Measuring Sexual Identity Using Survey Questionnaires: How Valid Are Our Measures?

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Abstract Patterns of poorer health are observed in numerous groups within the US population. The Healthy People 2020 initiative provides a national framework to improve the health of all people in the USA. One of the four over-arching goals of Healthy People 2020 is to achieve healthy equity, eliminate disparities, and improve the health of all groups including, lesbian, gay, bisexual, and transgender (LGBT) people. To achieve this goal for LGBT populations requires that these groups be identified in national health surveys. Sexuality, however, is a complex phenomenon that incorporates numerous, even contradictory, meanings, attitudes, and types of experiences, creating a major challenge in developing a single measure that is both meaningful and comparable across various socio-cultural groups throughout the US population. Without quality data, the picture of LGBT health, as it is portrayed through official statistics, is distorted. We contend that the specific construct of sexual identity (i.e., how individuals identify and conceptualize their own selves) is a key construct necessary for tracking health disparities. In this paper, we assess the validity of sexual identity measures using qualitative data from cognitive interview studies as well as estimates produced from the National Survey of Family Growth and the National Health and Nutrition Examination Survey.

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Introduction

For the past three decades, the Department of Health and Human Services has promoted the Healthy People initiative to provide a science-based approach for improving the health of all Americans. Eliminating health disparities across various US populations is a primary goal of the initiative (U.S. Department of Health and Human Services 2010). Those disparities recognized by Healthy People 2020 include those that occur by race and ethnicity, gender, education, income, geographic location, disability status, and sexual orientation. The Healthy People framework also requires that specific health-related objectives (e.g., risk for heart disease, tobacco use, and nutrition) are monitored across groups, providing the ability to evaluate changes in health statuses over time. However, there are data limitations. Notably, it is not possible to identify and track LGBT health disparities given the lack of information of sufficient quality on data sets used to monitor and track Healthy People objectives. For example, the National Center for Health Statistics (NCHS) does not recommend the use of existing NCHS sexual identity data to make prevalence estimates of the LGBT population or to describe the health characteristics of that population because of data irregularities associated with the current sexual identity variables.

Like other disparity groups, there are unique challenges to identifying LGBT respondents through surveys. Perhaps the foremost challenge is that sexuality, in and of itself, is a complex phenomenon that incorporates numerous, even contradictory, meanings, attitudes, and types of experiences

throughout the US population. Designing a single "one-size-fits-all" question is not as straightforward as it may seem. As Table 1 illustrates, estimates of LGBT populations in various nationally represented surveys are comparatively small, therefore the slightest degree of error can dramatically impact estimates. A cursory glance at the table below already indicates some problems with the measures. It is problematic, for example, that the numbers of "don't know/refused" cases are high and, in all but the National Health and Nutrition Examination Survey (NHANES), even surpass the number of those within the various sexual minority categories. It is also problematic that estimates of the "other" category are comparable to, or higher than, those of the sexual minority categories.

While it is all too easy to accept statistics as factual representations, it is essential to critically reflect upon the estimates and to examine the extent to which the measure is actually capturing what it purports to capture. To be sure, the way in which a question is asked, as well as its context, can impact estimates. These factors can likely explain the different estimates across surveys—most notably the "bisexual," "other," and "don't know/refused" categories—presented in Table 1. Again, because estimates of the LGBT population are so small, and because of the complexity of the phenomenon, it is especially important to understand and limit response error. Poor or biased data can easily lead to the mischaracterization of this population, which would hold implication for the Healthy People initiative and misguide the policies created to serve this disparity population.

In this paper, we first describe various constructs used to measure sexuality and argue that the concept of sexual identity is an important construct to measure given the goals of the Healthy People initiative. Using qualitative analyses of cognitive interview data as well as quantitative analyses of survey data produced by the National Survey of Family Growth (NSFG) and the NHANES, we assess the validity of questions designed to measure sexual identity for nationally-represented federal surveys. Table 2 presents the questions examined in this paper along with the type of data

used in the evaluation. In our discussion, we illustrate problematic response patterns associated with various measures, as well as demonstrate how these problematic patterns are systematic and can produce statistically biased data. By fully understanding the ways in which sexual identity questions perform, we are able to improve the design of such measures, thereby more accurately portraying the health needs and policy requirements for this group of people.

Constructs of Sexuality and the Appropriate Measure for Healthy People

To identify the sexual minority population in a survey, one common practice is to simply ask respondents, "What is your sexual orientation?" However, as a construct, sexual orientation is problematic in that it is intangible and difficult to define. In its everyday usage, the term *sexual orientation* is used as a "catch-all" term that can characterize one's sexual identity, behavioral patterns, or feelings of attraction (Sell 1997). Since respondents are likely referring to different aspects of sexuality when forming their answer, it is not clear what construct the data are actually capturing and, for that reason, the appropriate usage of that data. Additionally, references to particular aspects of sexuality are not likely to occur randomly (e.g., men may be more likely to consider one dimension while women consider another). These systematic differences can bias data, reducing the overall quality and allowing for mischaracterization.

