

Are Sexual Minorities Less Likely to Participate in Surveys? An Examination of Proxy Nonresponse Measures and Associated Biases with Sexual Orientation in a Population-based Health Survey

Field Methods

2018, Vol. 30(3) 208-224

© The Author(s) 2018

Reprints and permission:

sagepub.com/journalsPermissions.nav

DOI: 10.1177/1525822X18777736

journals.sagepub.com/home/fmx



Sunghee Lee¹, Karen I. Fredriksen-Goldsen²,
Colleen McClain¹, Hyun-Jun Kim²,
and Z. Tuba Suzer-Gurtekin¹

Abstract

One of the implicit assumptions in survey research is lower response rates by sexual minorities than by nonminorities. With rapidly changing public attitudes toward same-sex marriage, we reconsider this assumption. We used data from the 2013 and 2014 National Health Interview Survey that include contact history data for all sample families as well as sexual

¹ Institute for Social Research, University of Michigan, Ann Arbor, MI, USA

² School of Social Work, University of Washington, Seattle, WA, USA

Corresponding Author:

Z. Tuba Suzer-Gurtekin, Institute for Social Research, University of Michigan, 426 Thompson St., Ann Arbor, MI 48104, USA.

Email: tsuzer@umich.edu

orientation information about adults sampled from responding families. We created proxy nonresponse indicators based on contact efforts and reluctance from contact history data and linked them to sexual orientation of the sample adult and simulated nonresponse. The data did not support the assumption: Straight adults were more difficult to get cooperation from than nonstraights. With female sexual minorities showing higher nonresponse than their male counterparts, special considerations are required. Replication analyses may provide insights into what factors influence study participation decisions, which will inform how nonresponse may impact the accuracy of research findings.

There is an increasing need for collecting health data from sexual minorities to understand outcomes and challenges unique to that group (Clift and Kirby 2012; Cochran and Mays 2000; Dahlhamer et al. 2016; Dilley et al. 2010; Fredriksen-Goldsen et al. 2013; Sell and Holliday 2014). In fact, lesbian, gay, bisexual, and transgender health is one of the objectives in the U.S. Department of Health and Human Services' Healthy People 2020 initiative (<https://www.healthypeople.gov/2020/topics-objectives/topic/lesbian-gay-bisexual-and-transgender-health>). Meanwhile, an implicit yet prevailing assumption in data collection is that sexual minorities are hard to survey due to social stigma, often leading to an expectation of lower participation rates (i.e., higher unit nonresponse rates; Magnani et al. 2005; Meyer and Wilson 2009; Tourangeau 2014). This assumption appears to be influenced by somewhat dated studies on participation bias in HIV-related sexual behavior research (Catania et al. 1990; Herold and Way 1998).

However, this stigma may no longer be dominant, as the majority of the public now supports same-sex marriage (Flores 2015). According to the Pew Research Center (2016), 35% of the population supported same-sex marriage while 57% opposed it in 2001; these numbers changed to 55% support and 37% oppose in 2016. With this change in the larger social context, recent studies report lower and decreasing item nonresponse rates on sexual orientation questions, which once were viewed as highly sensitive and difficult to ask (Dahlhamer et al. 2014; Fredriksen-Goldsen and Kim 2015; Jans et al. 2015; Kim and Fredriksen-Goldsen 2012). A study of an HIV-positive cohort also offers a point against the assumed stigma noted above: The participation consent rate was reported to be higher for sexual minorities than their counterparts (Raboud et al. 2013). At the same time, an

increasing number of large-scale surveys have started to ask sexual orientation questions (e.g., the National Health Interview Survey [NHIS]), allowing comparisons by sexual orientation. If the assumption about sexual minorities' lower unit response rates holds, these comparisons may be subject to nonresponse biases stemming from differential response rates by sexual orientation. To the best of our knowledge, this assumption does not rest on current evidence. The trends in public opinion toward same-sex marriage reported by the Pew Research Center suggest it may be time to reconsider the assumption of lower unit response rates by sexual minorities.

Increasingly, surveys have started to collect paradata, which include information about the interview process itself (e.g., contact history; Kreuter et al. 2009). This type of data is proven to be useful for understanding nonresponse (Kreuter et al. 2009; Lee et al. 2009). In particular, two major dimensions of nonresponse one can study in contact history are contactability (e.g., number of contact attempts) and cooperation (e.g., reluctance, refusal), which are theorized to arise for different reasons (Groves 2006). With paradata, it is possible to identify respondents who are difficult to contact and/or reluctant to the interview request and use these respondents as proxies for true nonrespondents (Curtin et al. 2000, 2005; Davern 2013; Johnson and Wislar 2012; Keeter et al. 2000; Peytchev et al. 2010; U.S. Federal Committee on Statistical Methodology 2001; Whitman and Halbesleben 2013).

