

# Sex role separation in sexual diaries of homosexual men

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**Objective:** To measure types of sex role prevalence in common and risk-related behaviours among gay men for modelling HIV transmission.

**Design:** Cohort study of 385 homosexually active men recording sexual diaries over 1-month periods.

**Methods:** Measures of incidence of behavioural sex roles for masturbation, fellatio, anal intercourse and anilingus by relationship type, derived from 1-month sexual diary data.

**Results:** Low behavioural role rigidity for masturbation and fellatio, but higher rigidity for anal intercourse and anilingus. Participants with no regular partner showed a relatively low frequency of anal intercourse, whereas those in closed relationships showed a high frequency.

**Conclusion:** Although anal intercourse shows a certain degree of behavioural role rigidity, this rigidity is not large enough to conclude that gay men exclusively engage in either an active or a passive role. Typical rates for exclusive active and passive roles for anal intercourse during the month the diaries were recorded were in the range of 12–15%; the dual role was significantly higher.

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**Keywords:** Homosexual behaviour, HIV transmission, modelling, behavioural role separation, sexual diaries.

## Introduction

In the decade since the identification of HIV as the causative agent of AIDS much effort has been devoted to the prediction of transmission due to various environmental and behavioural factors [1]. Abramson [2] has noted that sexual parameters are critical to epidemiological models of the sexual transmission of HIV. The ultimate efficiency of such models depends upon quality and quantity of empirical data on sexual behaviour; predicting trends in the AIDS epidemic requires multidisciplinary co-operation [3].

The spread of HIV within the homosexual community is most closely associated with anal intercourse [4,5]. More specifically, passive anal intercourse is by far the highest risk factor in sexual transmission of HIV [6–9]. Conclusions derived from the disparity in risk between inserter ('active') and insertee ('passive') anal intercourse for epidemiological modelling were tentatively proposed *inter alia* by Trichopoloulos *et al.* [10],

who suggested that exclusive behavioural role separation leads to a low incidence of HIV, citing the Middle East and southeastern Europe as examples. Basic models using this idea have been investigated by Wiley and Herschekorn's [11], who confirmed Trichopoloulos' conjecture. Wiley's *et al.* modelling study also concluded that the 'worst case' epidemic occurs not with *random* mixing between groups, but when *dual-role* individuals tend to mix among themselves.

The model of the structure of sexual action underlining the investigations of Project SIGMA (Socio-Sexual Investigations of Gay Men and AIDS) defines *four* possible modalities [12] of sexual behaviour: Self, Active, Passive and (simultaneously) Mutual. It is important to note that Active and Passive modalities are not always equivalent to who is the inserter and who is the insertee, but are in contrast directional (i.e., to who is the agent and who is the recipient of the sexual behaviour). The active partner is the inserter in anal intercourse, but the insertee for fellatio. This appar-

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ent inconsistency is due to the fact that the modality is translated from the vernacular descriptions used by respondents (for example, 'I sucked my partner' and 'I fucked my partner' are both active behavioural roles, although the subject is insertee in the first and inserter in the second behaviour).

Four mutually exclusive behavioural role types can then be derived from these modalities: Both active *and* passive, *only* Active, *only* Passive and Neither (this partition of sex roles is referred to using the acronym BAPN). The 'Neither' role is crucial for accurately defining the incidence of a behaviour, since it makes the role set exhaustive. These behaviour role types are also fundamental in the sense that common, but more general, categories can be built up from them. Thus, 'inserter in anal intercourse' consists of two types: those who are 'Active' and those who are 'Both' in this terminology. More general categories can thus be matched by the BAPN behavioural role types.

The behavioural roles thus defined are best thought of as dispositional, but require a period of time in their definition, since at any one instant a respondent must assume either an Active, Passive or Neither role, but the individual's stability in a behavioural role is an issue of empirical fact. Thus, in a given period, interest centres on how consistent these modalities are; the Both role is expressed when an individual is both active and passive during this period.

