

Misclassification bias: diversity in conceptualisations about having ‘had sex’

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Abstract. *Background:* Understanding the signification of the word ‘sex’ has implications for both medical research and clinical practice. Little is known about how people of varying ages define sex and how situational qualifiers influence definitions across age groups. To our knowledge, this is the first study of a representative sample to assess attitudes about which sexual behaviours constitute having ‘had sex’ and to examine possible mediating factors (gender, age, giving/receiving stimulation, male ejaculation, female orgasm, condom use or brevity). *Methods:* A telephone survey of English-speaking residents of Indiana (USA) using random-digit-dialling produced a final sample of 204 men and 282 women ($n = 486$) ranging in age from 18 to 96 years. Questions assessed the respondents’ attitudes on manual-genital (MG), oral-genital (OG), penile-vaginal intercourse (PVI) and penile-anal intercourse (PAI) behaviours. *Results:* There was no universal consensus on which behaviours constituted having ‘had sex’. More than 90% responded ‘yes’ to PVI but one in five responded ‘no’ to PAI, three in 10 responded ‘no’ to OG and about half endorsed MG. Fewer endorsed PVI with no male ejaculation (89.1%) compared with PVI without a qualifier (94.8%, $P < 0.001$). MG was endorsed more often when received (48.1%) than given (44.9%, $P < 0.001$). Among men, the oldest and youngest age groups were significantly less likely to believe certain behaviours constituted having ‘had sex’. *Conclusions:* These findings highlight the need to use behaviour-specific terminology in sexual history taking, sex research, sexual health promotion and sex education. Researchers, educators and medical practitioners should exercise caution and not assume that their own definitions of having ‘had sex’ are shared by their research participants or patients.

Additional keywords: condom, meanings of sex, orgasm, sex definitions.

Introduction

Understanding the significance of the word ‘sex’ has implications for biomedical research, sexuality education and clinical practice. For example, published studies have reported that people not reporting a recent history of penile-vaginal sex will nonetheless test positive for sexually transmissible infections by urine assay.^{1,2} Indeed, a body of literature has been developed to address possible reporting issues and memory errors associated with sexual behaviours.^{3–6} Unfortunately, the elementary issue of what constitutes ‘sex’ has been vastly neglected. Thus, when hypotheses involving sex are tested, a misclassification bias inevitably occurs.⁷ The essence of misclassification bias is simple – people are either incorrectly classified as having sex or incorrectly classified as not having sex. In the latter case, this misclassification bias may result in an inflationary effect for programs seeking to promote abstinence.

Several studies using convenience samples have reported variations in the definition of having ‘had sex’.^{8–12} These studies highlight the need to use behaviour-specific terminology when taking sexual histories.

To our knowledge, no studies have collected data from a representative sample including older respondents and explored whether male ejaculation, female orgasm, condom use or brevity of intercourse affects attitudes about whether penile-vaginal intercourse (PVI) and penile-anal intercourse (PAI) constitute having ‘had sex’. Additionally, we assessed attitudes about giving and receiving manual-genital (MG) or oral-genital (OG) stimulation. Previous research has demonstrated that contextual variables are likely to have an effect on individuals’ definitions of ‘sex’; however, these results primarily derive from samples of college-aged individuals.^{10,13,14} Little is known about how older age

groups define sex and how situational qualifiers influence their definitions.

Methods

Data collection and sample characteristics

The Centre for Survey Research at Indiana University conducted a telephone survey of Indiana residents using random-digit-dialling. English-speaking household residents aged 18 years or older were eligible. Of the eligible contacts, 39% ($n = 504$) completed interviews. Of these, 486 (96.4%; 204 males, 282 females) provided valid answers to 'had sex' questions; this group constituted the current sample. Age ranged from 18 to 96 years, with men (mean age 46.50 years) significantly younger than women (mean age 50.6; $P < 0.005$). The majority (91.3%) identified themselves as white.

Measures

In addition to demographic questions, the following stem question was asked after an introduction indicating we were assessing attitudes and not behavioural history: 'Would you say you 'had sex' with someone if the most intimate behaviour you engaged in was. . .'. The 14 specific behavioural items and their abbreviations are listed in Table 1. Valid responses were 'yes' or 'no'.