Although this nonresponse assessment method has its advantages over other methods, one should be aware that it does not allow us to assess the nonresponse bias with respect to the complete sample (Groves 2006). Therefore, we examine sexual orientation as a correlate of nonresponse using proxy nonresponse indicators from contact history. In other words, this analysis provides first insight about the level of required efforts by sexual orientation among the respondents to investigate whether the nonresponse assumption for sexual minorities has support. To simulate the potential nonresponse bias by sexual orientation, we use the logic that without intensive efforts, hard-to-reach and hard-to-persuade respondents would have been nonrespondents.

This article uses a health survey that collects sexual orientation as well as contact history data and assesses the nonresponse assumption for sexual minorities. Specifically, we examine (1) whether there is a systematic association between proxy nonresponse indicators and respondents' sexual orientation; (2) the magnitude of potential nonresponse bias; and (3) whether the nonresponse bias differs by sexual orientation.

Method

Data

Data came from the 2013 and 2014 NHIS (Centers for Disease Control and Prevention 2014) for two reasons. First, sexual orientation questions were implemented in the NHIS for the first time in 2013. Second, conducting analysis in two different years provides an opportunity to ascertain replicability of the results. The data are used as follows.

Among a number of NHIS data components, four data sets are used: (1) paradata; (2) family data; (3) personal data; and (4) sample adult (SA) data. NHIS paradata record the interview process, such as the number of contact attempts, contact mode and strategies, interviewers' assessment of reluctance, and the outcome from the final contact attempt (National Center for Health Statistics 2014, 2015). Paradata are available for all families to whom contact attempts were made, regardless of whether they participated in NHIS. NHIS (2013) paradata indicate that there are 56,115 families eligible for the interview. Among these 56,115 families, contact history information is available for 55,843 families: 42,471 (76.1%) families completed family interviews; 2,277 (4.1%) had never been contacted; 9,080 (16.3%) refused; and 2,015 (3.6%) did not participate for other reasons (e.g., language problems). In NHIS (2014), 61,937 families were eligible and 61,746 had contact history data. Among them, 45,768 (74.1%) completed family interviews; 2,985 (4.8%) had never been contacted; 10,828 (17.5%) refused; and 2,165 (3.5%) did not participate for other reasons. Although interviewers made observations on a large proportion of the families who were never contacted in both years, 904 and 919 families in 2013 and 2014, respectively, were without interviewer observation data and, hence, without a reluctance indicator. Family and personal data are derived from the family interviews.

From responding families (i.e., those completing family interviews), NHIS samples an adult randomly for an extended interview, which includes sexual orientation questions. When combined with family and personal data, SA data provide substantive health and sociodemographic information. Of the adults sampled from 42,417 and 45,768 responding families in 2013 and 2014, respectively, 34,459 (81.2%) and 36,651 (80.1%) completed SA interviews.

Measures

Proxy nonresponse indicators. Proxy nonresponse indicators consider two dimensions of nonresponse: contactability and reluctance. First, for

Table 1. Contactability and Reluctance Measures for All Eligible Families, Families Completing Family Interviews, and Families Not Completing Family Interviews in National Health Interview Survey (2013, 2014).^a

Contactability and Reluctance Measures	All Eligible Families		Families Completing Family Interviews		Families Not Completing Family Interviews	
	2013	2014	2013	2014	2013	2014
<i>n</i> Contact attempted	55,843	61,746	42,471	45,768	13,372	15,978
Contactability						
Average number of contact attempts	5.1	6.4	4.3	5.9	7.7	7.8
Low contactability ^b (%)	26.5	29.4	19.2	24.6	49.6	43.1
<i>n</i> At least one contact made	54,939	60,827	12,652	45,628	42,287	15,199
Reluctance (%)	58.8	58.0	50.7	49.6	85.7	83.1
Contactability and reluctance						
Reluctant and low contact (%)	20.9	22.0	14.7	17.7	42.0	34.9
Reluctant and high contact (%)	37.8	36.0	36.1	31.9	43.7	48.2
Not reluctant and low contact (%)	5.3	7.2	4.5	6.9	8.1	8.3
Not reluctant and high contact (%)	35.9	34.8	44.8	43.5	6.2	8.6
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0

Data Source: Centers for Disease Control and Prevention/NCHS, National Health Interview Survey (2013, 2014).

^aUnweighted estimates.

^bSeven or more attempts for 2013; eight or more attempts for 2014.

contactability, we used the number of total contact attempts. As reported in Table 1, on average, families were contacted 5.1 times in 2013 and 6.4 times in 2014. In our analysis, those in the fourth quartile of the contact attempt numbers (equating to seven or more attempts for 2013 and eight or more for 2014) were categorized as low contactability, and the rest as high contactability. In both years, responding families were associated with fewer contact attempt numbers than nonresponding families (4.3 vs. 7.7 for 2013; 5.9 vs. 7.8 for 2014). Naturally, the proportion of low contactability cases was lower for responding than nonresponding families (19.2% vs. 49.6% for 2013; 24.6% vs. 43.1% for 2014).