The sexual diaries in this study were recorded over a period of 1 month, since this is the longest feasible period for collecting data by this method. Project SIGMA interview data indicate that estimates of the incidence of such behavioural role segregation for 1 month are highly correlated with estimates for a 6-month period, but the exclusive (Active, Passive) categories have a reduction in incidence during a full year. Such turnover is considered in the discussion of Table 3 below.

The incidence in each behavioural role for a population will therefore provide the necessary parameters for describing dominant HIV transmission routes, ignoring variations created by the use of prophylactics. In particular, we focus on the effects associated with relationship type and age, which Project SIGMA has been found to be crucial independent variables [13].

## Methods

Sexual diaries submitted to Project SIGMA were used as the data source for this study. The Project SIGMA diary study is of 385 non-clinic-based homosexually active men. These diarists are from various locations in England and Wales: primarily London and Cardiff, together with Newcastle, Teeside, Birmingham, Portsmouth, Leeds, Norwich, Liverpool and Bristol. Re-

spondents from the diary study rarely participate in it for consecutive waves. The greatest overlap occurs between waves I and II, when 25 out of the 221 wave I individuals also recorded diaries in wave II.

The sexual diaries database relating to the 385 individual diarists comprises 5712 sexual sessions, consisting of a total of 12 481 sexual acts. The median number of sessions per individual over the month is 15 (interquartile range, 11). The distribution of session length (number of acts in a session) is dominated by one-act sessions (over 70%), and follows an exponential decay function, with a mean of 1.90 and a variance of 3.06.

The validity of sexual diaries as a method for collecting sexual behaviour has been questioned [14], although James *et al.* [15] found a good fit between interviews and a self-administered questionnaire. However, Conrath *et al.* [16] are unquestionably in favour of diary recording techniques. The SIGMA sexual diaries present an excellent methodology for recording detailed sexual information [17], especially about role expression, since respondents are explicit not only about what is done (the behaviour), but also to whom it was done (the modality, or role).

Project SIGMA has developed a model of sexual behaviour [12] that defines every sexual act as a composite of three elements: the modality ('who does what to whom'), the behaviour ('what is done') and the outcome (the destination of ejaculate, if any). This structure is used to encode the diaries into a database.

Each respondent completes a diary form that has two sections: the face-sheet with covering information, and the diary itself. The covering information includes demographic attributes, the SIGMA respondent type (derived from their relationship type and age; see below) and their HIV status (if tested). When completing the diary section, the respondent records details on where they were (for example, at home, in a sauna), when it was (the date and time) and who they were with (their sexual partners), and then describes, in sequence, the sexual acts that took place during the encounter. Since each sexual act is partner-specific it is possible to take the partner's characteristics, preferences (including power and behavioural role preferences) into account; the situational factors enable other issues of opportunity to be studied. Each diary is then transcribed into a database using the sexual code, ready for analysis by computer programs.

The respondent's age and relationship type are described using the SIGMA typology [13] (Table 1) and included with each individual's data in the data base. To define the typology, the categories of sexual relationship type [*Closed* ('monogamous'), *Open* (at least one regular partner and others) or *No regular partner*] are crossed with the variable of Age (categorized as *Under 21*, *21 to 39*, and *Over 39* years). *Relationship type* is defined by the subject and may

be at odds with his partner's definition, particularly in the 'Closed' relationship. The youngest *Age group* consists of men whose sexual activity is illegal (in England and Wales), being under the age of homosexual consent of 21 years, and the oldest group consists of men who grew to sexual maturity before the 1967 Sexual Offences Act, when all homosexual activity (and hence, *a fortiori*, male sexual relationships) was illegal. These nine SIGMA relationship types are then labelled using the Roman numerals I-IX.

Table 1. SIGMA typology.

Relationship type	Age (years)		
	Under 21	21-39	Over 39
Closed ('monogamous')	I	II	III
Open ('one regular and other partners')	IV	V	VI
No regular partner	VII	VIII	IX

SIGMA, Socio-Sexual Investigations of Gay Men and AIDS.