A more prudent strategy is to disentangle the various dimensions of sexuality into separate constructs and to design questions around those aspects separately. The specific construct chosen should make theoretical sense to the particular research question at hand. Questions about *behavior* typically ask respondents to report a range of activities, such as sexual behaviors or practices, the time period within which sexual interactions occurred and the gender of their sexual partners (Laumann et al. 1994). Although it is more common and often preferred in epidemiological research to use sexual behavior measures to identify sexual minority

Table 1 Estimates of sexual identity groups by survey

Survey	Heterosexual, %	Gay men, %	Lesbian, %	Bisexual, %	Other, %	DK/refused, %
2002–2003 NSFG[a]	89.6	1.1	0.6	2.4	4.2	2.0
2006–2008 NSFG	94.5	0.8	0.5	2.5	0.4	1.2
2001–2008 NHANES[b]	95.7	1.1	0.7	1.9	0.3	0.4
HIS (UK) [c]	94.2	1.3	0.6	0.5	0.5	3.8
2009 CCHS[d]	96.5	1.2		1.0	NA	1.3

[a] National Survey of Family Growth

[b] National Health and Nutrition Examination Survey

[c] Health Interview Survey, UK

[d] Canadian Community Health Survey. Estimates found at: http://www.statcan.gc.ca/imdb-bmdi/document/3226_D3_T9_V15-eng.pdf

Table 2 Measures of sexual identity

Sexual identity question	Qualitative/cognitive interview data	Quantitative/survey data
What sexual orientation do you consider yourself to be? (1) heterosexual, (2) gay or lesbian, (3) bisexual, (4) other, (5) don't know	Ridolfo et al. (2010)	NA
Do you think of yourself as (1) heterosexual or straight (that is, sexually attracted only to women/men), (2) homosexual or gay/lesbian (that is, sexually attracted only to men/women), (3) bisexual (that is, sexually attracted to men and women), (4) something else, (5) or you're not sure?	Miller 2001; Ridolfo and Schoua-Glusberg 2009	2001–2008 NHANES
¿Se considera usted a sí mismo (1) heterosexual (*le atraen las mujeres/los hombres*), (2) homosexual *o gay/lesbiana* (*le atraen los hombres/las mujeres*), (3) bisexual (*le atraen los hombres y las mujeres*), (4) *alguna otra cosa*, (5) *no está seguro*(*a*)?	Ridolfo and Schoua-Glusberg 2009	2001–2008 NHANES
Do you think of yourself as (1) heterosexual, (2) homosexual, (3) bisexual, or (4) something else?	NA	2002–2003 NSFG
Do you consider yourself to be (1) heterosexual or straight, (2) gay or lesbian, or (3) bisexual?	Ridolfo et al. (2010)	NA
Do you think of yourself as (1) heterosexual or straight, (2) homosexual, gay, (or lesbian,) (3) bisexual, (4) or something else?	NA	2006–2008 NSFG
When you say "something else," what do you mean?	NA	2006–2007 NSFG
¿Usted se considera… (1) heterosexual, (2) homosexual, (3) bisexual, (4) *O alguna otra cosa*?	NA	2006–2008 NSFG
Cuando usted dice "alguna otra cosa", ¿a qué se refiere?	NA	2006–2007 NSFG

populations, this practice not only discounts sexual minorities' self-labeling, but it ignores the sociocultural factors that influence health disparities among sexual minorities (Young and Meyer 2005). That is, behavior in and of itself does not define a demographic group or population as it is conceptualized within Healthy People 2020. In fact, it is well established that same-sex behavior does not necessarily coincide with a gay or lesbian identity (Ridolfo and Schoua-Glusberg 2009; Laumann et al. 1994; Pathela, et al. 2006; Ellis et al. 2005; Lever et al. 1992).

Questions which ask about *sexual attraction* typically include scales that ask respondents to rate the degree to which they are "attracted" to the same or opposite sex. However, the usefulness of these scales relies on the assumption that attractions toward women and toward men are fundamentally opposite attractions, that is, individuals are either attracted to men or to women (Rust 1993). As with sexual behavior, individuals' sexual attractions are not uniformly concordant with their sexual identities (Ridolfo and Schoua-Glusberg 2009; Laumann et al. 1994; Ellis et al. 2005). Furthermore, as a subjective phenomenon, what actually constitutes "attraction" varies immensely among individuals, and (particularly when answering survey questions) respondents often conflate aesthetics with sexual desire in their interpretation of the term (Miller 2001).

Another important construct to examine when studying health disparities among sexual minority groups is *sexual identity*. Sexual identity is best conceptualized as a conception of self that is formed within a social context and defines for individuals their relationship to other individuals,

groups, and sociopolitical institutions within that context (Rust 1993). Furthermore, identities are instrumental in organizing peoples' lives and their everyday interactions. That is, identities have important implication for individuals' behaviors and others' actions toward them (Cast 2003). In the context of health, sexual identity is informative in understanding respondents' access to health care and, subsequently, the quality of care they are provided. Additionally, because identities are a conception of self, sexual identity (unlike orientation and attraction) is a more tangible and knowable construct and, theoretically, less problematic for respondents to report.

