Estimating Number of Lifetime Sexual Partners: Men and Women Do It Differently

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On surveys, men report two to four times as many lifetime opposite-sex sexual partners (SPs) as women. However, these estimates should be equivalent because each new sexual partner for a man is also a new sexual partner for a woman. The source of this discrepancy was investigated in this study. Participants reported number of lifetime and past-year SPs and estimation strategies. The pattern of lifetime estimates replicated. The lifetime protocols indicated that people used different estimation strategies, that people who used the same strategy produced similar estimates, that some strategies were associated with large estimates and others with small ones, and that men were more likely to use the former and women the latter. No sex differences in estimates or strategies were apparent in the past-year protocols. Our findings suggest that discrepant lifetime partner reports occur because men and women rely on different estimation strategies, not because they intentionally misrepresent their sexual histories.

It is common for surveys of sexual behavior to ask respondents to indicate how many sexual partners (*SPs*) they have had over the course of their lives (e.g., ACSF Investigators, 1992; Johnson, Wadsworth, Wellings, Bradshaw, & Field, 1992; Smith, 1992). Responses to such questions provide important information for epidemiologists and public health researchers concerned with modeling or tracking the transmission of sexually transmitted diseases, and for social scientists interested in characterizing and explicating sexual practices of individuals and groups (Einon, 1994). Of equal importance, such questions provide survey researchers with an opportunity to assess the validity of their instruments (Laumann, Gagnon, Michael, & Michaels, 1994; Lewontin, 1995; Morris, 1993; Smith, 1992). If surveys elicit accurate reports from their respondents, heterosexual men and women should, on average, report having had the same number of partners. This is because each new *SP* for a man is also a new *SP* for a woman. Thus, for a closed population, men and women *must* have the same number of opposite-sex *SPs*, and therefore should generate similar reports. This, however, is rarely the case. Instead, men typically report two to four times as many opposite-sex partners as women (ACSF Investigators, 1992; Johnson et al., 1992; Laumann et al., 1993; Smith, 1992).

Researchers have attempted to account for these discrepant partner reports in two ways. *Good-faith* explanations have assumed that respondents answer survey questions as accurately as they can and that the discrepancy reflects biased sampling (e.g., undersampling or failing to sample prostitutes or young female partners; Morris, 1993; Wiederman, 1997). In contrast, *bad-faith* explanations assume that respondents are "telling themselves and others enormous lies" (Lewontin, 1995, p. 29), with men deliberately inflating their reports and/or women deliberately underreporting. At present, good-faith accounts are considered unlikely because the assumptions required to eliminate the discrepancy seem highly implausible (Laumann et al., 1994; Morris, 1993; Wiederman, 1997).[1] Thus, a consensus has emerged that "intentional misreports are the main source of the discrepancies" (Smith, 1992, p. 210; see also Einon, 1994; Laumann et al., 1994; Lewontin, 1995; Tourangeau & Smith, 1996; but see Wiederman, 1997). If correct, this conclusion has far-reaching implications as it undermines the credibility of self-report data in general, and in so doing suggests that "all scientific sociology . . . is in deep trouble" (Lewontin, 1995, p. 24).

The bad-faith explanation assumes that men generally exaggerate their sexual prowess, or women minimize their sexual experiences, or both. If this view is correct, sex-differences should be common across a wide range of sensitive survey questions. However, such differences appear to be more the exception than the rule. For example, men and women typically provide similar responses when asked to

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[1] To take a concrete example, in a recent national survey men reported an average of 12.14 opposite-sex lifetime *SPs*, and women an average of 3.44. If the only cause of this difference was the failure to sample prostitutes and females under the age of 18, these results would imply that over 70% of the opposite sex *SPs* reported by the male respondents (i.e., an average of 8.7 contacts per man) belonged to one of these two groups. This is, as Morris notes, "a highly unlikely scenario" (1993, p. 437). Moreover, Wiederman (1997) has found that the gender discrepancy persists even when respondents who have admitted to participating in prostitution were removed from the sample.

estimate the frequency and duration of sexual activity (Laumann et al., 1994), and they are equally likely to acknowledge having engaged in oral and anal sex (Laumann et al., 1994; Tourangeau & Smith, 1996). More importantly, men and women provide very similar reports when asked how many sexual partners they have had in the past year (ACSF investigators, 1992; Johnson et al., 1992; Laumann et al., 1994; Morris, 1993; Smith, 1992).

