR: men 7.97; CI, 4.78 to 13.3; AOR women 3.95; CI, 2.30 to 6.80) than the heterosexual general population. There is evidence to suggest that the two groups were more similar in their reporting of partner numbers in the late 1990s relative to the early 1990s.

Conclusion: Heterosexual HIV infected individuals without major risks for HIV acquisition in England, Wales, and Northern Ireland are significantly more likely to report high risk sexual behaviours relative to the British heterosexual general population. However, these differences may have decreased over time, at least for the number of partners. Effective sexual health promotion, including the continued promotion of condom use, would impact on the rising rates of STI diagnoses and also prevent HIV transmission among the heterosexual general population.

See end of article for authors' affiliations

Correspondence to: Vicky Gilbert, HIV and STI Department, Health Protection Agency Centre for Infections, 61 Colindale Avenue, London NW9 5EQ, UK; vicky.gilbert@hpa.org.uk

Accepted for publication 16 April 2005

At the start of the UK HIV epidemic, there was fear of heterosexual spread among the general population.¹ While fears of a major endogenous heterosexual epidemic have thus far not been realised, individuals without major risks continue to be infected through heterosexual intercourse within the United Kingdom. By this, we mean individuals who do not report injecting drug use, sex between men (if male), any partners with these risks, heterosexual intercourse abroad, or sexual partners from an area with high HIV prevalence. Between 1985 and 2003, they represented approximately 3% of all HIV infections acquired through heterosexual intercourse diagnosed in the United Kingdom.² Despite the relatively small numbers of heterosexuals infected within the United Kingdom, as the number of all heterosexuals living with HIV (diagnosed and undiagnosed) in the United Kingdom grows, the likelihood of heterosexual transmission within the United Kingdom will increase.³ Understanding the sexual behaviours of heterosexuals without major risks who are diagnosed with HIV is important for preventing further heterosexual transmission in the United Kingdom as this can inform sexual health promotion initiatives.

We compare factors associated with heterosexual transmission of HIV reported by individuals without major risks diagnosed with HIV in England, Wales, and Northern Ireland to similarly defined samples of the heterosexual general population, identified via national probability sample surveys

conducted in 1990 and 2000—the British National Surveys of Sexual Attitudes and Lifestyles (Natsal 1990 and Natsal 2000).^{4,5}

METHODS

New HIV diagnoses are reported to the HIV and STI Department at the Health Protection Agency Centre for Infections.⁶ Probable route of infection is collected for all reports, and probable country of infection for those infected through heterosexual intercourse. Reports are followed up by a nurse counsellor if information is incomplete. If an individual was probably infected within the United Kingdom, further information concerning partner's probable route and country of infection are recorded.

Interviews are sought with those individuals who, after discussion with their clinician, do not report injecting drug use, sex between men (if male), any partners with these risks, heterosexual intercourse abroad (excluding with UK nationals), or a sexual partner from an area with high HIV prevalence (including Africa, Latin America/Caribbean, and Asia).^{7,8} Therefore, HIV infected individuals included in these analyses are those infected through heterosexual intercourse in the United Kingdom by partners also believed to have been

Abbreviations: AOR, adjusted odds ratio; CASI, computer assisted self interviewing; PAPI, pen and paper interviewing

infected through heterosexual intercourse in low HIV prevalence countries, including the United Kingdom.

Interviews are undertaken with the consent of the clinician and agreement of the diagnosed individual and last between 2 hours and 3 hours. They are typically conducted either in hospital or the individual's home. Interviews are semistructured, allowing probing via a wide range of questions, including sociodemographics, reason(s) for HIV testing, clinical symptoms, previous recreational drug use, history of sexually transmitted infections, sexual behaviour, risk factors for partners, contraceptive practice, overseas travel history, and a history of blood transfusions and other medical procedures.