We have written computer programs (N.H. Coxon *et al.*, unpublished data) to perform several methods of data analysis on diaries. The program for BAPN analysis is chiefly used here. This program identifies each individual's data and assigns a role type for each behaviour during the specified period. The results are then aggregated into the nine SIGMA age  $\times$  relationship types as percentage incidence figures.

## Results

Table 2 shows the basic results from the BAPN program for the three most common behaviours (anal intercourse, fellatio and masturbation) and for anilingus (included because of its relative frequency and its implication in transmission of hepatitis A). The number of respondents in each type is shown under the type label. Each row of Table 2 represents a single behaviour-by-role combination, and each column a given type of diarist. The entries are the percentage of that type who engaged in the specified activity during the diary month. Each row was then analysed in a two-way table format (reflecting the structure of the 3  $\times$  3 SIGMA age by relationship typology) using a median polish [18] (a resistant variant of the additive model). This method iteratively estimates main and interactive effects associated with Age and Relationship type categories on each sexual behaviour. The results of the analysis are not presented here, but the subsequent paragraphs rely upon them.

From the total (right-hand column) values in Table 2, it is clear that the two most common sexual behaviours (masturbation and fellatio) are little prone to behavioural role rigidity, in the sense that the 'Both' category dominates the others and the exclusively Ac-

Table 2. BAPN\* incidence by typology and total.

	Type									Total
	I	II	III	IV	V	VI	VII	VIII	IX	
No. diarists	6	44	15	4	95	70	36	59	48	385
Anal intercourse										
Both	17	27	20	0	26	17	3	10	6	17
Active	0	18	20	0	16	13	19	4	10	13
Passive	0	11	13	25	13	19	14	7	8	12
Neither	83	43	47	75	45	51	64	78	75	58
Fellatio										
Both	50	64	40	50	73	61	47	36	33	54
Active	0	5	0	0	9	13	6	7	13	9
Passive	0	9	13	0	4	7	0	9	4	6
Neither	50	23	47	50	14	19	47	48	50	31
Masturbation										
Both	67	82	40	25	78	76	58	52	67	68
Active	0	2	13	0	2	4	3	1	0	3
Passive	0	0	13	25	7	4	3	0	2	4
Neither	33	16	34	50	13	16	36	46	31	25
Anilingus										
Both	17	25	13	0	14	11	3	3	2	10
Active	0	14	0	0	12	16	3	6	4	10
Passive	0	7	0	0	7	3	6	4	4	5
Neither	83	55	87	100	67	70	89	87	90	75

\*Acronym for partition of sex roles into Both active and passive, only Active, only Passive and Neither.

tive and exclusively Passive roles are small. In contrast, anal intercourse shows a considerably higher degree of role rigidity, and anilingus a small (but significant) degree of rigidity.

On analysis of the four rows of the Anal intercourse subtable (Table 2), a consistent pattern of effects emerged. In general, Relationship type had stronger effects than age on the incidence figures of each variant of anal intercourse. In particular, having No regular partner lowered the incidence of anal intercourse for all practising (Both, Active or Passive) roles, and being in a Closed relationship consistently raised it. Age effects were concentrated mainly in the youngest group (under 21 years), considerably decreasing the incidence of anal intercourse for those exclusively Active and increasing the incidence of those exclusively Passive. A few strong interaction effects augment this picture — the incidence of Active anal intercourse for those under 21 years *and* with no regular partner was much higher than would be expected given the main effects, and the incidence for those in a Closed relationship *and* under 21 years was much lower than expected. In brief, the Regular/No regular partner divide and the Under 21/Over 21 years boundaries are the most significant with respect to sexual role differentiation according to this analysis.