These findings are inconsistent with the view that people *always* respond in bad faith when asked about their sexual behavior. At the same time, they raise two interesting questions. First, if people do not, as a matter of course, misrepresent their sexual experiences, what accounts for discrepant reports of lifetime *SP*s? Second, why is this discrepancy reduced or eliminated when the time frame of the report is narrowed to the past year? In this article, we argue that a *strategy-differences* explanation can account for both phenomena. This approach takes as its starting point the observations that sexually active people do not necessarily keep a running count of *SP*s, and that people who have not kept a tally cannot respond simply by retrieving a count from memory. Instead, they must generate a suitable numerical response using one of a variety of potentially applicable estimation strategies.

It is well established that people use multiple strategies to generate numerical estimates, that different strategies are associated with explicable characteristic biases, and that strategy use is influenced by the availability of task-relevant information and the actual magnitude of the to-be-estimated quantity (Blair & Burton, 1987; Brown, 1995, 1997; Burton & Blair, 1991; Conrad, Brown, & Cashman, 1998; Menon, 1993). Of particular relevance, Brown (1995, 1997) demonstrated that people asked to estimate event frequencies sometimes retrieve and count event instances (i.e., *enumerate*) and sometimes produce rapid intuitive estimates (i.e., *rough approximations*). Participants who enumerate often underestimate event frequencies because relevant instances may be permanently forgotten, because output interference causes some instances to become temporally inaccessible, and because people sometimes terminate their retrieval efforts before all relevant instances have been recalled. In contrast, participants who produce rough approximations often overestimate event frequencies. It is believed that people generate these estimates by mapping vague quantifiers (e.g., terms like "quite a few," "lots") onto a numerical response scale and that this process produces overestimation because the lower bound of the response scale is anchored but the upper bound is not (Brown, 1995).

It is conceivable that some people enumerate when reporting their number of lifetime *SP*s and others respond with rough approximations. If so, all else being equal, people who enumerate should produce smaller estimates than people who use rough approximations. Thus, if we assume that the mean number of *SP*s is the same for men and women and that men and women respond in good faith, then we should find that men rely more on strategies associated with larger estimates (e.g., rough approximation) and women rely more on those associated with smaller estimates (e.g., enumeration).[2] If this is the case, then differential strategy use can explain the sex difference in reports of lifetime *SP*s.

As noted above, men and women report comparable numbers of past-year *SP*s. In addition, it is common to find (and logically appropriate) that past-year estimates are considerably smaller than lifetime estimates. These facts have two implications. First, there is evidence that people are less prone to use approximation strategies when the to-be-estimated values are small than when they are large (Brown, 1995; Burton & Blair, 1991; Conrad et al., 1998). Thus, approximated estimates should be less common when people report past-year *SP*s than when they report lifetime *SP*s. Second, if strategy differences do account for discrepant lifetime reports, then the pattern of strategy use should be the same for men and women when they produce comparable reports (i.e., when they respond to the past-year question). A questionnaire study was conducted to investigate these predictions.

Method

Participants

University students from Alberta, New Jersey, New York, and Pennsylvania took part in this study (n = 1,787, *mdn age* = 19). Some received credit toward their final grade and others participated to partially fulfill a course requirement.

Procedure

Data were collected in classrooms and lecture halls from groups ranging in size from 10 to 200. To assure confidentiality and minimize self-presentation issues, participants were not allowed to sit next to one another, they were led to believe that each questionnaire was unique, and they were informed that their responses were anonymous.

Each participant completed, in writing, a 6-page booklet. Instructions were printed on the first page along with questions concerning the participant's age, sex, and marital status, and a series of attitude questions were presented on the final page along with a question concerning the respondent's sexual orientation. Pages 2 through 5 were composed of two pairs of counterbalanced questions, with one question per page. One pair of questions asked participants to report their number of lifetime *SP*s and then to describe how they arrived at their estimate. Specifically, the first question asked the participant to "report the number of sexual partners you have had in your life (that is, a person with

[2] It is worth emphasizing that this core prediction was a deduction based on the assumptions and findings outlined above, and that we believe it was unnecessary to introduce additional assumptions concerning the basis of the gender difference. We did recognize at the outset that a confirmatory set of results would raise questions concerning social, cognitive, and motivational factors that underlie a gender-based difference in strategy use. However, we address this issue in the Discussion after we have established the existence of a difference.

whom you have had vaginal or anal intercourse)," and the second requested that the participant "describe how you made your estimate of the number of sexual partners reported on the previous page" (see Conrad et al., 1998, for evidence that this sort of immediate retrospective report can produce accurate information on strategy use in survey settings). The second pair of questions was identical to the first, except that participants were asked about their number of partners for past the 12 months.

