Comparing national probability and community-based samples of sexual minority adults: Implications and recommendations for sampling and measurement

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Abstract

Scientific evidence regarding sexual minority populations has generally come from studies based on two types of samples: community-derived samples and probability samples. Probability samples are lauded as the gold standard of population research for their ability to represent the population of interest. However, while studies using community samples lack generalizability, they are often better able to assess population-specific concerns (e.g., minority stress) and are collected more rapidly, allowing them to be more responsive to changing population dynamics. Given these advantages, many sexual minority population studies rely on community samples. To identify how probability and community samples of sexual minorities are similar and different, we compared participant characteristics from two companion samples from the *Generations Study*, each designed with the same demographic profile of U.S. sexual minority adults in mind. The first sample was recruited for a national probability survey, whereas the second was recruited for a multi-community sample from four U.S. cities. We examined sociodemographic differences between the samples. Although there were several statistical differences between samples, the effect sizes were small for sociodemographic characteristics that defined the sample inclusion criteria: sex assigned at birth, race/ethnicity, and age cohort. The samples differed across other characteristics: bisexual respondents, respondents with less education, and those living in non-

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urban areas were underrepresented in the community sample. Our findings offer insights for recruiting community samples of sexual minority populations, and for measuring sexual identity on probability surveys. They also bolster confidence in well-designed community samples as sources for data on sexual minority populations.

Keywords

Sexual orientation; sexual identity; sampling; probability sample; community sample

Introduction

Over the last several decades, the scope and depth of sexual minority population research has grown, dramatically increasing our understanding of the lives and wellbeing of sexual minority people (typically operationalized as lesbian, gay, and bisexual [LGB] people) (Institute of Medicine, 2011). Impactful population research relies on carefully selected, purposive samples to draw meaningful inferences about populations of interest (Binson, Blair, Huebner, & Woods, 2007; Meyer & Wilson, 2009; Rossi, Wright, & Anderson, 2013). Broadly speaking, scientific evidence regarding sexual minority populations has come from studies based on two sampling approaches, both of which offer challenges and advantages to researchers: community-based and probability samples.

Studies derived from community samples have provided researchers with the ability to purposively assess the distinctive mechanisms theorized to be crucial to sexual minority wellbeing (e.g., minority stress). Yet despite decades of advances in methods for community sampling (Meyer & Wilson, 2009; Watters & Biernacki, 1989), such studies are limited by lack of population representation or generalizability. Further, the impacts of selection bias are often unknown – that is whether community samples are representative of all sexual minorities, or whether those who participate differ from sexual minorities not reached by such studies (Dodds, Mercer, Mercey, Copas, & Johnson, 2006; Drabble et al., 2018; Salway et al., 2019). Probability samples became a viable option for sexual minority research when large-scale studies began to include questions about sexual minority status (Dilley, Simmons, Boysun, Pizacani, & Stark, 2010; Sell & Holliday, 2014; Sell & Petrulio, 1996). Probability samples have the advantage of generalizability (i.e., they should be representative of the population of interest). However, with noted exceptions (Dodge et al., 2019), studies from these types of samples often exclude minority-specific measures, and thus may have limited application for understanding the lives of sexual minority people. Although probability samples are generally regarded as superior for population generalizability, little is known regarding the degree to which rigorous community sampling designs yield samples that differ or are similar to probability samples.

Sexual minority population research: A brief history

Homosexuality has long been stigmatized, with serious social consequences for sexual minority people (Hatzenbuehler, Phelan, & Link, 2013; Meyer, 2003). As a result, sexual minorities have historically been a "hard-to-reach" population (Ellard-Gray, Jeffrey, Choubak, & Crann, 2015). In part because of this challenge, early sexual minority