Measuring sexual identity, however, on a survey questionnaire presents its own unique challenges. Sexual identity (as an understanding of self) is multi-dimensional, rooted in social and political contexts, and changes over the course of individuals' lives (Stein and Plummer 1994). Community ties, cultural and political values, friendship relations, as well as sexual behavior and desire have all been identified as central components of sexual identity (Esterberg 1997; Stein 1997). Consequently, individuals' sexual identities do not necessarily conform to discrete, objective, and uniformly defined categories (Institute of Medicine 1999; Plummer 1981, 1995). With this in mind, we would be remiss if we did not acknowledge that it is somewhat problematic to quantify the concept of sexual identity. Sexual identity, however, is not unique in that there are numerous examples of complex constructs on Federal surveys, for example, disability status and racial identity. For these important, yet complex, constructs, a good deal of investment is placed in
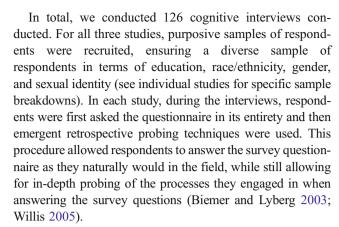
the development and evaluation of these measures to ensure that the intended concept is captured. To this end, it is our goal to develop a question that most accurately captures the concept of sexual identity. Such a question must be relevant across a broad spectrum of sexualities and understandable within various socio-cultural groups that are represented in the US population.

Methods

The assessment of many contemporary survey variables is best accomplished with a dynamic question development and evaluation strategy. This is particularly true of survey items that focus on complex concepts such as identity and sexuality. A variety of methods are available to evaluate both the validity and the reliability of survey questions; however, each of the methods has its own strengths and weaknesses (Madans et al. 2011). In this paper, we use both qualitative and quantitative data to examine the quality of the various versions of the sexual identity questions.

Qualitative Data and Methods

The qualitative findings presented in this paper come from three separate question evaluation studies we conducted at NCHS (see Miller 2001; Ridolfo and Schoua-Glusberg 2009; Ridolfo et al. 2010). Within these studies, three different sexual identity questions were evaluated using the method of cognitive interviewing. Cognitive interviewing is a qualitative method used to examine how survey questions perform. The method can be used to determine the construct that is captured by a survey question, as well as to uncover problems that could lead to response error in the survey data (Willis 2005). Traditionally, cognitive interviewing has focused on response error that emerges due to disruption in the cognitive processes that respondents engage in when answering survey questions (i.e., comprehension, recall, judgment, and response mapping) (Tourangeau et al. 2000). However, it is increasingly argued that these cognitive processes occur within a larger socio-cultural context, and in order to fully understand how respondents comprehend and respond to survey questions, it is necessary to examine how each step in the response process is informed by individuals' lived experiences (Miller et al. 2011). During cognitive interviews, respondents are administered a survey questionnaire and are then asked to describe how and why they answered a question the way they did. In doing so, interviewers elicit narratives regarding the interpretive processes respondents engage in while answering the survey question. When paired with quantitative analyses, this method allows us to assess the validity of survey questions across diverse groups of respondents (Miller 2011).

In total, we conducted 126 cognitive interviews conducted. For all three studies, purposive samples of respondents were recruited, ensuring a diverse sample of respondents in terms of education, race/ethnicity, gender, and sexual identity (see individual studies for specific sample breakdowns). In each study, during the interviews, respondents were first asked the questionnaire in its entirety and then emergent retrospective probing techniques were used. This procedure allowed respondents to answer the survey questionnaire as they naturally would in the field, while still allowing for in-depth probing of the processes they engaged in when answering the survey questions (Biemer and Lyberg 2003; Willis 2005).

Data from cognitive interviews were analyzed using the constant comparative method of analysis, an inductive process to generate conclusions (see Lincoln and Guba 1985; Strauss and Corbin 1990; Creswell 1998 for in-depth discussion of the constant comparative method). Data were analyzed with two themes in mind: (1) the ways in which respondents interpreted the question and (2) the ways in which respondents formulated their response (see Ridolfo and Schoua-Glusberg 2011 for detailed illustration regarding the use of the constant comparative method to analyze cognitive interview data).

Quantitative Data and Methods

The quantitative data used in the current study are from the 2002 and 2006–2008 NSFG and the 2001–2008 NHANES. The language of the interview variable is not available for the 2001 and 2002 NHANES. Therefore, when Spanish and English interviews are compared in this paper, 2003–2008 data are used. Both surveys are conducted by the NCHS. Detailed methodological descriptions of the data sets are available on the NCHS website (http://www.cdc.gov/nchs). The NSFG data sets include data on respondents aged 15–45 years, whereas the NHANES data set includes data on respondents aged 20–59 years. It is important to note that the sexual identity questions analyzed for both the NSFG and NHANES surveys are included in a section of the survey administered using Audio Computer-Assisted Self Interviewing (A-CASI). The questions are also included in sections of the survey about sexual behavior. Statistical analyses were conducted using the SURVEY procedures in SAS version 9.2 in order to account for the clustering, stratification, and weighting in the NSFG and NHANES complex sampling designs. The percentage of missing data is the primary dependent variable in the quantitative analyses in this paper. Missing data is defined as respondents who answered "don't know," refused, something else, or not sure. The decision to group these responses together was made for two reasons. First, this reflects how data users traditionally treat these categories. That is, often, data users

drop these categories from the analysis completely. Second, in cognitive testing, we found that respondents select each one of these response options (don't know, refused, something else, or not sure) for various reasons, and none of these response options were producing meaningful data. In addition to the sexual identity question, the 2006–2008 NSFG used an open-ended follow-up question whereby respondents were allowed to write in another answer if, when answering the sexual identity question, they had selected "something else." These open-ended responses were also examined in this analysis.