Results and Discussion

Lifetime Estimates

An initial analysis was conducted on the responses of the 1036 women and 687 men who claimed to have had only heterosexual intercourse, specified their sex, and provided a numerical response to both the lifetime and past-year questions.[3] Consistent with their youth, these participants tended to be relatively inexperienced, though men (M = 3.79) did provide somewhat larger lifetime *SP* estimates than the women (M = 2.54), $t(1721) = 1.93$, $p = .05$.[4] Only responses for those reporting lifetime *SP*s at or above the 90th percentile for the entire sample (8 *SP*s) were included in the analyses presented below. We focused on the high end of the contact distribution because men and women who have had relatively few partners provide similar estimates (Morris, 1993) and use similar response strategies (see below).[5] Given that this study was primarily concerned with the relation between discrepant partner reports and strategy use, it seemed reasonable to concentrate on that portion of the distribution that displayed the discrepancy most clearly. The 90% cutoff yielded a set of 85 sexually active men (*mdn* age = 23) and 90 sexually active women (*mdn* age = 22). Figure 1 presents the distribution of reported lifetime *SP*s provided by these participants. As these data suggest, *SP* reports provided by men (M = 19.91) in this set were significantly larger than those provided by women (M = 13.16), $t(173) = 3.85$, $p < .001$.

An examination of the written protocols revealed that participants used several different strategies to generate their *SP* reports.[6] The most common of these was *enumeration* (e.g., "Counted all the names I remembered."); collapsing across sex, 39% of the sexually-active participants stated that they arrived at their estimates by recalling each of their partners. Twenty-nine percent used a *tally-retrieval* strategy. These people indicated that they maintain a tally in memory and that they responded to the lifetime question by recalling and stating the current value of this tally (e.g., "I kept track in my diary, and I know that my boyfriend is #27."). Another 17% indicated that their estimates were *rough approximations*. Protocols were assigned to this category when participants indicated that they generated their responses without carefully examining the available evidence. Such estimates were often accompanied by an expression of uncertainty (e.g., "Rough guess, give or take 1 or 2 partners"). In addition to these common strategies, 11% of the participants produced protocols that were too vague to be coded (e.g., "Memory") or that included only irrelevant information, 2% used a *rate-based* strategy (e.g., "Avg of 5/year from 16-21, then remained monogamous."), and 1% failed to respond.

Figure 1. Distribution of reported lifetime sexual partners for sexually active women (top panel) and men (bottom panel). Within-bar shadings reflect the proportion of responses generated by the different estimation strategies.

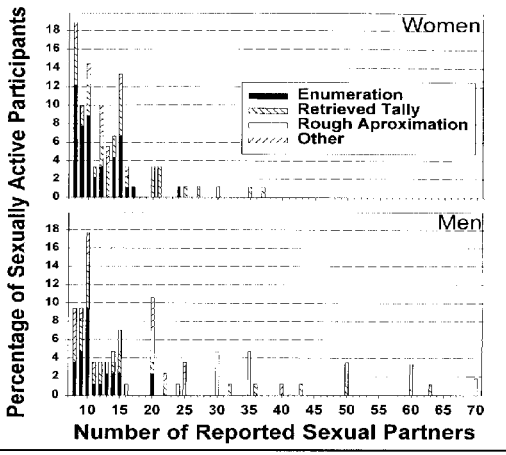


Figure 2 displays percentages of the sexually active men and women who used each of the common estimation strategies. A 2 (Sex) × 4 (Strategy Type: enumeration, retrieved tally, rough approximation, ambiguous) test of independence was conducted, and, as expected, sex of participant and estimation strategy were related, $\chi^2(3) = 22.45$, $p < .0001$. Specifically, women (48.9%) were more likely than men (29.4%) to enumerate, and they were more likely to retrieve and state a tally; retrieved tally accounted for 33.3% of estimates produced by the women and 23.5% of those produced by the men. In contrast, men (29.4%) were far more likely than women (4.4%) to indicate that their estimates were rough approximations. Ambiguous

[3] In addition, as is the norm for survey researchers in this area (e.g., Tourangeau & Smith, 1996), 5 participants (4 males and 1 female) were eliminated because they provided partner estimates of greater than 100. Results including these participants did not differ substantially from those reported below.