The general population surveys, Natsal 1990 and Natsal 2000, are stratified probability sample surveys of the general population, resident in Britain. Details of the methodology and question wording are published elsewhere.^{4 5 9} Briefly, between 1990–1 Natsal 1990 interviewed 18 876 people aged 16–59 years, of whom 13 765 were aged 16–44 years; between 1999–2001 Natsal 2000 interviewed 11 161 people in this age range. Natsal 1990 and Natsal 2000 achieved similar response rates, 63.3% and 65.4%, respectively. Respondents were interviewed in their homes with a questionnaire consisting of a face to face interview carried out by trained interviewers, and a self completion module containing more sensitive questions, using pen and paper interviewing (PAPI) in 1990 and computer assisted self interviewing (CASI) in 2000. To facilitate comparisons between surveys, questions in Natsal 2000 were identical to those in Natsal 1990.^{4 9}

The questions in the Natsal surveys refer to behaviours before interview, whereas the questions asked to the HIV infected heterosexuals without a major risk refer to behaviours before HIV diagnosis. Questions asked in the semi-structured interviews for the HIV infected heterosexuals without a major risk were worded in a similar way to those used in the Natsal surveys for the variables examined here, permitting comparisons between data sources. This is with the exception of condom use, where the Natsal surveys ask have you ever used a condom, whereas the HIV infected individuals are asked about never using a condom, and so the appropriate figures from the Natsal surveys were calculated (see table on *STI* website).

Demographic and sexual behaviour data for the heterosexual general population survey individuals aged 16–44 in the 1990 and 2000 Natsal surveys were compared with data for 139 HIV infected heterosexuals without a major risk aged 16 and over at diagnosis, in England, Wales, and Northern Ireland, diagnosed between January 1986 and March 2002 and interviewed between December 1987 and March 2003. To achieve comparability as far as possible with the HIV infected heterosexuals without a major risk, the general population samples excluded those who reported injecting non-prescribed drugs; anal and/or oral sex with men (men only); new partner(s) from outside the United Kingdom in the past 5 years (Natsal 2000 only); that they had “not yet had heterosexual sex”; and those living in Scotland.

All analyses were performed using Stata version 7.0 to account for stratification, clustering, and weighting of the

Table 1 Comparison of sociodemographic characteristics between data sources by time frame and gender

	Early 1990s		Late 1990s	
	General population Natsal 1990 respondents	HIV+ heterosexuals without risk pre-1995	General population Natsal 2000 respondents	HIV+ heterosexuals without risks 1995+
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Men				
Unweighted N, weighted N	4883, 5650	38, 38	3405, 4148	25, 25
Age (years)		p=0.226		p=0.079
16–24	27.1 (25.7 to 28.7)	15.8 (7.2 to 31.2)	22.6 (21.0 to 24.4)	4.0 (0.5 to 24.3)
25–34	38.8 (37.2 to 40.3)	39.5 (25.2 to 55.8)	37.8 (36.0 to 39.6)	52.0 (32.7 to 70.7)
35–44	34.1 (32.7 to 35.5)	44.7 (29.7 to 60.8)	39.6 (37.7 to 41.4)	44.0 (26.0 to 63.8)
Marital status		p<0.001		p=0.333
Married	53.8 (52.0 to 55.6)	31.6 (18.7 to 48.0)	45.9 (44.0 to 47.9)	40.0 (22.8 to 60.2)
Cohabiting	9.3 (8.4 to 10.3)	29.0 (16.7 to 45.3)	16.5 (15.0 to 18.0)	12.0 (3.8 to 31.9)
Previously married	4.3 (3.8 to 5.0)	13.2 (5.5 to 28.2)	4.6 (3.9 to 5.3)	12.0 (3.8 to 31.9)
Single, never married	32.5 (30.8 to 34.3)	26.3 (14.7 to 42.6)	33.1 (31.3 to 34.9)	36.0 (19.6 to 56.4)
Place of residence in Britain		p=0.029		p=0.780
Greater London	13.8 (11.0 to 17.3)	26.3 (14.7 to 42.6)	13.8 (11.7 to 16.2)	12.0 (3.8 to 31.9)
Ethnicity		p=0.339		p<0.001
Self-reported as white	93.5 (92.2 to 94.5)	97.4 (83.2 to 99.6)	91.5 (90.1 to 92.8)	100.0
Born in the UK		p=0.578		p<0.001
Yes	92.3 (91.0 to 93.4)	94.7 (81.0 to 98.7)	92.3 (91.2 to 93.3)	100.0
Women				
Unweighted N, weighted N	6580, 5744	23, 23	5293, 4462	30, 30
Age		p<0.001		p=0.288
16–24	26.4 (25.1 to 27.8)	65.2 (43.8 to 81.9)	21.7 (20.3 to 23.2)	16.7 (7.0 to 34.7)
25–34	38.6 (37.3 to 40.0)	34.8 (18.2 to 56.2)	39.0 (37.5 to 40.5)	53.3 (35.5 to 70.3)
35–44	35.0 (33.6 to 36.4)	0.0	39.3 (37.8 to 40.9)	30.0 (16.2 to 48.7)
Marital status		p=0.017		p=0.125
Married	58.4 (56.6 to 60.0)	26.1 (12.0 to 47.8)	48.5 (46.8 to 50.2)	43.3 (26.8 to 61.5)
Cohabiting	11.4 (10.6 to 8.7)	26.1 (12.0 to 47.8)	19.5 (18.3 to 20.8)	6.7 (1.6 to 23.5)
Previously married	8.1 (7.4 to 8.7)	13.0 (4.2 to 34.2)	7.9 (7.2 to 8.6)	10.0 (3.2 to 27.2)
Single, never married	22.2 (20.8 to 23.6)	34.8 (18.2 to 56.2)	24.2 (22.7 to 25.7)	40.0 (24.1 to 58.4)
Place of residence in Britain		p=0.005		p=0.823
Greater London	14.8 (11.9 to 18.4)	34.8 (18.2 to 56.2)	14.8 (12.7 to 17.2)	13.3 (5.0 to 31.0)
Ethnicity		p=0.623		p=0.378
Self reported as white	93.8 (92.7 to 94.8)	91.3 (70.4 to 97.9)	92.3 (91.2 to 93.2)	96.7 (79.2 to 99.6)
Born in the UK		p=0.833		p=0.392
Yes	92.5 (91.2 to 93.6)	91.3 (70.4 to 97.9)	92.5 (91.6 to 93.3)	96.7 (79.2 to 99.6)