Second, the reluctance measure was created based on interviewer observation across all contact attempts per family. When interviewer observation indicated that families expressed lack of interest, too busy or not having time, privacy or antigovernment concerns, hostility, or uncertainty about the survey or interviewers experienced difficulties scheduling interview appointments or respondents' breaking scheduled appointments, we considered these as reluctant and the remainder as not reluctant. Overall, Table 1 shows that a little less than 60% of the families showed some sign of reluctance. This rate was lower for responding than nonresponding families by over 30% in both years (50.7% vs. 85.7% for 2013; 49.6% vs. 83.1% for 2014).

Third, we combined these two indicators into one with the following categories: (1) reluctant and low contactability; (2) reluctant and high contactability; (3) not reluctant and low contactability; and (4) not reluctant and high contactability, with the first category considered as the most difficult to obtain a response and the last as the least difficult. When reflecting these proxy nonresponse indicators with the actual response status of family interviews, they appear as imperfect yet reasonable measures for true nonresponse. Table 1 shows that the rate of most difficult cases was two to three times larger for nonresponding than responding families (14.7% vs. 42.0% for 2013; 17.7% vs. 34.9% for 2014). Moreover, while almost half of the responding families were classified as least difficult, none of the 10 nonresponding families was classified as such.

Sexual orientation. The sexual orientation question in NHIS asks SAs: "Which of the following best represents how you think of yourself?" with five response options: (1) gay/lesbian; (2) straight (i.e., not gay); (3) bisexual; (4) something else; and (5) I don't know (National Center for Health Statistics 2014). This study combines gay/lesbian, bisexual, and something else as nonstraight. Those who chose "I don't know" or refused to answer and those whose sexual orientation was not ascertained due to interview break-offs were excluded as item nonresponse. Item nonresponse rates on sexual orientation were similar between 2013 and 2014 at 3.3% and 3.1%. Combined with gender data, each SA was further classified as straight male, nonstraight male, straight female, or nonstraight female. A total of 1,806 SAs were identified as nonstraight, roughly evenly split between males and females (see Online Appendix Table S1).

Health characteristics. We assessed nonresponse bias on health status, behaviors, and care utilization. For health status, we used self-rated health (combined fair/poor health), having any of the following chronic

conditions: diabetes, hypertension, cardiovascular disease, chronic obstructive pulmonary disease, asthma, cancer, arthritis, ulcer, or epilepsy; limited in any way; experiencing sleep problems the previous week; experiencing moderate or high psychological distress in the past 30 days based on the Kessler–6 inventory (Kessler et al. 2002); and obesity. Physical inactivity (no moderate or vigorous activities) last week, current smoking status, and binge drinking in the past year were used as health risk behaviors. For health care and utilization, we considered current health insurance coverage, whether a doctor’s office was visited four or more times in the past 12 months, whether respondent stayed at an emergency room (ER) in the past 12 months, and whether respondent could afford needed care (prescription medicine, mental health care, dental care, eyeglasses, seeing a specialist, and follow-up care) in the past 12 months.

Online Appendix Table S1 includes sexual orientation, other sociodemographic characteristics, and health characteristics SAs from NHIS (2013, 2014) used in this study. The sample compositions are similar between these two years.

Analysis Steps

Analysis is conducted using SAS version 9.2 at the SA level using the combined paradata, family, personal, and SA data. It should be noted that nonresponse below is based on proxy indicators which reflect true nonresponse shown in Table 1, not on true nonresponse itself.

First, proxy nonresponse indicators were examined by respondents’ sexual orientation and by its interactions with age and race/ethnicity. This association between sexual orientation and nonresponse was further examined in logistic regression that controlled for well-known correlates of nonresponse, including age, race/ethnicity, family structure, education, employment status, poverty status, home ownership, and place of residence (Kreuter et al. 2010). The second step examined potential nonresponse bias first by comparing SAs from the least difficult families against SAs from other families with Rao–Scott χ^2 test and also by the relative bias calculated as: $\text{relbias}(\%) = \frac{(y_1 - y)}{y} \times 100$, where y_1 is the health outcome estimates based on the least difficult families and y on all families. The idea behind relative bias is whether not making extensive efforts, such as increased contact attempts and/or refusal conversion would have affected the substantive health characters. Hence, a positive relative bias means that not making the efforts results in incorrectly producing

estimates higher than what should be. Last, we compared the relative bias by sexual orientation.