[4] Because the distributions of lifetime and past-year estimates were highly skewed, we transformed these estimates and the past-year estimates (i.e., transformed estimated = $\log_e$[raw estimate + .5]) before computing the relevant inferential statistics. However, we report means computed from the raw estimates because they better convey the magnitudes involved.

[5] In the present study, the partner discrepancy disappeared when the top 10% of the contact distributions was excluded from the data set (for men, M = 1.51; for women, M = 1.53; $t(1546) < 1.0$).

[6] The initial coding scheme was developed by the authors after they had read through a large percentage of the lifetime and past-year strategy reports. Two pairs of research assistants, who were blind to the sex of the respondent and unaware of the study's predictions, coded the protocols in accordance with this scheme. Identical codes were assigned to 89% of the lifetime protocols (Kappa = .85) and 81% of the past-year protocols (Kappa = .73). Disagreements were resolved through discussion.

Figure 2. Percentage of sexually active participants as a function of sex and strategy type (lifetime estimates).

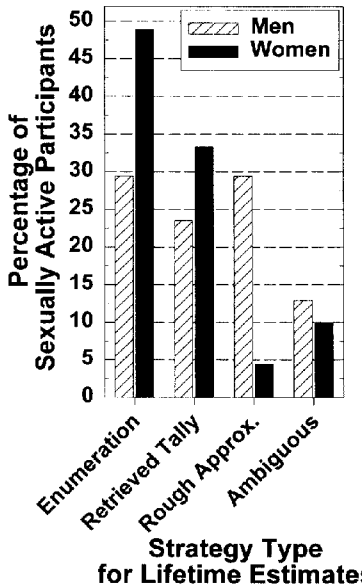
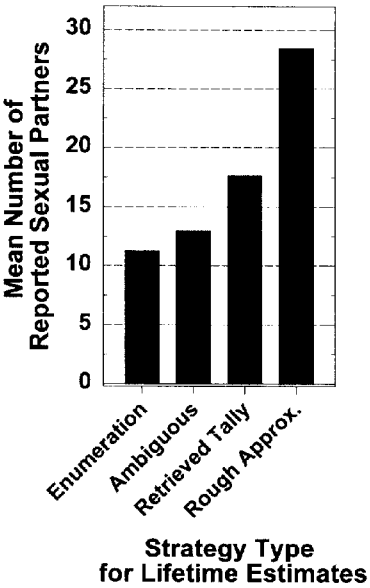


Figure 3. Mean number of reported lifetime sexual partners as a function of strategy type.



protocols were produced at about the same rate by both sexes (12.9% for men and 10.0% for women).

Mean reported number of *SP*s is plotted as a function of strategy type in Figure 3. As this figure indicates, participants who responded using rough approximation (M = 28.48) produced significantly more lifetime *SP*s than those who retrieved tallies (M = 17.66). Those who recalled tallies reported significantly more lifetime *SP*s than those who enumerated (M = 11.29) and those who provided ambiguous strategy reports (M = 13.00), $F(3, 167)$ = 11.71, $p < .0001$.[7] The Strategy Type × Sex interaction was not significant, $F(3, 167) = 1.05$, *ns*. In other words, strategy type was related to reported *SP*s, with rough approximation yielding the largest estimates and enumeration-based responses the smallest.[8] However, men and women who used the same strategy produced estimates of about the same size. Consistent with this point, analyses of covariance controlling for the rough approximation strategy versus each of the other strategies rendered the sex effect on reported *SP*s nonsignificant, $F(1, 95) = 1.64$, *ns*, $F(1, 76) = 2.08$, *ns*, and $F(1, 46) = 1.59$, *ns*, for the sex effect on report of *SP*s controlling for rough approximation versus enumeration, rough approximation versus retrieved tally, and rough approximation versus ambiguous strategies, respectively.