p Values for difference in percentages between data sources.

Table 2 Prevalence of sexual HIV risk behaviours by data source and adjusted odds ratios (AOR) for the difference in prevalence between data sources: women

	Early 1990s		Late 1990s		Overall AOR† for difference between sources (95% CI)
	General population Natsal 1990 respondents % (95% CI)	HIV+ heterosexuals without risks pre-1995 % (95% CI)	General population Natsal 2000 respondents % (95% CI)	HIV+ heterosexuals without risks 1995+ % (95% CI)	
Unweighted N, weighted N	6580, 5744	23, 23	5293, 4462	30, 30	
% reporting first heterosexual intercourse before age 16	p=0.031 11.4 (10.6 to 12.3)	26.1 (12.0 to 47.8)	p=0.867 22.0 (20.8 to 23.4)	23.3 (11.4 to 41.9)	p=0.303 1.40 (0.74 to 2.66)
Age at first heterosexual intercourse: median (Q1, Q3)		16 (15, 17)		16 (15.75, 18)	
Number of heterosexual partners, past 5 years					
0	p<0.001 1.4 (1.1 to 1.8)	0	p=0.180 2.0 (1.7 to 2.4)	3.3 (0.5 to 20.8)	p=0.004 2.17 (1.28 to 3.66)‡
1	67.0 (65.4 to 68.5)	21.7 (9.2 to 43.4)	61.0 (59.4 to 62.6)	46.7 (29.7 to 64.5)	
2	14.2 (13.2 to 15.3)	13.0 (4.2 to 34.2)	14.3 (13.4 to 15.4)	13.3 (5.0 to 31.0)	
3-4	11.2 (4.5 to 5.8)	43.5 (24.9 to 64.1)	12.4 (11.3 to 13.5)	26.7 (13.8 to 45.3)	
5-9	5.1 (4.5 to 5.8)	8.7 (2.1 to 29.6)	7.3 (6.5 to 8.2)	6.7 (1.6 to 23.5)	
10+	1.1 (0.8 to 1.5)	13.0 (4.2 to 34.2)	2.9 (2.4 to 3.5)	3.3 (0.5 to 20.8)	
Number of heterosexual partners, past 5 years: median (Q1, Q3)		3 (2, 4)		1.5 (1, 3.25)	
% reporting heterosexual anal sex, ever	p=0.340 14.5 (13.6 to 15.6)	21.7 (9.2 to 43.4)	p=0.156 25.2 (23.8 to 26.6)	36.7 (21.4 to 55.2)	p=0.249 1.58 (0.73 to 3.41)
% reporting never using condoms	p=0.001 25.0 (23.7 to 26.4)	56.5 (35.9 to 75.1)	p=0.003 14.0 (13.0 to 15.2)	33.3 (18.8 to 52.0)	p<0.001 3.95 (2.30 to 6.80)