Results

It is a common understanding that where a question is placed in a questionnaire and the topics of questions that come before can impact how a survey question is interpreted (Sudman et al. 1996). However, it is equally important to recognize that the question response process itself is set within the context of each respondent's life circumstance, and this perspective also impacts question interpretation; how respondents go about understanding and answering a survey question is necessarily informed by the socio-cultural context in which they live. Respondents' social location, including such significant factors as their socio-economic status, education, and age can impact how respondents go about interpreting and processing survey questions (Miller 2003; Miller et al. 2011).

The most noteworthy finding of this study is that respondents' conceptualization of their own sexuality impacted the way in which they interpreted and processed questions pertaining to sexual identity. Significantly, respondents' different self-conceptions lead to different types of response problems which, in some cases, led to skewed or misleading survey data. The findings of our analysis are organized by the following themes: (1) construct equivalence, (2) question interpretation, and (3) response category fit. Qualitative and quantitative data are presented where appropriate. The findings from this study provide necessary insight for the improvement of sexual identity measures, which will be discussed in the paper's conclusion.

Salience of Sexual Identity and Construct Equivalence

The idea of construct equivalence, that is, the extent to which a particular measureable concept exists and is salient to all potential sub-groups within a survey sample, has been a focal point in the cross-cultural survey methodology literature (Harkness et al. 2003, 2010; Miller et al. 2011). Data lacks comparability if a particular construct does not exist, or is fundamentally different, in one or more of the represented cultural groups. Cognitive interviewing can provide insight into the degree that constructs correspond across

socio-cultural groups—what Padilla (2007) refers to as "construct overlap." Analysis of cognitive interviews in this study revealed that the construct of sexual identity differed across the various sexuality subgroups. This lack of comparability generated not only disparate data across groups, but it also generated different types of question response problems for the different groups of respondents.

In contrast to those respondents who did not identify within a sexual minority group, the concept of "sexual identity" held a particularly distinct and salient meaning for those identifying as lesbian, gay, bisexual, or transgender. For LGBT-identified respondents, "sexual identity" represented a core component of their sense of self. Perhaps not surprisingly, this was not true for non-LGBT respondents. By claiming a lesbian, gay, or bisexual sexual identity, individuals are able to make sense of significant aspects of their everyday lives that, in many ways, run counter to that of socio-cultural ideals (Plummer 1995; Stein and Plummer 1994). Although specific conceptualizations varied across LGBT interviews, the underlying theme running throughout all LGBT interviews pertained to life experience occurring outside mainstream expectation. For example, some respondents described forgoing traditional marriage in order to create a family with someone of the same gender, others discussed their acknowledgement of same-sex sexual attractions or engaging in same-sex sexual behaviors—feelings and actions, they recognized, that are non-normative and unsanctioned. Still others described belonging to a larger LGBT community and participating in LGBT-related political activities. For example, one respondent conceptualized his sexual identity within a socio-political framework:

> To say that I am gay or I am lesbian is a political statement. And it's about self-acceptance and about self-acknowledgment and that there's more—it's more than just the mechanics of sexual behavior… it has more to do with a community, a cultural connection and a social connection than just who you have sex with.

Transgender interviews underscored the same theme of self-acknowledgement outside social expectation. However, for these respondents, an additional critical component included the complex relationship between gender and sexual identities. By comparison, gender identity was not as prominent a theme in lesbian, gay, and bisexual interviews. Because sexual identity and gender identity were intrinsically linked for transgender respondents, the question response process became more involved and often problematic. For example, one respondent who was transgender female to male explained:

> Because I'm trans I kind of consider myself, I mean I date women but I guess I might identify my orientation to be kind of heterosexual but a little queer. I

mean I'm not, I don't date men but at the same time I'm biologically female, transitioned to male so. I guess heterosexual. Let's say heterosexual.

When asked more about his response, he explained:

For me it's because of the process to get where I'm at has been so much a part of the queer community for so many years, it's hard to fully identify as heterosexual because it's more, in terms of, less about my orientation and more about I think culture and feeling still a part of that queer culture.