Past-Year Estimates

In contrast to the lifetime estimates, the past-year *SP* estimates provided by the sexually active men (M = 3.45) were not significantly larger than those provided by the sexually active women (M = 2.58), $t(173) = 1.26$, *ns*. This replicates a common finding in the survey literature (ACSF Investigators, 1992; Johnson et al., 1992; Laumann et al., 1994; Morris, 1993; Smith, 1992) and has two important implications. First, the past-year data argue against the possibility that the sex difference reported above arose because our participants were responding in bad faith; if they had been, there should have been a reliable sex difference for both lifetime and past-year estimates. The past-year data also address an alternative explanation for the partner discrepancy reported above. One could argue that the men in our sample were actually more experienced than the women, and that the reported difference in estimated life-time *SP*s merely reflected this fact. However, given that the male and female participants were about the same age, and assuming that the men in this sample had more partners than the women, a sex difference should have been apparent in the past-year estimates as well as the lifetime estimates. Because the data do not support this prediction, we conclude that it is unlikely that men and women were drawn from qualitatively different samples.

[7] This F value and the following one were obtained from two-way, between-groups (Sex X Strategy Type) ANOVAs performed on reported *SP*s, and the significant comparisons occurred at the $p < .05$ level based on Newman-Keuls tests.

[8] It is also worth noting that 79% of the participants who relied on rough approximation produced rounded estimates (i.e., estimates divisible by 5); the corresponding figures for enumerated responses, retrieved tallies, and ambiguous responses were 38%, 38%, and 41% respectively, $\chi^2(3) = 16.46$, $p < .001$ (see Figure 1).

As with the lifetime data, written protocols indicated that several strategies were used to generate past-year *SP* estimates. In this case, participants most often asserted that they were certain that their past-year responses were correct and/or provided information that would justify this certainty (e.g., "I'm married and monogamous—so 1," "I've been celibate for the past two years"). Overall, 43% of participants indicated they had *certain knowledge* of the number of past-year *SP*s. In addition, 29% of the participants enumerated, 15% produced unclassifiable reports, 9% retrieved a tally, and 2% failed to respond.

As predicted, rough approximations were far less common when participants responded to the past-year question (2%) than the lifetime question (14%). Also, as predicted, a 2 (Sex) × 4 (Strategy Type: certain knowledge, enumeration, retrieved tally, ambiguous) test of independence indicated that sex of participant and past-year estimation strategy were unrelated, $\chi^2(3) = 1.87$, *ns*. Thus, in contrast to the pattern of sex differences evident in the lifetime reports, men and women were equally likely to use each of the four dominant response strategies when estimating the number of past-year *SP*s. Specifically, 40% of men and 47% of women responded to the past-year question with certain knowledge. Comparable figures were 28% and 30% for enumeration, and 9% and 8% for tally retrieval; 19% of the protocols produced by men were ambiguous as were 12% of those produced by women.

Finally, it should be noted that a 2 (Sex) × 4 (Strategy Type) ANOVA conducted on the past-year estimates yielded only a main effect for Strategy Type, $F(3, 161) = 29.34$, $p < .0001$ (F's < 1.0 for the main effect of Sex and the Sex × Strategy Type interaction). A set of follow-up comparisons indicated that participants who claimed certain knowledge produced reliably smaller past-year estimates ($M = 1.37$) than those who used other common response strategies, and that retrieved tallies ($M = 4.40$), enumerated estimates ($M = 4.08$), and estimates accompanied by ambiguous strategy reports ($M = 4.37$) were not significantly different.

Discussion

This study demonstrates that people use a variety of strategies when reporting their number of lifetime sexual partners, that some strategies (e.g., rough approximations) are associated with relatively large reports, others (e.g., enumeration) are associated with relatively small reports, and that men are more likely to use the former whereas women are more likely to use the latter. In sharp contrast to the lifetime data, past-year *SP* reports produced by men were in close agreement with those produced by women, and there was no relationship between strategy type and sex of respondent. These past-year data argue against a bad-faith interpretation of the lifetime discrepancy as it seems unlikely that participants would deliberately distort their answers to one set of questions but not the other. Thus, we conclude that men and women produce discrepant lifetime reports, not because they intentionally misrepresent their experiences as is commonly assumed, but because they tend to use different estimation strategies. These findings allow us to trace the sex difference in the magnitude of lifetime partner reports to a difference in the way in which men and women produce their reports.