Given that NHIS data are designed to represent the population, appropriate weights and sample design variables were incorporated in the analysis. Because the results from 2013 and 2014 were consistent, we pooled 2013 and 2014 data for a higher level of statistical power.

Results

Sexual Orientation as a Correlate of Nonresponse

About 2.5% ($SE = 0.1\%$) SAs were identified with nonstraight, roughly evenly split between nonstraight males and females in both years. On average, 4.7 contacts were made to the families with SAs with little to no difference by SAs' sexual orientation ($F = 0.78$, $df = 3$, $p = .505$): 4.7, 4.5, 4.7, and 4.7 contacts made to families with straight male, nonstraight male, straight female, and nonstraight female SAs. The low contactability did not differ by sexual orientation (Rao–Scott $\chi^2 = 5.5$, $df = 3$, $p = .138$). However, reluctance differed significantly (Rao–Scott $\chi^2 = 20.7$, $df = 3$, $p < .001$, as seen in Figure 1, where the two dark shades indicate reluctant cases). Families with straight SAs were more reluctant than those with nonstraight SAs: the highest reluctance rate at 43.4% (= 12.1% + 31.4%) from families with straight female SAs, followed by straight males (43.3%), nonstraight females (41.5%), and nonstraight males (34.6%; Rao–Scott $\chi^2 = 32.5$, $df = 3$, $p < .001$).

This differential reluctance pattern persisted when interacting sexual orientation with race and age. While non-Whites and those younger than 50 years old showed a higher level of reluctance compared to their counterparts, nonstraight SAs were consistently associated with a lower level of reluctance than straight SAs within each race group and within each age-group. From Figure 1, it appeared that, overall, nonstraight SAs were easier to contact and less reluctant than straight SAs, older nonstraight SAs, and nonstraight white SAs being the least difficult groups.

The association between these proxy nonresponse indicators and sexual orientation was examined controlling for well-known correlates of nonresponse in multinomial logistic regression in Table 2. We used the least difficult cases (high contactability and not reluctant) in the nonresponse indicator as a reference category. Hence, the odds ratios (OR) in Table 2 can be understood as indicating potential nonresponse.

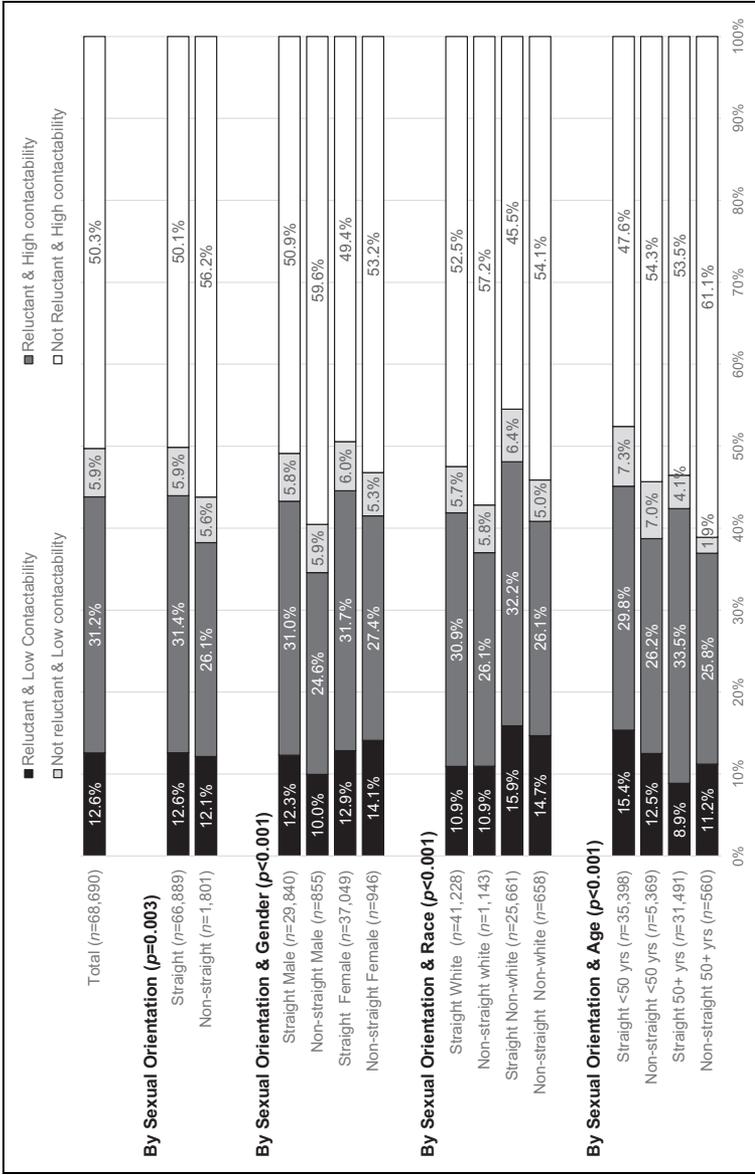


Figure 1. Contactability and reluctance by sexual orientation and combinations of sexual orientation, gender, race, and age for sample adults. Weighted estimates.
 Note: Reported p values based on Rao-Scott χ^2 test. Data Source: Centers for Disease Control and Prevention/National Center for Health Statistics (NCHS), National Health Interview Survey (2013, 2014).