In comparison to LGBT-identified respondents, most of the other respondents did not hold a salient sexual identity; this lack of salience was reflected in the absence of a well-defined identity as heterosexual. Unlike LGBT respondents whose identity helps to make sense of non-normative experiences, non-LGBT respondents have little need for a salient heterosexual identity. Instead, these respondents often dis-identified from a gay identity or possessed what is referred to as a "not-me" identity (McCall 2003). For these respondents, identifying as heterosexual (or as some described it "not gay" or "normal") served to distance themselves from what they perceived as a stigmatized gay identity. When asked to define what identifying as heterosexual meant to them, these respondents often lacked a vocabulary to describe their sexual identity, finding it hard to elaborate on the meaning. Instead of defining a central component of their sense of self, these respondents gave loosely constructed answers that vaguely pertained to sexual behavior and sexual attractions. For example, one respondent explained it's "what do you gear yourself toward, the same sex or opposite sex." When answering the question, another respondent asked, "Heterosexual means you only deal with men right? I guess I'm hetero." As evidenced by this last respondent, it is arguable that many of these respondents simply do not possess a sexual identity as it is not salient to their life experience.

Respondent Identity and Question Interpretation

How respondents understood the construct of sexual identity held direct implication for the ways in which they understood the various versions of the question. For example, LGBT respondents understood the question which asked "Do you consider yourself to be heterosexual or straight, gay or lesbian, or bisexual" as asking about identity, however, they tended to interpret the orientation question (i.e., "What sexual orientation do you consider yourself to be?") as only asking about sexual attraction or behavior. "By limiting it to sexual orientation," one gay-identified respondent explained, "it seems like it is more about behavior—attraction and the acting out of that attraction." By

comparison, heterosexual (or non-LGBT) respondents maintained the same interpretation (i.e., the vague and loosely defined "not-me" construct) across both of these questions.

As previously described, non-LGBT respondents often had a limited vocabulary when reporting their sexual identities and some, particularly those of lower socio-economic status, were unfamiliar with the term "heterosexual." Consequently, for questions with response categories that only used the term "heterosexual" (e.g., NSFG 2002), some respondents found it difficult to answer. For example, one respondent with difficulty deliberated over the different response options: "I'm going back [and forth] to 'heterosexual' [and] I guess 'other.' I want to be 'straight.' I'm straight. You can write men only if you want." In providing an actual response, some respondents selected the category "heterosexual" by ultimately deducing that it meant "not gay." Others, however, selected the response category "other" and explained that they did not belong to any of the provided options but, rather, were "straight." Still others opted out of the question completely answering "don't know" or "refused." Finally, a few others believed the term "heterosexual" meant "bisexual." For example, one confused respondent explained: "You know I hear that it [heterosexual] means male and female, a person that likes a male or a female. A female likes a female and male."

Examination of the 2002 NSFG survey data reaffirms the cognitive interview findings: comprehension problems lead to high rates (i.e., 6.2% of all respondents) of "something else," "refused" and "don't know" responses. Additionally, comprehension problems were not entirely random but were more likely to occur for those respondents of lower socio-economic status. Indeed as Table 3 illustrates, those respondents with lower education were more likely to have "something else," "refused," and "don't know" responses. Furthermore, the problems appear to be exacerbated for women.

In an attempt to resolve this type of problem, in its version of the sexual identity question, the NHANES incorporated a descriptive clause for each response category, defining the identity categories along the dimension of sexual attraction. Common identity categories (i.e., straight, lesbian, and gay) were also used to clarify the response options (see Table 2 for exact wording). The resulting survey data appears to indicate that these changes improve problems of comprehension as they are observed in rates of missing data. In comparing the percent of "don't know/refused" and "other" responses in the NHANES to those of the other surveys not utilizing a definitional clause (as illustrated in Table 1), only 0.7% of NHANES respondents answered "other" or "don't know/refused," while the other surveys ranged from 1.6% to 6.2% of respondents. Additionally, the percentage of missing data is lower for all

Table 3 Distribution of missing data by education in the 2002 NSFG

Missing data	Men			Women		
	Less than high school	High school	More than high school	Less than high school	High school	More than high school
Yes	11.4%	8.0%	2.1%	14.4%	7.9%	2.1%
No	88.7	92.0	97.9	85.6	92.1	97.9
	100	100	100	100	100	100
N	(1,361)	(1,505)	(2,055)	(1,702)	(2,167)	(3,767)
	Rao-Scott Chi-square (2)=63.47, $p<.05$			Rao-Scott Chi-square (2)=240.28, $p<.05$		

Missing data=something else, refused, and "don't know" responses

educational groups—although the relationship continues to be significant (see Table 4).

The definitional clause, however, creates another type of interpretive problem that is not visible in the survey data. Specifically, the solution conflates the construct of sexual identity with that of attraction, and it is not clear which construct is actually being measured. In cognitive interviews, many respondents indicated that they did not notice the statement; they either had no sexual identity (but rather a "not-me" identity) and answered solely based on their perceived "attractions," or their sexual identity was consistent with the way they perceived their "attraction." However, for other respondents, specifically those whose identity and sense of attraction were not concordant, the response process was much more complicated. In forming their answer, they either had to adhere to the sexual identity portion of the question and disregard the sexual attraction clause, or adhere to the sexual attraction clause and disregard the sexual identity portion of the question. This was true for both minority and non-minority identified respondents. For example, one woman who has self-identified as a lesbian for over 20 years explained how she deliberated over the question:

> See, to me, sexuality is more than just who you sleep with. In fact, it's more about emotion or it's equally about emotion, not just sex. So, I could never imagine myself in a relationship with a man, but I do

occasionally sleep with one.... [as far as answering the question], I thought I can't answer this any other way aside from lesbian because of what I said before about the emotional part of it, because I could never imagine being in a relationship with a man."