*OR for being an HIV+ interviewee relative to being a Natsal survey respondent, adjusting for sociodemographics in table 1.

†AOR for being an HIV+ interviewee relative to being a Natsal survey respondent, adjusting for survey's time frame (whether conducted early or late 1990s) and sociodemographics in table 1.

‡Calculated from proportional odds logistic regression.

§Questions on paying for sex were not asked to women in either Natsal survey.

heterosexual general population samples.¹⁰ The heterosexual general population samples were weighted to correct for unequal selection probabilities and to match the age/sex/regional population profile (according to census data) so that the data are broadly representative of the general population with respect to these variables.⁵⁻⁹ The Natsal 1990 data were weighted for differential selection probabilities and then post-stratified to the 1991 census estimates, thereby differing slightly from the method reported in previous publications.⁴

Given that the data from the HIV infected heterosexuals without a major risk were collected between 1987 and 2003, and that significant increases in sexual risk behaviours have been observed from the Natsal 1990 and 2000 surveys,⁵ comparisons are made for two time periods: the early 1990s (interviews conducted before 1995) and also for the late 1990s (interviews conducted from 1995 onwards). For each time period, we use logistic regression to calculate odds ratios (ORs) adjusting for the sociodemographic factors in table 1, as a measure of the difference in reporting behaviours between data sources (heterosexual general population survey versus heterosexual HIV infected individuals). The ORs for the number of heterosexual partners are calculated using proportional odds logistic regression. As a summary measure of the difference between data sources, we also calculate adjusted ORs (AORs) adjusting for sociodemographics and time period. Where the OR for the late 1990s is closer to one than that for the early 1990s then we interpret this as evidence of a convergence between sources—that is, more similar reporting in the two data sources in the late 1990s than before. The converse represents a divergence. We examine the interaction between the data source and time period as a test of significant convergence or divergence. Statistical significance is considered as $p < 0.05$ for all analyses.

RESULTS

Between January 1986 and March 2002, 497 heterosexuals without a major risk were diagnosed with HIV in England, Wales, and Northern Ireland and reported to the Health Protection Agency Centre for Infections. Of these, 139 (28%) were interviewed (80 men, 59 women). Of those not interviewed (358), 74 (21%) had died; 89 (25%) were no longer attending their centre for care and were therefore unable to be interviewed; for 56 (16%) the clinician advised against an interview; 89 (25%) patients refused to be interviewed; 44 (12%) were still being followed up and six were awaiting interview.

The HIV infected heterosexual women without a major risk interviewed in the early 1990s were significantly younger than the heterosexual general population women interviewed for Natsal 1990 (table 2). There were significant differences in the early 1990s between the data sources with respect to marital status, with the heterosexual general population more likely to report that they were married than the HIV infected heterosexuals without a major risk. In the early 1990s, a significantly larger proportion of the HIV infected heterosexuals without a major risk reported that they lived in London than observed from the 1990 heterosexual general population data. The HIV infected heterosexual men without a major risk were significantly more likely to report their ethnicity as "white" and their country of birth as "United Kingdom" in the late 1990s than the heterosexual general population men interviewed for Natsal 2000 (table 3). Given these differences, we adjust for these sociodemographic variables when comparing the data sources with respect to the sexual HIV risk behaviours shown in tables 2 and 3.