In contrast to anal intercourse, there is no real common consensus amongst researchers on the level of risk associated with fellatio. Analysis of the sexual diary data of which sexual behaviours immediately precede anal intercourse in a sexual session has shown that fellatio is by far the most common antecedent [19],

complicating measurement of its independent level of risk. However, cases of HIV transmission via the oral-genital route have been reported [20], making fellatio a possibly significant component of a transmission model, especially considering the high infectivity for fellatio during primary infection (523 times higher than at any other stage of infection) reported by Koopman *et al.* [21]. Analysis of this section of Table 2 shows that respondents expressing the Both role in fellatio occurred mainly among those in an open relationship, and were fewest among those with no regular partner. The Active role was associated most strongly with those over 39 years old, and least in Closed relationships. The Passive role was highest in Closed relationships, and lowest for young men (under 21 years). As mentioned above, 44% did not engage in fellatio during their diary. The Neither role was strongest among those under 21 years old.

Masturbation is a low-risk behaviour, but is useful as a 'yardstick' because it is common. Analysis of this section of Table 2 indicates that Age and Relationship effects were very small for masturbation, especially among those who practised the Both role (67%). It is likely that, given a few more months, almost every respondent who engages in masturbation will do so in both roles.

The HIV transmission risk associated with anilingus is not well documented, but it is still an important variable in the transmission of hepatitis A and associated sexually transmitted diseases. Analysis of this section of Table 2 shows that the Active role had the highest incidence for those in an Open relationship, and lowest for those in a Closed relationship. The highest incidence for Passive anilingus was associated with men between 21 and 39 years old. Those who engaged in both roles did so the most in a Closed relationship (a similar pattern to anal intercourse).

How stable are these role modalities? To answer this question, turnover data are necessary, and unfortunately the longitudinal properties of sexual diaries data in Project SIGMA are poor: relatively few men keep a diary on a regular basis, and since only 25 individuals wrote diaries in both waves of these data, it is hazardous to rely on their turnover rates. However, these 25 diarists are a subset of the 296 SIGMA respondents for whom we have reported (interview) sexual behaviour data on an annual basis. Therefore the turnover rates between BAPN role types based upon the interview data of the Project for this year are shown in Table 3.

Table 3 shows the turnover rates (in number of individuals) for each of the role variants of anal intercourse. The intersection of a row with a column shows the number of individuals who were in the row's role in wave III who changed to the column's role in wave IV. The diagonal entries show the number of individuals who remained in the given behavioural role in both waves. The most striking feature is the

**Table 3.** Turnover matrix: anal intercourse role: SIGMA (interview) data, wave III and wave IV.

	Wave III			
	Both	Active	Passive	Neither
Wave IV				
Both	83	15	11	10
Active	11	19	3	6
Passive	16	2	13	5
Neither	17	13	11	61

$\chi^2 = 143.44$ ; d.f. = 9;  $P < 0.0001$ .

high stability of the Both and Neither roles: approximately two-thirds of those who abstained from anal intercourse (Neither) and of those who practised it both actively and passively (Both) continued to do so a year later. Thus, the Both category is the largest and the most stable role behaviour among those engaging in anal intercourse. Those who are exclusively Active or exclusively Passive not only form a much smaller proportion of gay men, but were almost twice as likely to change to another role. A number of international studies reported by Ross [22] have shown that preferences for sexual acts in their various modalities also follow a similar pattern, with the Both variant of anal intercourse being considerably more common than the single-mode Active and Passive variants.

Finally, we consider the individual-based average frequencies of the behaviours during the diary/month (derived by counting their occurrence in the diary records), since such measures are also crucial parameters for modelling sexual behaviour.

The four most frequent sexual activities shown in Table 4 (masturbation, fellatio, anal intercourse and anilingus) account for approximately 80% of total non-solo sexual activity (i.e., with a partner present), and together with their reciprocated modes (mutual masturbation and mutual fellatio) represent over 90% of the total number of sexual acts. The mean frequency rates *per individual* for the four behaviours are also shown in Table 4. The mean number of sexual acts per individual diary/month is 19.3 for these behaviours.

On average, anal intercourse was engaged in three times a month. Since over 50% of diarists did not engage in anal intercourse (this is a typical value for the Neither role; see Table 4), those who did engage in anal intercourse did so approximately six times a month. The mean values for other behaviours can similarly be adjusted by reference to the appropriate 'Neither' category in Table 3.