Admittedly, this account raises an interesting and difficult question: Why is it that women tend to enumerate and men are prone to respond with rough estimates? It seems reasonable to assume that any explanation would involve the interaction of social and cognitive factors. One possibility is that women have better memory for their partners than men. Consistent with this interpretation, one line of research demonstrates that enumeration-based estimates become more common and rough approximations less common as memory for relevant instances increases (Brown, 1997). Another line of research suggests that women are more likely than men to think about sex in the context of relationships (Gagnon & Simon, 1973; Oliver & Hyde, 1993), suggesting that women may be more likely to deeply encode or rehearse their experiences. Assuming women have better memories for their partners than do men, and given that enumeration-based estimates should be common when partners can be readily recalled and rough approximations should be common when they cannot, it follows that women should enumerate more than men, and that men should produce rough approximations more than women.

A second possibility relates strategy type and motivation. This account assumes that people believe that enumeration produces more accurate estimates than competing guessing strategies, that they realize that recalling a large number of instances from a given category can be time consuming and difficult (Williams & Hollan, 1981), and that women take questions about their sexual behavior more seriously than do men and thus are willing to put more effort into answering them accurately. Under these assumptions, women should enumerate more than men, at least when many *SP*s must be recalled. In this case, a motivational factor related to the sex of the respondent (i.e., a concern with accuracy) would influence strategy selection. In turn, for reasons described above, differential strategy use would yield the observed pattern of discrepant lifetime reports.

Both memory differences and motivational explanations are compatible with the finding that men and women respond in much the same way to the past-year question: Consistent with the memory-based account, it could be that recent partners are equally well-remembered by men and women, but more remote ones are not; or, consistent with the motivational account, it could be that men are as likely to enumerate as women when the numbers involved are relatively small, but not when they are large.

Although the past-year findings do not differentiate between the two accounts, a simple experiment might. For example, if the memory account is correct, men who are explicitly asked to recall the identities of their sexual partners should respond more slowly and with fewer names than women who are asked to do the same (Bousfield &

Sedgewick, 1944). Similarly, if all respondents are required to enumerate and the memory-differences account is correct, men should produce *smaller* lifetime *SP* estimates than women. As these predictions suggest, we believe that it should be possible to investigate how people represent their sexual experiences and how this knowledge influences subsequent behavior—at present, little is known about these important issues.

In closing, we should note that the findings reported above were derived from a subset of data collected from a convenience sample, that participants included in this sample were relatively young, and that it is possible that the university students we sampled had *SP*s who were not university students. Thus, we make no claims concerning the representativeness of this sample, nor do we assume that the men and women who were included in this sample must have had the same number of opposite sex *SP*s. Certainly it is possible that the men, who were slightly older than the women, were also more experienced. If so, one could argue that a difference in the actual number of *SP*s was responsible for both the strategy differences reported above and the observed differences in the estimated lifetime *SP*s. Nonetheless, it is important to recognize that our data do replicate two central findings in the area: a sex difference for the lifetime reports coupled with no difference for past-year reports. Moreover, the strategy-differences perspective accurately predicted that lifetime partner reports, but not past-year reports, would be associated with different patterns of strategy use, and it also accurately specified how these patterns would differ. More generally, these findings, and those reported in the behavioral frequency literature (Blair & Burton, 1987; Burton & Blair, 1991; Conrad et al., 1998; Menon, 1993), suggest that large differences in response magnitude reflect marked differences in the ways that responses are generated. Thus, we are confident that the same pattern of differences would appear if strategy reports were collected along with lifetime *SP* estimates on a national survey.

In summary, the present study links discrepant lifetime partner reports to differences in strategy use. These data, in conjunction with evidence that men and women often provide comparable responses to other sensitive questions, argue against the view that survey respondents deliberately and routinely distort their sexual histories. Of course, response error is to be expected when people answer survey questions concerning their sexual behavior. There is nothing unusual about this—response error is a general problem. What has been unusual is the willingness of researchers to attribute the partner discrepancy solely to bad-faith responding when it is commonly accepted that response error reflects a complex, but tractable, set of cognitive and social factors (Sudman, Bradburn, & Schwarz, 1996). The present research demonstrates that it is feasible to investigate how these factors affect the way that people respond to sensitive questions and that it is also of theoretical and practical importance.

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