Overall, the HIV infected heterosexual men without a major risk were significantly more likely to report first heterosexual intercourse before age 16 (AOR, 2.75; 95%

confidence interval (CI), 1.65 to 4.57), than the heterosexual general population men, but this was not the case for women (AOR, 1.40; CI, 0.74 to 2.66). The HIV infected men and women without a major risk were also, overall, significantly more likely to report greater partner numbers (AOR, men 2.44; CI, 1.47 to 4.05; AOR women 2.17; CI, 1.28 to 3.66) than the heterosexual general population. The HIV infected heterosexual men and women without a major risk were also significantly more likely to report never having used condoms (AOR, men 7.97; CI, 4.78 to 13.3; AOR women 3.95; CI, 2.30 to 6.80) than the heterosexual general population. There is some evidence that the HIV infected men without a major risk were more likely to report heterosexual anal sex than the heterosexual general population men (AOR, men 1.78; CI, 1.03 to 3.07). We observe no significant difference in the reporting of paying for sex between the HIV infected heterosexual men without a major risk and men in the heterosexual general population surveys (AOR, 1.17; CI, 0.49 to 2.80).

There is some evidence of a convergence between data sources over the 1990s. The most marked convergence was for the number of heterosexual partners reported by men in the past 5 years. The AORs for the HIV infected heterosexuals without major risks relative to the heterosexual general population were 3.81 (CI, 2.06 to 7.05) for men and 3.54 (CI, 1.60 to 7.82) for women in the early 1990s, but for the late 1990s the AORs were smaller at 1.03 (CI, 0.41 to 2.61) and 1.46 (CI, 0.68 to 3.13) for men and women respectively (p values from testing for the statistical significance of the interaction: men $p = 0.02$, women $p = 0.14$). These data suggest that reported partner numbers were broadly comparable between the two data sources in the late 1990s.

DISCUSSION

The HIV infected heterosexual men and women without a major risk were significantly more likely to report some of the "high risk" sexual behaviours studied relative to the heterosexual general population. In particular, men were more likely to report an earlier sexual debut, and among men and women, greater numbers of partners. While there is evidence that partner numbers reported by the HIV infected individuals may have converged with partner numbers reported by the heterosexual general population, the HIV infected heterosexual men and women remained significantly more likely to report never having used condoms.

Surveillance data have indicated limited spread of HIV infection into the heterosexual general population,² and so we see the heterosexual general population respondents as "low risk" in terms of HIV acquisition. The HIV infected individuals without a major risk described here are also seen as representing "low risk" individuals because they reported none of the established "high risk" behaviours (including heterosexual intercourse in a high HIV prevalence country or in the United Kingdom with a partner infected in a high HIV prevalence country.) We acknowledge that these HIV infected heterosexual men and women without a major risk may not be representative of similar individuals also without a major risk infected with HIV through heterosexual intercourse in the United Kingdom, since being interviewed depends on being diagnosed, being assessed for risk and consenting to interview. The offering and recommending of HIV testing in antenatal clinics in more recent years may have led to better ascertainment of HIV infections in "low risk" heterosexuals and may partly explain the convergence with partner numbers between the two groups over time.

Our study has some limitations. While the individuals interviewed for the Natsal surveys were asked questions about behaviours before interview, the questions asked to the HIV infected heterosexuals without a major risk referred to

Table 3 Prevalence of sexual HIV risk behaviours by data source and adjusted odds ratios (AOR) for the difference in prevalence between data sources: men