Data analysis

The following inferential statistics were used: *t*-tests for gender differences in age; McNemar tests to compare the proportions of 'yes' responses across behaviours and Chi-square tests for age analyses of item within gender.

Results

Table 1 presents the percentage of respondents who answered 'yes' for each behaviour. Almost all respondents believed PVI constituted having 'had sex' (94.8%) even if there was no female orgasm, it was very brief, or a condom was used. However,

compared with these variations of PVI, significantly fewer ($P < 0.001$) answered 'yes' to PVI-no ejaculation (89.1%). Compared with all PVI questions, significantly fewer ($P < 0.001$) responded 'yes' to PAI (80.8%) and its variations. There were no significant differences in answers for the variations of PAI. Compared with the assessed variations of PVI and PAI, significantly fewer ($P < 0.011$) responded 'yes' to OG. Compared with OG-received (72.9%), slightly fewer answered 'yes' to OG-performed (71.0%; $P < 0.049$). Compared with the variations of PVI, PAI and OG, less than half of the respondents answered 'yes' to MG ($P < 0.001$). Significantly more respondents answered 'yes' for MG-received (48.1%) than MG-performed (44.9%, $P < 0.001$).

The majority of participants answered similarly for PVI and PAI regardless of qualifiers (i.e. no female orgasm, no male ejaculation, brevity or condom use). However, a small proportion of participants gave inconsistent answers for PVI compared with PVI-no ejaculation (6.9%; 95% CI: 4.6–9.2%), PVI-no female orgasm (4%; 95% CI: 2.2–5.7%), PVI-very brief (4.4%; 95% CI: 2.6–6.2%) and PVI-condom (4.2%; 95% CI: 2.4–6.0%). Even fewer participants responded inconsistently to PAI compared with PAI-no ejaculation (2.1%; 95% CI: 0.8–3.4%), PAI-no female orgasm (3.4%; 95% CI: 1.8–5.0%), PAI-very brief (3.0%; 95% CI: 1.4–4.5%) and PAI-condom (3.4%, 95% CI: 1.8–5.0%).

Overall, the majority of participants answered similarly regardless of directionality (performer or recipient) of MG or OG. Dissimilar responses by directionality were given by 4.0% (95% CI: 2.2–5.7%) of participants for MG and by 3.5% (95% CI: 1.9–5.2%) for OG.

Responses did not differ significantly overall for men and women (Table 2). Additionally, gender comparisons within age groups were not statistically significant. Given that the sample included proportionally fewer older men than women, separate Chi-square analyses of answers by age were performed within gender (Table 2). Holm–Bonferroni correction was applied to adjust for multiple comparisons and those remaining statistically

Table 1. Percentage and 95% confidence intervals of the sample ($n = 486$) answering 'yes' for each behaviour

Wording of item: Would you say you 'had sex' with someone if the most intimate behaviour you engaged in was. . .	Abbreviation	% respondents answering 'yes' (95% CI)
You touched, fondled or manually stimulated a partner's genitals?	MG-performed	44.9 (40.5–49.3)
A partner touched, fondled, or manually stimulated your genitals?	MG-received	48.1 (43.7–52.5)
You had oral (mouth) contact with a partner's genitals?	OG-performed	71.0 (67.0–75.0)
A partner had oral (mouth) contact with your genitals?	OG-received	72.9 (69.0–76.9)
Penile-vaginal intercourse?	PVI	94.8 (92.9–96.7)
Penile-vaginal intercourse with no ejaculation; that is, the man did not 'come'?	PVI-no ejaculation	89.1 (86.3–91.9)
Penile-vaginal intercourse with no female orgasm; that is, the woman did not 'come'?	PVI-no female orgasm	92.7 (90.4–95.0)
Penile-vaginal intercourse, but very brief?	PVI-very brief	94.4 (92.3–96.5)
Penile-vaginal intercourse with a condom?	PVI-condom	93.3 (91.0–95.6)
Penile-anal intercourse?	PAI	80.8 (77.3–84.3)
Penile-anal intercourse with no male ejaculation; that is, the man did not 'come'?	PAI-no ejaculation	79.5 (75.9–83.1)
Penile-anal intercourse with no female orgasm; that is, the woman did not 'come'?	PAI-no female orgasm	81.1 (77.6–84.6)
Penile-anal intercourse, but very brief	PAI-very brief	81.8 (78.4–85.2)
Penile-anal intercourse with a condom?	PAI-condom	82.0 (78.6–85.4)