Similarly, a heterosexual woman found herself having to disregard the attraction clause in order to answer the sexual identity component of the question.

> I thought a little bit about it because I've been attracted to women but I wouldn't say—I wouldn't consider myself bisexual because I don't have an interest in having a relationship with a woman. It's more maybe a curiosity thing.

It is impossible to determine from the survey data alone the extent to which this type of response pattern impacted the estimates. Depending on how respondents ultimately choose to base their answer—on identity, as these two respondents did, or on attractions—the estimates are impacted. It is possible that the estimate of bisexual is larger if respondents base their answer on attraction, rather than identity.

In 2006, NSFG altered its identity question by adding the more commonly used identity categories, but forgoing a definitional clause. As illustrated in Table 1, the change dramatically reduced the missing data: "other" dropped

Table 4 Distribution of missing data by education in the 2001–2008 NHANES

Missing data	Men			Women		
	Less than high school	High school	More than high school	Less than high school	High school	More than high school
Yes	4.0%	1.1%	0.4%	6.1%	2.1%	1.0%
No	96.0	98.9	99.6	93.9	97.9	99.9
	100	100	100	100	100	100
N	(1,450)	(1,474)	(2,774)	(1,421)	(1,365)	(3,392)
	Rao-Scott Chi-square (2)=83.76, $p<.05$			Rao-Scott Chi-square (2)=82.21, $p<.05$		

Missing data=something else, refused, and "don't know" responses

from 4.2% in 2002 to 0.4% in 2006, and "don't know/refused" responses dropped from 2.0% to 1.2%. Furthermore, as Table 5 illustrates, the relationship between education and missing data is reduced and is even weaker than that of the NHANES. The relationship between gender and missing data has disappeared. Thus, it appears that the NHANES attraction clause added an unnecessary complication. A question comparable to the sexual identity measure used in the 2006–2008 NSFG was cognitively tested and showed better comprehension over other questions which did not include commonly used terms such as straight and gay (see Ridolfo et al. 2010). For example, upon hearing the question which contained "straight" in the response options, one respondent stated: "I'm straight then. Now I have to go home and figure out what heterosexual is." We should note, however, that a few respondents did not conceptualize the term "straight" as a term to characterize one's sexuality, but rather to indicate an individual as being "straight laced" (meaning they did not use drugs or alcohol). To this extent, use of this additional term in the response category did not completely eliminate interpretation problems.

Much more of a problem, however, is that the inclusion of the word "straight" only resolved comprehension problems in English because there is no equivalent wording in the Spanish language. Across all three data sets, as illustrated in Table 6, the percentage of missing data was higher for Spanish-speaking respondents compared with English-speaking respondents. This is true for both men and women. Comprehension problems persist among Spanish-speaking respondents. Even for the NHANES, where the definitional clause attempted to explain the terms, Spanish interviews compared with those in English generated higher rates of missing data.

Comprehension problems among non-LGBT respondents can undoubtedly explain the relatively high rates of missing data—a problem that is particularly high among Spanish speakers. Without a doubt, an improved question will be one that has equivalent meaning in both English and Spanish. It will also be critical to develop a measure that reduces the amount of missing data. By comparison, there were only six cases (.04%) of missing data for the NSFG racial identity question, and even those cases were ultimately imputed. There is no known way to accurately impute sexual identity data. Specifically because the sexual minority rates are so small, it is critical to more accurately distinguish the non-minorities from the minorities in the missing data categories. As the next section describes, we also found in the cognitive interview studies that sexual minorities can also fall into these categories.

Lack of Fit: LGBT Experience and the Categorical Structure of Survey Questions

As previously discussed, it is well documented that sexual and gender identities are fluid, that is, they can change over time and from context to context. However, the categorical structure of survey questions requires that respondents conceptualize their identity, at least in the confines of the survey interview, as a more-or-less static phenomenon. This problem was most evident among those in the process of "coming out" and those transitioning genders. For these respondents, the "other" and "don't know" responses often represented the most appropriate categories. Transgender respondents, for example, tended to describe the other response options as not accurately capturing their true identity. As one respondent explained, he identified as both a heterosexual woman and a homosexual man because he was transitioning from male-to-female. Another transgender respondent explained that he has been exploring the term "queer" to describe himself. Queer, he noted, was more encompassing of individuals who do not fit into the male–female binary. Because of this categorical problem, some transgender respondents selected "other" in lieu of the options provided. Still other transgender respondents chose "heterosexual" because they had fully re-conceptualized their gender identity and were in relationship with partners of their previous gender.