	Early 1990s		Late 1990s		Overall	
	General population Natsal 1990 respondents % (95% CI)	HIV+ heterosexuals without risks pre-1995 % (95% CI)	General population Natsal 2000 respondents % (95% CI)	HIV+ heterosexuals without risks 1995+ % (95% CI)		AOR* for difference between sources (95% CI)
Unweighted N, weighted N	4883, 5650	38, 38	3405, 4148	25, 25	-	-
% reporting first heterosexual intercourse before age 16	p=0.021 24.0 (22.7 to 25.5)	p=0.014 40.5 (26.0 to 57.0)	p=0.011 29.0 (27.2 to 30.8)	p=0.014 52.0 (32.7 to 70.7)	p=0.005 3.11 (1.41 to 6.86)	p<0.001 2.75 (1.65 to 4.57)
Age at first heterosexual intercourse: median (Q1, Q3)	17 (16, 19)	16 (14.75, 18)	17 (15, 18)	15 (14, 16.5)	to	to
Number of heterosexual partners, past 5 years	p<0.001		p=0.953		p=0.948	p=0.001
0	1.1 (0.9 to 1.4)	0.0	1.5 (1.2 to 2.0)	4.0 (0.5 to 24.3)	1.03 (0.41 to 2.61)‡	2.44 (1.47 to 4.05)‡
1	53.7 (52.0 to 55.4)	21.1 (10.8 to 37.0)	50.4 (48.4 to 52.3)	48.0 (29.3 to 67.3)		
2	12.2 (11.2 to 13.3)	10.5 (4.0 to 25.2)	13.6 (12.3 to 14.9)	12.0 (3.8 to 31.9)		
3-4	15.7 (14.5 to 16.9)	34.2 (20.9 to 50.6)	16.2 (14.9 to 17.7)	16.0 (6.0 to 36.2)		
5-9	10.6 (9.6 to 11.8)	13.2 (5.5 to 28.2)	12.1 (10.9 to 13.4)	12.0 (3.8 to 31.9)		
10+	6.6 (5.9 to 7.5)	21.1 (10.8 to 37.0)	6.2 (5.3 to 7.2)	8.0 (2.0 to 27.6)		
Number of heterosexual partners, past 5 years: median (Q1, Q3)	1 (1, 3)	3 (2, 6.5)	2 (1, 4)	1 (1, 4)	-	-
% reporting paying for heterosexual sex, ever§	p=0.557 5.7 (4.9 to 6.5)	7.9 (2.5 to 22.1)	p=0.853 7.2 (6.4 to 8.2)	p=0.369 12.0 (3.8 to 31.9)	p=0.621 1.38 (0.38 to 4.97)	p=0.727 1.17 (0.49 to 2.80)
% reporting heterosexual anal sex, ever	p=0.061 15.2 (14.1 to 16.3)	26.3 (14.7 to 42.6)	p=0.267 1.55 (0.71 to 3.37)	p=0.042 44.0 (26.0 to 63.8)	p=0.102 2.02 (0.87 to 4.68)	p=0.039 1.78 (1.03 to 3.07)
% reporting never using condoms	p<0.001 17.3 (16.1 to 18.6)	63.2 (46.8 to 77.0)	p<0.001 8.29 (4.22 to 16.3)	p<0.001 44.0 (26.0 to 63.8)	p<0.001 7.13 (3.16 to 16.1)	p<0.001 7.97 (4.78 to 13.3)

*OR for being an HIV+ interviewee relative to being a Natsal survey respondent, adjusting for sociodemographics in table 1.
 †AOR for being an HIV+ interviewee relative to being a Natsal survey respondent, adjusting for survey's time frame (whether conducted early or late 1990s) and sociodemographics in table 1.
 ‡Calculated from proportional odds logistic regression.
 §Questions on paying for sex were not asked to women in either Natsal survey.

Key messages

- HIV infected heterosexuals who do not report a major risk for HIV acquisition in England, Wales and Northern Ireland are significantly more likely to report "high risk" sexual behaviours relative to the British heterosexual general population
- Findings reiterate the need for continued promotion of condom use, with HIV infected heterosexuals without a major risk significantly more likely to report never using condoms compared to the heterosexual general population. Effective sexual health promotion would impact on the rising rates of STI diagnoses with the additional benefit of preventing HIV transmission among the heterosexual general population

behaviours before diagnosis, introducing the possibility of recall bias. In addition, for reasons of sensitivity, interviews are not sought immediately after HIV diagnosis in order to allow the individual to adjust to their HIV diagnosis and so, the median length of time between diagnosis and interview date was 11 months. A further point to consider is that the HIV infected heterosexuals without a major risk may also have been more likely to remember, and perhaps report differently, previous sexual experiences than interviewees for the heterosexual general population surveys because of their awareness of their HIV positive status. Differences in data collection may also have introduced reporting bias: the HIV infected heterosexuals without a major risk were interviewed face to face, whereas the heterosexual general population respondents used self completion methods (PAPI in 1990, CASI in 2000) for the questions about sexual behaviour. Finally, it is important to remember that date of diagnosis does not necessarily indicate date of infection as someone can be diagnosed many years after infection. The vast majority of the HIV infected heterosexuals without a major risk did not report a previous HIV test, and so it is not possible to ascertain an approximate date of infection using a previous negative test result.