Table 2. Analyses by gender and age within gender for percentage answering ‘yes’ for each behaviour

Note: superscript letters used to denote post-hoc comparisons when overall Chi-square tests showed significant age group differences. Percentages followed by the same letter are not significantly different from one another. *, significant after Holm–Bonferroni correction for multiple comparisons. MG, manual-genital; OG, oral-genital; PAI, penile-anal intercourse; PVI, penile-vaginal intercourse

% respondents answering ‘yes’ to each behaviour	Gender	Age group (years)				Total	Chi-square <i>P</i> -value
		18–29	30–44	45–64	65+		
	Men <i>N</i> =	31	62	88	23	204	
	Women <i>N</i> =	31	77	109	61	278	
MG-performed	Men	9.7 ^a	51.6 ^b	52.3 ^b	36.4 ^b	43.8	<0.000*
	Women	29.0	44.2	51.4	47.5	46.0	0.171
MG-received	Men	16.7 ^a	53.2 ^b	54.5 ^b	43.5 ^b	47.3	0.003
	Women	32.3	44.2	55.1	53.3	49.1	0.099
OG-performed	Men	33.3 ^a	80.6 ^b	78.4 ^b	59.1 ^a	70.3	<0.000*
	Women	61.3 ^{a,b}	74.0 ^{a,b}	79.4 ^a	59.3 ^b	71.5	0.024
OG-received	Men	40.0 ^a	82.3 ^b	79.5 ^b	59.1 ^{a,b}	72.3	<0.000*
	Women	67.7 ^{a,b}	76.6 ^{a,b}	80.4 ^a	59.3 ^b	73.4	0.023
PVI	Men	96.7	98.4	95.4	77.3	94.5	0.002*
	Women	93.5	97.4	96.3	89.8	94.9	0.119
PVI-no ejaculation	Men	90.0	91.9	87.5	63.6	86.6	0.008
	Women	93.5	96.1	90.7	82.8	90.8	0.060
PVI-no female orgasm	Men	96.7	96.8	93.1	86.4	94.0	0.303
	Women	90.3	96.1	91.6	86.4	91.6	0.247
PVI-very brief	Men	96.7 ^a	98.4 ^a	94.3 ^a	81.8 ^b	94.5	0.030
	Women	96.8 ^a	96.1 ^a	96.3 ^a	86.4 ^b	94.2	0.043
PVI-condom	Men	100 ^a	96.8 ^a	92.0 ^a	81.8 ^b	93.5	0.037
	Women	93.5	94.8	94.3	88.1	93.0	0.415
PAI	Men	76.7 ^a	88.7 ^a	81.4 ^a	50.0 ^b	79.5	0.002*
	Women	83.9 ^a	88.2 ^a	84.0 ^a	66.7 ^b	81.5	0.011
PAI-no male ejaculation	Men	76.7 ^a	87.1 ^a	79.1 ^a	45.5 ^a	77.5	0.001*
	Women	83.9 ^a	88.2 ^a	82.1 ^a	66.7 ^b	80.7	0.016
PAI-no female orgasm	Men	76.7 ^a	90.3 ^a	81.4 ^a	59.1 ^b	81.0	0.013
	Women	83.9	88.2	81.1	73.2	81.8	0.175
PAI-very brief	Men	76.2 ^{a,b}	91.9 ^a	81.4 ^{a,b}	59.1 ^b	81.5	0.007
	Women	83.9	88.2	82.1	71.4	81.8	0.102
PAI-condom	Men	83.3 ^a	88.7 ^a	83.7 ^a	59.1 ^b	82.5	0.018
	Women	83.9 ^a	88.2 ^a	82.1 ^a	69.1 ^b	81.3	0.047

significant are marked with asterisks (Table 2). After this correction, women’s answers did not vary significantly by age for any of the items.