For those respondents "coming out," that is, in the process of questioning their sexual identity, the experience of

Table 5 Distribution of missing data by education in the 2006–2008 NSFG

Missing data	Men			Women		
	Less than high school	High school	More than high school	Less than high school	High school	More than high school
Yes	3.1%	1.6%	0.7%	3.8%	1.2%	1.0%
No	96.9	98.4	99.3	96.2	98.8	99.9
	100	100	100	100	100	100
N	(1,883)	(1,590)	(2,637)	(1,960)	(1,844)	(3,522)
	Rao-Scott Chi-square (2)=17.14, p<.05			Rao-Scott Chi-square (2)=39.42, p<.05		

Missing data=something else, refused, and "don't know" responses

Table 6 Percentages of missing data by language and ethnicity

	Men			Women		
	Spanish Hispanic interview	English Hispanic interview	English non-Hispanic interview	Spanish Hispanic interview	English Hispanic interview	English non-Hispanic interview
2002–2003 NSFG	12.1%	10.6%	5.1%	12.9%	9.5%	5.6%
	87.9	89.4	94.9	87.1	90.5	94.4
	100	100	100	100	100	100
	(359)	(763)	(3793)	(558)	(1,031)	(6,037)
2006–2008 NSFG	8.9%	1.3%	1.0%	9.3%	1.2%	1.1%
	91.1	98.7	99.0	90.7	98.8	98.9
	100	100	100	100	100	100
	(451)	(947)	(4708)	(546)	(1,053)	(5,716)
2003–2008 NHANES	6.2%	1.2%	0.9%	9.1%	4.0%	1.4%
	93.8	98.8	99.1	90.9	96.0	98.6
	100	100	100	100	100	100
	(595)	(543)	(3,098)	(576)	(685)	(3,324)

Missing data=something else, refused, and "don't know" responses

transitioning presented the same type of response problems. For example, instead of answering the question, one woman who was, at the time, married to a man, went on to explain:

> Well, I'm in a coming out process. I've made many, many attempts to get involved with lesbian groups or women. But you know back in the mid '70s—see, when I was 21 after a year I knew that I didn't want to be involved with men. So then I started going to lesbian groups, but they were so militant back then, full of so much hatred and anger. And I thought, oh my God, this is going to destroy me. That was around, say, '72 to '74. And then about 10 years later, '82 to '84, I started corresponding with lesbians through [a lesbian group] in Washington. I was writing to women from all across the country. And then I met my husband.

As the respondent continued to explain, the question was difficult to answer because, although she is married, she remains involved in several lesbian organizations and has told many people, including her husband, that she is a lesbian. In the context of legalized marriage, she lives as a heterosexual, but, in other social circles, she presents herself as a lesbian. Many gay and lesbian respondents also corroborated this type of response problem, noting that their answer would have fluctuated at different points in their life, and that they (like this woman) endured a long transition period before they fully identified as "gay" or "lesbian." For these respondents, it is likely that they respond "don't know" or "other."

Though not a problem for many cognitive interview respondents, some sexual minority respondents did not conceptualize their identity within the provided categories, that is, "gay," "lesbian," or "bisexual." These terms used commonly to describe sexual identities were not universally used across all sexual minority groups. For example, a few respondents discussed using alternative terms, such as "queer" or "same gender loving." This was particularly seen among some racial and ethnic minorities who associated gay and lesbian with white gays and lesbians. One respondent, who was a black male, associated the term "gay" with white homosexual men and did not feel that it applied to him as a black male. He explained:

> Because I think gay is like a marker. It's like a stereotype. I guess when you see gay it's mostly white gay men. You just see mostly one race and that's what you see when you say gay. It's like you see 'Queer as Folk,' which has no black characters on it…. I look in the mirror and I say 'okay I'm a different color of skin, different skin color than what I see of what's gay.'

While some respondents, who used alternative terms to describe their sexual minority identity, would select "gay or homosexual," others would select the "other" category when provided.

Interestingly, the 2006–2008 NSFG write-in answers for category "something else," reflect these same findings found in the cognitive interviews. Slightly more than half of the codeable write-ins included words that could be interpreted as being that of a sexual minority group, for example, writing in "omnisexual," "multisexual," "trisexual," and "bicurious." Another third included terms that could be interpreted as belonging to the heterosexual or non-LGBT category, for

example, a woman writing in Spanish, "solo me gustan los hombres," a man writing "sex with female only," and others writing "normal." The remaining codeable write-ins included a couple respondents who wrote "transgender," a few who stated that they had "no sexuality" and others who stated that they "do not know" or "aren't sure." Thus, in considering how to handle the problem of missing data, it is important to recognize that this group does not consist solely of heterosexuals who are unfamiliar with the terms. The missing data also consists of sexual minorities.

Discussion

Findings from this study have provided a clearer picture of the types of interpretive processes used by respondents to construct responses to sexual identity questions in Federal surveys. The picture reveals a complex process that is informed by respondents' conceptualizations of themselves as well as their experience and understanding of sexuality. Taken together, the findings provide a rich understanding of the phenomena that is captured in the survey data and, then, transformed into a statistic for a prevalence rate or as an independent variable to characterize a population. This understanding provides a keener ability to interpret the data as well as to assess scientific work purporting to characterize the LGBT population. Just as importantly, the findings provide a path for improving measures to produce a more accurate representation of this disparity group. The discussion below summarizes the findings as they pertain to question design and lays out a strategy for improving the measure.