Table 2. Multinomial Logistic Regression Model of Combined Reluctance and Contactability (Reluctant and Low Contactability, Reluctant and High Contactability, and Not Reluctant and Low Contactability, Respectively, Compared to Not Reluctant and High Contactability).^a

Contactability and Reluctance Measures	Dependent Variable: Combined Reluctance and Contactability (Ref.: Not Reluctant and High Contactability)					
	Reluctant and Low Contactability		Reluctant and High Contactability		Not Reluctant and Low Contactability	
	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
Predictor: Sexual orientation (ref.: nonstraight male)						
Straight male	1.50	[1.06–2.12]	1.36	[1.06–1.74]	1.31	[0.90–1.92]
Straight female	1.66	[1.18–2.34]	1.45	[1.14–1.85]	1.52	[1.04–2.21]
Nonstraight female	1.68	[1.08–2.59]	1.30	[0.95–1.79]	1.11	[0.68–1.81]
Control variables						
Age (ref.: 71 years old or older)						
18–30 Years old	1.84	[1.55–2.19]	0.87	[0.78–0.96]	2.74	[2.15–3.49]
31–40 Years old	1.94	[1.65–2.27]	1.02	[0.92–1.14]	2.72	[2.10–3.53]
41–50 Years old	2.03	[1.72–2.39]	1.12	[1.01–1.24]	2.53	[1.97–3.24]
51–60 Years old	1.67	[1.43–1.94]	1.04	[0.94–1.15]	2.14	[1.65–2.78]
61–70 Years old	1.23	[1.03–1.46]	1.03	[0.95–1.12]	1.36	[1.06–1.76]
Race/ethnicity/interview language (ref.: non-Hispanic white)						
Non-Hispanic black	1.74	[1.57–1.93]	1.23	[1.14–1.34]	1.45	[1.23–1.70]
Non-Hispanic other	1.43	[1.23–1.65]	1.31	[1.18–1.45]	1.25	[1.04–1.51]
Hispanic interviewed in English	1.51	[1.34–1.70]	1.13	[1.02–1.25]	1.27	[1.08–1.50]
Hispanic interviewed in Spanish	1.83	[1.56–2.14]	1.45	[1.28–1.65]	1.16	[0.93–1.45]
Family structure (ref.: one adult without child)						
1 Adult with child	1.35	[1.18–1.55]	1.04	[0.93–1.17]	1.02	[0.84–1.24]
2+ Adult with child	1.32	[1.19–1.47]	1.14	[1.06–1.23]	0.88	[0.79–0.88]
2+ Adult without child	0.92	[0.84–1.01]	1.11	[1.05–1.18]	0.74	[0.66–0.83]
Education						
Some college versus less	1.13	[1.05–1.23]	1.02	[0.96–1.08]	1.10	[0.99–1.22]
Income						
<200% Versus 200%+ FPL	0.80	[0.73–0.87]	0.92	[0.86–0.98]	0.73	[0.64–0.83]
Work status last week						
Work versus not work	1.46	[1.35–1.57]	1.10	[1.04–1.16]	1.66	[1.47–1.86]
Home ownership: Own versus not own	0.85	[0.78–0.92]	1.04	[0.97–1.11]	0.90	[0.80–1.01]

(continued)

Table 2. (continued)

Contactability and Reluctance Measures	Dependent Variable: Combined Reluctance and Contactability (Ref.: Not Reluctant and High Contactability)					
	Reluctant and Low Contactability		Reluctant and High Contactability		Not Reluctant and Low Contactability	
	OR [95% CI]		OR [95% CI]		OR [95% CI]	
Place of residence: Region (ref.: northeast)						
Midwest	1.08	[0.91–1.29]	0.90	[0.79–1.03]	1.07	[0.88–1.29]
South	0.80	[0.71–0.91]	0.97	[0.87–1.07]	0.82	[0.70–0.97]
West	0.80	[0.69–0.91]	0.96	[0.86–1.07]	0.81	[0.69–0.97]

Note: OR = odds ratio; CI = confidence in travel; FPL = federal poverty level.

Data Source: Centers for Disease Control and Prevention/NCHS, National Health Interview Survey (2013, 2014).

^aWeighted estimates.