For men, there were significant age differences in the percentage answering ‘yes’ for several behaviours. Specifically, significantly fewer men aged 18–29 answered ‘yes’ for MG regardless of direction. For OG-performed, men in the youngest (18–29) and oldest (65+) age groups were less likely to answer ‘yes’ compared with the middle two age groups. For OG-received, only the youngest age group was significantly different from men aged 30–64 years. For PVI, significantly fewer men in the oldest age group answered ‘yes’ compared with the other age groups. For PAI, the oldest age group was significantly less likely to answer ‘yes’ across all PAI questions. When the Holm–Bonferroni correction was applied, only PAI, PAI-no male ejaculation and PAI-very brief retain significant differences by age.

Discussion

In this representative sample of adult residents in one state in the USA, there was no universal agreement as to what behaviours

constituted having ‘had sex’. These findings highlight the diversity of opinions regarding which behaviours constitute having ‘had sex’. The large majority believed that PVI was having ‘had sex’, but one in five answered ‘no’ to PAI, three in 10 answered ‘no’ to OG and more than half answered ‘no’ for MG. Overall, men and women answered similarly. These findings suggest that researchers assessing whether male or female study participants have ‘had sex’ must exercise extreme caution in the construction of their questions as failure to do so may easily result in a misclassification bias that greatly distorts study findings.

This study also examined whether qualifiers to PVI and PAI (no male ejaculation, no female orgasm, condom use or brevity) made a difference in the endorsement of the behaviour. For the sample overall, significantly fewer people regarded PVI-no male ejaculation as sex compared with PVI (without a qualifier). MG was believed to be sex more often when it was received compared with when it was performed. It is important to note that although a small proportion of individuals gave inconsistent answers for the same behaviour differentiated by qualifiers such as orgasm, brevity, condom and direction, it is difficult to understand how these individuals may interpret non-specific

questions with regard to having 'had sex'. Previous studies have suggested that the occurrence of orgasm may influence ratings.^{8,10} In this study, the qualifier was the absence of orgasm compared with a non-qualified description of the behaviour rather than an explicit comparison of presence or absence of orgasm.

In particular, age appeared to be related to how men answered, with the oldest and youngest age groups being significantly less likely to believe that certain behaviours were having 'had sex'. In an Australian sample, three-quarters of the study participants aged 50–59 years, but only about half of those aged 16–19 years, agreed with the statement, 'If two people had oral sex, but not intercourse, you would still consider that they had had sex together'.¹⁵ We found similar differences for men aged 45–64 years compared with those aged 18–29 years. However, possibly due to limited cell size, the differences between those over 64 years and the youngest group were not significant. It is not clear whether such age-related differences are due to cohort effects, developmental effects or issues related to sexual function that may vary by age. Further research is needed to explore these issues. Nonetheless, our findings suggest that questions about having 'had sex' may be interpreted differently across age cohorts, particularly among men.

Most studies in this area have focussed only on university students or young adults. This study provided data from a representative sample aged 18–96 years. Although the sampling method has many strengths, within each age by gender group, there were relatively few people, particularly for the youngest and oldest age categories. This may limit the degree of generalisation for the age-related analyses. The survey methodology presented situational qualifiers for PVI and PAI in only a brief descriptive fashion compared with more qualitative approaches or vignette studies. However, at this time, we cannot say which methodological approach more closely approximates the processes involved when people are reporting on their sexual histories. Other qualifiers also worth exploring in future research include: the relational context of the behaviour; the relevance of consent; effects of socioeconomic status; ethnicity and the potential costs/benefits of labelling a behaviour as having 'had sex'.^{8,10,12,14}

The current study adds to a growing body of literature exploring the constructed meaning of language related to sexuality. Given the diversity of opinions about what constitutes having 'had sex', it is likely that people across gender and age groups may answer questions about how many partners they 'had sex' with or how many times they 'had sex' using varying criteria. They may think of different behaviours when researchers or practitioners use this phrase. Thus, the results provide empirical evidence supporting the need to use behaviour-specific terminology in sexual history taking, sex research, sexual health promotion and sex education. Furthermore, researchers, educators and medical practitioners should exercise caution and not assume that their own definitions of having 'had sex' are shared by their participants, students or patients.