Problematic Categories

As demonstrated above, the use of an "other" category in questions on sexual identity captures respondents from four distinct groups: (1) non-LGBT respondents who have comprehension problems regarding the terms "heterosexual" and "straight"; (2) sexual minority respondents who reject traditional terms used to describe sexual identity; (3) transgender respondents; and (4) respondents who are experimenting or questioning their sexual identity. As a result, this category is not analytically meaningful, and it would be necessary to drop these cases altogether from the analyses altogether. Because the sexual minority numbers are so low, however, it is critical to resolve this "other" problem as much as possible.

In revising a sexual identity question, it may seem reasonable to simply drop the "other" option from the response categories. However, as revealed in cognitive interviews, respondents opting for the "other" category often do so after debating over the "other" and "don't know" categories.

Without an "other" category, it is likely that these respondents would ultimately choose the "don't know" option. A more prudent solution may be similar to the approach used by the NSFG where a follow-up question is used for respondents to clarify what they mean by "other." Instead of following up with an open-ended question, whereby respondents write-in their answers, the question would consist of response categories that ultimately place respondents into one of the four distinct groups that are outlined above. This same strategy could be used to clarify why respondents choose the "don't know" category: whether they do not understand the terminology or because they are transitioning genders or questioning their sexuality.

Problems Are Systematic

An important finding discovered was that the question response problems cited above do not occur randomly across our samples but rather systematically occur among particular subgroups of the sample. Less-educated respondents and Hispanic respondents, particularly those who completed the survey in Spanish, were more likely to be unfamiliar with the terms used in the questions. Additionally, cognitive interviews illustrated that transgender respondents as well as racial minorities rejecting traditional terms used to describe sexual identities were more likely to experience difficulty.

Adding terms respondents are more familiar with, and more importantly, identify with, may improve estimates. Across cognitive interview studies and in the 2006–2007 NSFG, we found respondents interpreting heterosexual as meaning "not gay." It may be advantageous to allow respondents to indicate that they are in fact not gay, instead of asking them to report that they are straight or heterosexual, terms they may not be familiar with and may not identify with. Similarly, adding alternative terms to the "gay or homosexual" category may also improve response rates as respondents may feel more comfortable reporting that they are "queer" or "same gender loving" and thus be less likely to answer "other" or "don't know" or "refused."

It is important to note that this is a complex question because, in the end, sexual identity is a complex concept. Even with these changes, there will likely be respondents who experience problems. This is a complex question that cannot easily be explained through a traditional question format, where interviewers are asked to read "help screens" to clarify terminology. Self-administration with the use of A-CASI technology would allow uniform presentation of help screens to help clarify the intent of the question. Content of the help screens should be based on information gained from previous studies in which respondents described their conceptualizations of their own sexual identities.

Beyond Question Design: Other Considerations for Ensuring Data Quality

Question design flaws represent only one factor related to potential measurement error. While this paper has concentrated solely on question design, it is important to identify and reduce, if not eliminate, other sources contributing to measurement error. In the two NCHS surveys, sexual identity is asked after a series of sexual behavior and attraction questions. Therefore, it is possible that, in the survey interview, respondents conflate interpretations of those concepts with the identity question. To capture a purer identity variable, then, it would be necessary to ask this question outside this context, perhaps in a demographic section. Additionally, some research suggests that data quality may be compromised when interviewers, themselves, deem questions to be sensitive (Sudman et al. 1977; Singer and Kohnke-Aguirre 1979; Singer et al. 1983). For questions that interviewers do not like asking because they find it awkward or too personal, they may decide to skip the question altogether and code the response as "don't know" or "refused." Or interviewers may answer the question themselves based on their perceptions of the respondent. In this regard, a self-administered instrument, such as the A-CASI technology, again, would serve as an important strategy for ensuring data quality. If the use of A-CASI technology is not permitted due to time and cost constraints, survey sponsors should consider using other forms of self-administered questionnaires. If interviewer administered modes are used, survey sponsors should focus their attention on training interviewers not only on the importance of asking questions as worded and the implications of invalid data but also on surveying sensitive topics (i.e., questions they may not feel comfortable administering).

Conclusion

The addition of a sexual identity question on surveys collecting data used to monitor and track Healthy People objectives may help us achieve the Healthy People 2020 goal of eliminating health disparities for LGBT populations. However, it is necessary that measures capture an accurate representation of the population. Understanding data quality and limitations of survey data is an important, yet arguably overlooked aspect to doing "good science." To make policy effective, it is critical that the data driving policy is quality—that the measures used to identify a population are indeed identifying the correct population. This paper has illustrated ways in which existing measures of sexual identity can lead to mischaracterization of the LGBT population. Specifically, this paper has shown that lower socio-economic and Spanish-speaking heterosexual respondents are more likely to either be missing or misclassified in the survey data used to monitor the Healthy People.

With these respondents falling out of the analysis as missing data or being misclassified, the picture of LGBT health will necessarily be skewed. By understanding question response processes and the potential for error across the sexual identity groups, it is possible to improve the design of such measures, thereby more accurately portraying the health needs and policy requirements for this group of people.

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