Sexual orientation was associated with nonresponse. Notably, when compared to nonstraight male SAs, straight females showed significantly higher odds of being reluctant and/or difficult to contact with ORs ranging from 1.45 to 1.66. ORs for being reluctant with low contactability, as well as for being reluctant with high contactability, were significantly higher for straight males compared to nonstraight males. Nonstraight females were also significantly more likely to be reluctant and difficult to contact than nonstraight males.

When examining control variables, younger SAs were associated with significantly higher reluctance and/or lower contactability than older SAs. All racial and ethnic minority groups showed significantly higher odds of any combinations of reluctance and low contactability. SAs with higher education or higher income, who worked last week or who did not own their home, were associated with higher nonresponse odds than their respective counterparts. SAs from families with children tended to have higher odds of reluctance and/or low contactability than those without. Compared to the northeast region, southern and western regions were associated with lower nonresponse odds.

Sexual Orientation and Nonresponse Bias in Health Characteristics

We examined the estimates of health characteristics by nonresponse indicators and further by sexual orientation (see Online Appendix Table S2).

Overall, 12.9% of SAs reported fair or poor health. The rate was 13.9% for those from the least difficult families and 11.9% for the rest, significantly different at $p < .001$. The relative bias was 7.6%. This means that if NHIS had not made contact or persuasion efforts, the results would have overstated negative health. Similar observations can be made for chronic conditions and limitations. Overall, there were statistically significant differences, but the differences were small, ranging from 0 to 2%. However, on doctors' visits and ER stays, SAs from least difficult families were more likely to have visited four or more times and stayed at an ER in the past 12 months than other SAs.

When examining nonresponse bias by respondents' sexual orientation, different patterns emerged. Overall, nonstraight males and females were associated with larger relative biases than their counterparts. On self-rated health, the relative bias was largest for nonstraight males at 19.5%. On psychological distress, nonstraight females had the largest relative bias at 6.1%. Nonstraight females also showed a positive relative bias toward obesity and on physical inactivity and a very large positive bias on current smoking. Unlike other groups, nonstraight males showed a negative relative bias on binge drinking. While relative biases were smaller for nonstraights than straights on doctors' visits, it was large for nonstraight females on ER stays. Both nonstraight males and females showed a large bias on not affording health care but in the opposite direction: It was positive for males and negative for females.

Discussion

The assumption about sexual minorities' low participation rates did not hold in our analysis. In fact, straights were associated with higher nonresponse than nonstraights. This pattern held true for both nonstraight males and females. Straight females were the most difficult group in terms of contactability and reluctance. Perhaps the stigma for the sexual minorities is not as high as it once was, and the survey contact history data used in this study could have reflected this change.

Had the contact and persuasion efforts been reduced, the results would have portrayed the population differently, and this difference would have been larger for nonstraights than straights. Among nonstraight males, nonrespondents were likely to report better health (higher self-rated health, lower chronic condition prevalence rates, and lower rates of limitations), be binge drinkers, and have fewer issues with health-care affordability than respondents. For nonstraight females, nonresponse was associated with

being less obese, being less physically inactive, being nonsmokers, and having more issues with affording health care than respondents.

In sum, nonresponse rates may be comparable between sexual minorities and nonminorities or lower for sexual minorities than nonminorities; however, potential nonresponse bias may be larger for sexual minorities than nonminorities. Although not explicitly elaborated, sexual minorities as a group experience unique health challenges: sleep problems, psychological distress, smoking, binge drinking, and health-care affordability compared to the counterparts (see Online Appendix Table S2). Therefore, special considerations are required for surveying sexual minorities.

While this study offers new insights into the nonresponse mechanisms by introducing sexual orientation as a potential correlate, there are a number of limitations.

First, we used those who required more intensive contact attempts and refusal conversion efforts used as a proxy for nonrespondents. These people were, in fact, respondents at the end. Although used in other studies (Curtin et al. 2000; Kreuter et al. 2010; Lee et al. 2009), the weakness of this approach is that it does not assess true nonresponse. In fact, some suggest its utility is unclear (Groves 2006; Lin and Schaeffer 1995), which is why we examined sexual orientation as a correlate, not a cause, of nonresponse. However, as shown in Table 1, while not perfect, the proxies differentiated true response patterns. Moreover, unless we start with a list of people whose sexual orientation is fully known, we cannot assess nonresponse with sexual orientation. To our knowledge, such data do not exist.

Second, this study used publicly available paradata, which did not include detailed contact history, such as the time, mode, and outcome of each contact attempt.

Third, SAs were not necessarily the first person to whom contact attempts were made. To address this, we carried out a separate analysis with family respondents using their sexual orientation (obtained from SA data, if they were completed for adult interviews) and same-sex coupledness (obtained from family and personal data, if not sampled for adult interview). Note that family respondents in the NHIS can be regarded as gatekeepers. Essentially, results were the same as those reported in this study.