Conflicts of interest

None declared.

Acknowledgements

This research was supported by the Rural Center for AIDS/STD Prevention and The Kinsey Institute for Research in Sex, Gender and Reproduction at Indiana University, Bloomington.

References

- 1 Crosby RA, DiClemente RJ, Wingood GM, Lang D, Harrington KF. The value of consistent condom use: a study of STI prevention among African American adolescent females. *Am J Public Health* 2003; 93: 901–2. doi:10.2105/AJPH.93.6.901
- 2 Zenilman JM, Weisman CS, Rompalo AM, Elish N, Upchurch DM, Hook EW III, *et al.* Condom use to prevent incident STDs: the validity of self-reported condom use. *Sex Transm Dis* 1995; 22: 15–21.
- 3 Orr DP, Fortenberry DJ, Blythe MJ. Validity of self-reported sexual behaviors in adolescent women using biomarker outcomes. *Sex Transm Dis* 1997; 24: 261–6. doi:10.1097/00007435-199705000-00005
- 4 Shew ML, Remafedi GJ, Bearinger LH, Faulkner PL, Taylor BA, Potthoff SJ, *et al.* The validity of self-reported condom use among adolescents. *Sex Transm Dis* 1997; 24: 503–10. doi:10.1097/00007435-199710000-00002
- 5 Tourangeau R. Remembering what happened: memory errors and survey reports. In: Stone AA, Turkkan JS, Bachrach CA, Jobes JB, Kurtzman HS, Cain VS, editors. *The science of self-report: implications for research and practice*. Manwah, New Jersey: Lawrence Erlbaum Associates; 1993. pp. 29–47.
- 6 Turner CF, Ku L, Rogers SM, Linberg LD, Pleck JH, Sonenstein FL. Adolescent sexual behavior, drug use, and violence. Increased reporting with computer survey technology. *Science* 1998; 280: 867–73. doi:10.1126/science.280.5365.867
- 7 Crosby RA, DiClemente RJ, Holtgrave DR, Wingood GM. Design, measurement, and analytic considerations for testing hypotheses relative to condom effectiveness against non-viral STIs. *Sex Transm Infect* 2002; 78: 228–31. doi:10.1136/sti.78.4.228
- 8 Bogart LM, Cecil H, Wagstaff DA, Pinkerton SD, Abramson PR. Is it "sex"? college students' interpretations of sexual behavior terminology. *J Sex Res* 2000; 37: 108–16.
- 9 Pitts M, Rahman Q. Which behaviors constitute "having sex" among university students in the UK? *Arch Sex Behav* 2001; 30: 169–76. doi:10.1023/A:1002777201416
- 10 Randall HE, Byers ES. What is sex? Students' definitions of having sex, sexual partner, and unfaithful sexual behavior. *Can J Hum Sex* 2003; 12: 87–96.
- 11 Richters J, Song A. Australian university students agree with Clinton's definition of sex. *BMJ* 1999; 318: 1011–2.
- 12 Sanders SA, Reinisch JM. Would you say you 'had sex' if...? *JAMA* 1999; 281: 275–7. doi:10.1001/jama.281.3.275
- 13 Gute G, Eshbaugh EM, Wiersma J. Sex for you, but not for me: discontinuity in undergraduate emerging adults' definitions of 'having sex'. *J Sex Res* 2008; 45: 329–37.
- 14 Peterson ZD, Muehlenhard CL. What is sex and why does it matter? A motivational approach to exploring individuals' definitions of sex. *J Sex Res* 2007; 44: 256–68.
- 15 Pitts M, Smith A. Understanding oral sex. *Sex Health* 2008; 5: 315–6. doi:10.1071/SH08031

Manuscript received 8 July 2009, accepted 19 October 2009