Although numbers are small, the number of HIV infected individuals without a major risk diagnosed in the United Kingdom has increased over recent years and can be expected to rise, particularly among black communities, as the total number of people living with HIV in the United Kingdom rises.² The sexual behaviour of the British general population is known to have changed between 1990 and 2000.⁵ Our results suggest tentative evidence that, despite some possible change over time also in the behaviour of those acquiring HIV infection, those diagnosed more recently may be more similar in behaviour to the general population, at least in terms of reported numbers of partners. While this trend is worrying, it is important to remember that rates of STI diagnoses are far higher than HIV diagnoses in the heterosexual general population and that men who have sex with men remain at greatest risk of acquiring HIV in the United Kingdom.³ However, our findings reiterate the need for effective sexual health promotion, particularly the continued promotion of

condom use; a policy that would impact on the rising rates of STI diagnoses as well as prevent HIV transmission among the heterosexual general population.

ACKNOWLEDGEMENTS

We would like to acknowledge all those HIV infected individuals who have been interviewed over the years for their generosity and time, all those who report HIV/AIDS diagnoses to the HPA and those who provide information which assists in the following up of cases. We would also like to thank the Natsal study participants, the team of interviewers and operations, and computing staff from the National Centre for Social Research who carried out the interviews. The study was supported by a grant from the Medical Research Council with funds from the Department of Health, the Scottish Executive and the National Assembly for Wales.

CONTRIBUTORS

VG, CM, and SD conceived the idea for the paper; VG conducted all the interviews with the HIV positive individuals; SD prepared the dataset for the HIV infected individuals and CM prepared the dataset for the Natsal surveys; CM undertook the statistical analysis of both datasets, with the guidance of AC; VG, CM, and SD undertook the main writing of the paper; AC, KF, AJ, and BE were all involved in interpretation of the results and advising on drafts of the paper.



A further table is on the STI website,
www.stijournal.com/supplemental

Authors' affiliations

V L Gilbart, S Dougan, K A Fenton, B G Evans, HIV and STI Department, Health Protection Agency Centre for Infections, 61 Colindale Avenue, London NW9 5EQ, UK

C H Mercer, A J Copas, A M Johnson, Centre for Sexual Health and HIV Research, Department of Primary Care and Population Sciences, University College London, Mortimer Market Centre, off Capper Street, London WC1E 6AU, UK

There is no conflict of interest.

REFERENCES

- 1 **Berridge V**. *AIDS in the UK: the making of policy, 1981-1994*. Oxford: Oxford University Press, 1996.
- 2 **Dougan S**, Gilbart VL, Sinka K, et al. HIV infections acquired through heterosexual intercourse in the United Kingdom: findings from national surveillance. *BMJ*, doi:10.1136/bmj.38393.572188.EB (published 11 March 2005).
- 3 **Health Protection Agency**. *The UK Collaborative Group for HIV and STI Surveillance. Focus on prevention. HIV and other sexually transmitted infections in the United Kingdom in 2003*. London: Health Protection Agency, Centre for Infections, November 2004.
- 4 **Johnson AM**, Wadsworth J, Wellings K, et al. *Sexual attitudes and lifestyles*. Oxford: Blackwell Scientific Press, 1994.
- 5 **Johnson AM**, Mercer CH, Erens B, et al. Sexual behaviour in Britain: partnerships, practices, and HIV risk behaviours. *Lancet* 2001;**358**:1835-42.
- 6 **PHLS Communicable Disease Surveillance Centre, ICH (London), SCIEH**. HIV & AIDS in the UK. An epidemiological review: 2000 London, 2001.
- 7 **McGarrigle C**, Gilbart V, Nicoll A. AIDS and HIV infection acquired heterosexually. *Commun Dis Rep, CDR Review* 1997;**7**:9:125-8.
- 8 **Gilbart VL**, Roeside F, Evans BG, et al. Unusual HIV transmission through blood contact: analysis of cases reported in the United Kingdom to December 1997. *Commun Dis Public Health* 1998;**1**:108-13.
- 9 **Erens B**, McManus S, Field J, et al. *National survey of sexual attitudes and lifestyles II: Technical report*. London: National Centre for Social Research, 2001.
- 10 **StataCorp**. *Stata statistical software: Release 7.0*. Texas: Stata Corporation, 2001.