## Discussion

Men who engaged in anal intercourse did so a mean of six times a month, out of a total of approximately 20

Table 4. Mean incidence of behaviours per diary.

	Mean incidence per individual (diary)	Total for behaviour
Anal intercourse		
Active	1.6	
Passive	1.3	2.9
Fellatio		
Active	2.9	
Passive	2.3	5.2
Masturbation		
Active	5.2	
Passive	4.3	9.5
Anilingus		
Active	1.0	
Passive	0.7	1.7
Total		19.3

sexual acts a month. The monthly incidence of Both, Active, Passive and Neither roles for anal intercourse was 18, 14, 12 and 56%, respectively. When broken down by Relationship type and Age group, the highest levels of the Both role were among those in a relationship (whether Closed or Open) and by far the lowest incidence of anal intercourse was among men with No regular partner. Similarly, the Both role was particularly common in the 21–39 years age group.

The lowest incidence of anal intercourse was associated with men with No regular partner (who had the most casual encounters in the diary data). Approximately 72% of them did not engage in anal intercourse in that month. The highest incidence occurred in Closed relationships. This suggests that frequency of anal intercourse is inversely related to number of sexual partners, which further supports the need to use the variable of *penetrative* sexual partners [5] in epidemiological models (since the number of sexual partners is not indicative of the number of risk contacts).

These results therefore strongly contradict the idea that homosexual men tend to be exclusively active or passive during anal intercourse in England and Wales; rather, if within a given period they engage in anal intercourse they are overwhelmingly likely to do so in both modalities. Indeed, the figures we have cited may well be an underestimate [10], especially since the number of respondents practising the Both role is less than figures observed by Van Zessen and Van Griensven [23], who reported an incidence of 61% for the Both role in their Amsterdam cohort (although this is over a period of 6 months using retrospective interviewing techniques). However, our diary-based BAPN estimates for anal intercourse in England and Wales have been confirmed independently by retrospective interviewing results from the London Project SIGMA site, who report interview-based Both, Active, Passive and Neither rates of 17, 14, 12 and 57%, respectively, over 1 month (P. Weatherburn, personal communi-

tion). These figures agree with ours within a range of 1%.

Wiley and Herschekorn's [11] epidemiological analysis of homosexual behavioural role separation in anal intercourse used the simplifying assumption that role characteristics are constant over time (i.e., that individuals maintain their sex role type consistently). Clearly this is not likely. Our turnover table (Table 3) suggests that while 65% of men who engage in Both modalities are likely to maintain their role over a year, only a third of those exclusively Active (39%) or exclusively Passive (34%) are likely to do so. In their study of behavioural role change rates in a large longitudinal cohort ( $n = 723$ ) in Amsterdam Van Zessen and Van Griensven [23] reported that roles during anal intercourse are significantly static over time: the percentage of individuals who maintained their sex role type on follow-up after 6 months was 62, 42, 29 and 78% for Both, Active, Passive and Neither, respectively — which corresponds within  $\pm 5\%$  to the SIGMA interview-based annual rate in Table 3. They also reported a similarly low exchange rate ('migration') between the Active and Passive roles for anal intercourse.

The characteristics associated with risk behaviours presented here have important implications for modelling of HIV transmission in the homosexual population.

First, if gay men engage in anal intercourse they are far more likely to practise both Active and Passive variants within a given period than to practise one role exclusively.

Second, as Wiley *et al.* [11] conclude, the worst case epidemic occurs when individuals expressing the Both role tend to mix among themselves. This diary study therefore clearly pinpoints gay men in a Closed relationship and men in the 21–39-year age group as potentially exhibiting the highest risk of HIV transmission, due to the dual-role mixing level associated particularly with them. This is a worrying conclusion given that Regular partnership durations are often shorter than the period of primary infection (i.e., before an effective antibody response is developed). Moreover, since few gay men in England and Wales are normally tested more than once a year, this duration is also smaller than the latency between tests.

Third, although young gay men (under 21 years) are generally slightly more likely to engage in anal intercourse (especially passive anal intercourse), they are much less likely to do so in the dual role.

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