Fourth, by nature, the analysis relied on self-reports of sexual orientation. If some sexual minority respondents masked their orientation and if a higher level of efforts was needed for them, then sexual minorities would be associated with higher nonresponse than what this study reported. However, low item nonresponse rates of the sexual orientation questions suggest this an unlikely case.

Despite the limitations, we believe replicating studies of this nature will increase our understanding of sexual orientation as a correlate of nonresponse and associated nonresponse biases. Researchers may consider expanding the scope of paradata so that detailed contact history as described above can be assessed by the sampled family characteristics (e.g., housing type), obtained through interviewer observations, neighborhood characteristics linked to census data, and characteristics of interviewers, for both respondents and nonrespondents alike. We expect these data, in conjunction with sexual orientation data, to provide a rich context of how a family or person arrives at the decision as to whether to participate in a survey and what factors, including sexual orientation, are related to such a decision.

Authors' Note

The funders played no role in the study design, analysis, and interpretation of the data; writing the manuscript; or the decision to submit the manuscript for publication.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was partially supported by a grant from the National Institute of Aging (grant number: R01AG026526-03A1; principal investigator: Fredriksen-Goldsen).

Supplemental Material

Supplementary material for this article is available online.

References

- Catania, J. A., D. R. Gibson, D. D. Chitwood, and T. J. Coates. 1990. Methodological problems in AIDS behavioral research: Influences on measurement error and participation bias in studies of sexual behavior. *Psychological Bulletin* 108: 339–62.
- Clift, J. B., and J. Kirby. 2012. Health care access and perceptions of provider care among individuals in same-sex couples: Findings from the Medical Expenditure Panel Survey (MEPS). *Journal of Homosexuality* 59:839–50.

- Cochran, S. D., and V. M. Mays. 2000. Relation between psychiatric syndromes and behaviorally defined sexual orientation in a sample of the US population. *American Journal of Epidemiology* 151:516–23.
- Curtin, R., S. Presser, and E. Singer. 2000. The effects of response rate changes on the index of consumer sentiment. *Public Opinion Quarterly* 64:413–28.
- Curtin, R., S. Presser, and E. Singer. 2005. Changes in telephone survey nonresponse over the past quarter century. *Public Opinion Quarterly* 69:87–98.
- Dahlhamer, J. M., A. M. Galinsky, S. S. Joesti, and B. W. Ward. 2014. *Sexual orientation in the 2013 National Health Interview Survey: A quality assessment*. https://www.cdc.gov/nchs/data/series/sr_02/sr02_169.pdf (accessed January 5, 2017).
- Dahlhamer, J. M., A. M. Galinsky, S. S. Joesti, and B. W. Ward. 2016. Barriers to health care among adults identifying as sexual minorities: A US national study. *American Journal of Public Health* 106:1116–22.
- Davern, M.. 2013. Nonresponse rates are a problematic indicator of nonresponse bias in survey research. *Health Services Research* 48:905–12.
- Dilley, J. A., K. Wynkoop Simmons, M. J. Boysun, B. A. Pizacani, and M. J. Stark. 2010. Demonstrating the importance and feasibility of including sexual orientation in public health surveys: Health disparities in the Pacific northwest. *American Journal of Public Health* 100:460–67.
- Flores, A. R. 2015. Examining variation in surveying attitudes on same-sex marriage: A meta-analysis. *Public Opinion Quarterly* 79:580–93.
- Fredriksen-Goldsen, K. I., and H.-J. Kim. 2015. Count me in: Response to sexual orientation measures among older adults. *Research on Aging* 37:464–80.
- Fredriksen-Goldsen, K. I., H.-J. Kim, S. E. Barkan, A. Muraco, and C. P. Hoy-Ellis. 2013. Health disparities among lesbian, gay, and bisexual older adults: Results from a population-based study. *American Journal of Public Health* 103:1802–9.
- Groves, R. M. 2006. Nonresponse rates and nonresponse bias in household surveys. *Public Opinion Quarterly* 70:646–75.
- Herold, E. S., and L. Way. 1998. Sexual self-disclosure among university women. *Journal of Sex Research* 24:1–14.
- Jans, M., J. Viana, D. Grant, S. D. Cochran, A. C. Lee, and N. A. Ponce. 2015. Trends in sexual orientation missing data over a decade of the California Health Interview Survey. *American Journal of Public Health* 105:e43–50.
- Johnson, T. P., and J. Wislar. 2012. Response rates and nonresponse errors in surveys. *Journal of the American Medical Association* 307:1805–6.
- Keeter, S., C. Miller, A. Kohut, R. M. Groves, and S. Presser. 2000. Consequences of reducing nonresponse in a national telephone survey. *Public Opinion Quarterly* 64:125–48.
- Kessler, R. C., G. Andrews, L. J. Colpe, E. Hiripi, D. K. Mroczek, S.-L.T. Normand, E. E. Walters, and A. M. Zas. 2002. Short screening scales to monitor population

- prevalences and trends in nonspecific psychological distress. *Psychological Medicine* 32:959–76.
- Kim, H.-J., and K. I. Fredriksen-Goldsen. 2012. Hispanic lesbians and bisexual women at heightened risk for [corrected] health disparities. *American Journal of Public Health* 102:e9–15.
- Kreuter, F., M. P. Couper, and L. E. Lyberg. 2009. The use of paradata to monitor and manage survey data collection. In *Proceedings of the Joint Statistical Meetings, Survey Research Methods Section*, 282–96. Alexandria, VA: American Statistical Association.
- Kreuter, F., K. Olson, J. Wagner, T. Yan, T. M. Ezzati-Rice, C. Casas-Cordero, M. Lemay, A. Peytchev, R. M. Groves, and T. E. Raghunathan. 2010. Using proxy measures and other correlates of survey outcomes to adjust for nonresponse: Examples from multiple surveys. *Journal of the Royal Statistical Society: Series A (Statistics in Society)* 173:389–407.
- Lee, S., E. R. Brown, D. Grant, T. R. Belin, and J. M. Brick. 2009. Exploring nonresponse bias in a health survey using neighborhood characteristics. *American Journal of Public Health* 99:1811–17.
- Lin, I.-F., and N. C. Schaeffer. 1995. Using survey participants to estimate the impact of nonparticipation. *Public Opinion Quarterly* 59:236–58.
- Magnani, R., K. Sabin, T. Saidel, and D. D. Heckathorn. 2005. Review of sampling hard-to-reach and hidden populations for HIV surveillance. *AIDS* 19: S67–72.
- Meyer, I. H., and P. A. Wilson. 2009. Sampling lesbian, gay, and bisexual populations. *Journal of Counseling Psychology* 56:23–31.
- National Health Interview Survey (NHIS). 2013. Public-use data file and documentation. https://www.cdc.gov/nchs/nhis/nhis_2013_data_release.htm (accessed March 1, 2016).
- National Health Interview Survey (NHIS). 2014. Public-use data file and documentation. https://www.cdc.gov/nchs/nhis/nhis_2014_data_release.htm (accessed March 1, 2016).
- National Center for Health Statistics. 2014. *A brief quality assessment of the NHIS sexual orientation data*. <http://www.cdc.gov/nchs/data/nhis/qualityso2013508.pdf> (accessed March 1, 2016).
- National Center for Health Statistics. 2015. *Paradata file description, National Health Interview Survey, 2014*. http://ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2014/srvydesc_paradata.pdf (accessed March 1, 2016).
- Pew Research Center. 2016. *Changing attitudes on gay marriage*. <http://www.pewforum.org/2016/05/12/changing-attitudes-on-gay-marriage/> (accessed May 17, 2017).

- Peytchev, A., E. Peytcheva, and R. M. Groves. 2010. Measurement error, unit nonresponse, and self-reports of abortion experiences. *Public Opinion Quarterly* 74:319–27.
- Raboud, J., D. S. Su, A. N. Burchell, S. Gardner, S. Walmsley, A. M. Bayoumi, S. Blitz, C. Cooper, I. Salit, J. Cohen, S. B. Rourke, and M. R. Loutfy. 2013. Representativeness of an HIV cohort of the sites from which it is recruiting: Results from the Ontario HIV Treatment Network (OHTN) cohort study. *BMC Medical Research Methodology* 13. <http://bmcmedresmethodol.biomedcentral.com/articles/10.1186/1471-2288-13-31> (accessed January 5, 2017).
- Sell, R. L., and M. L. Holliday. 2014. Sexual orientation data collection policy in the United States: Public health malpractice. *American Journal of Public Health* 104:967–69.
- Tourangeau, R. 2014. Defining hard-to-survey populations. In *Hard-to-survey populations*, eds. R. Tourangeau, B. Edwards, T. P. Johnson, K. M. Wolter, and N. Bates, 3–20. Cambridge: Cambridge University Press.
- U.S. Federal Committee on Statistical Methodology. 2001. *Measuring and reporting sources of errors in surveys*. Statistical Policy Working Paper 31, Office of Management and Budget, Washington, DC. <https://s3.amazonaws.com/sitesusa/wp-content/uploads/sites/242/2014/04/spwp31.pdf> (accessed January 26, 2018).
- Whitman, J. R. B., and M. V. Halbesleben. 2013. Evaluating survey quality in health services research: A decision framework for assessing nonresponse bias. *Health Research and Educational Trust* 48:913–30.