population studies relied almost exclusively on samples derived from clinic- and prison-based populations. These studies suffered severe selection effects, that not surprisingly, yielded findings that portrayed sexual minority people as sick and morally flawed compared to heterosexuals (Hammack, Mayers, & Windell, 2013; Meyer & Wilson, 2009; Morin, 1977). Evelyn Hooker's approach to studying homosexual men in the 1950s stood in stark contrast to the earlier clinic-based studies (Minton, 2002). Hooker called for the use of samples of sexual minority people derived from the larger, general community of homosexual men; her findings showed that homosexual men recruited through community samples were generally well-adjusted and healthy (Hooker, 1957). This community-based sampling approach was a revolution for sexual minority research and represented a marked shift in the approach to studying sexual minority people that continues to this day. Importantly, the research derived from community-based samples helped to establish that sexual minorities did not systematically differ from heterosexuals, except for their experiences related to adversity and stigma. Such research helped to alter larger societal views of homosexuality (e.g., leading to the removal of homosexuality from the DSM list of mental disorders in 1973) (Bayer, 1987), and set the stage for contemporary understandings of sexual minority lives and health (Meyer, 2003).

Due in part to the difficulty associated with collecting probability-based samples of sexual minority people, community-derived samples remain the bedrock for sexual minority population research. The sophistication by which such samples are collected has improved over time, including the use of targeted recruitment across distinct venues to capture a diverse range of sexual minority people, random digit dialing, computer-assisted and internet-based surveys, or respondent-driven methods that apply weights to accommodate non-random sample collection (Heckathorn, 1997; Meyer, Schwartz, & Frost, 2008; Muhib et al., 2001; Rothblum, 2007; Sadler, Lee, Lim, & Fullerton, 2010; Watters & Biernacki, 1989). Important lessons have been gleaned from community-based samples, which have allowed researchers to advocate for the inclusion of measures of sexual minority status in larger population-based studies (Sell & Holliday, 2014). The inclusion of measures in large-scale surveys has been a significant advance for sexual minority researchers and advocates, and results from such studies have contributed to arguments for improvements in social, legal, and political equality for sexual minority people (e.g., the repeal of "Don't Ask, Don't Tell" and the legalization of same-sex marriage). Given the growing availability of both types of samples, it is now possible to assess the efficacy of community samples to reach populations that are achieved in probability samples.

Comparing community-based to probability samples

Relatively little research has attempted to compare community-based and probability samples of sexual minority populations. In the most extensive assessment of this question to date, Salway et al. (2019) performed a systematic review of 21 studies that assessed selection bias among non-probability samples of sexual minority people, using a variety of methods (e.g., by comparing non-probability samples to general population-based surveys or random digit dial surveys). They revealed consistent evidence of selection bias; in the majority of cases, single, lesbian/gay-identified, and higher-SES sexual minority people were over-represented in studies using non-probability samples.

Although studies derived from both sample types generally show disparities between sexual minority and heterosexual populations (e.g., in mental or behavioral health), the magnitude of difference may vary by sampling strategy (Salway et al., 2019). For instance, studies derived from community-based samples of men who have sex with men may overestimate HIV and sexual risk behaviors, as compared to probability-based samples (Dodds et al., 2006). In another study, Drabble et al. (2018) compared substance use outcomes between heterosexual and sexual minority women in a national probability sample, as well as to sexual minority women from a community-based sample from Chicago. They obtained mixed results; in comparison to heterosexual women, sexual minority women from the community sample reported greater drug use disparities, but fewer tobacco use disparities, as compared to sexual minority women from the probability sample.

A key consideration when making comparisons across distinct samples is to understand how similar (or distinct) the intended populations under study were. Sexual minorities are diverse and include distinct subpopulations (e.g., monosexual [e.g., gay, lesbian] vs. plurisexual [e.g., bisexual, pansexual] people; men vs. women; diverse race and ethnic groups) often with varying social, economic, or health statuses (Balsam, Beauchaine, Mickey, & Rothblum, 2005; Koh & Ross, 2006; Marshal et al., 2011; Saewyc et al., 2008). For instance, bisexual women have lower incomes, report less social support, and are less likely to finish college compared to lesbian women (Krueger & Upchurch, 2019). Further, the emergence (or reclaiming) of new sexual minority identities such as "queer" or "pansexual" may introduce new diversity into samples of LGB people (Goldberg, Rothblum, Russell, & Meyer, 2019). Whereas several population-based studies now include measures that assess LGB identities, these newer identities (e.g., queer, pansexual) are typically excluded (Horner, 2007; Morandini, Blaszczynski, & Dar-Nimrod, 2017; Watson, Wheldon, & Puhl, 2019). The exclusion of new sexual identity labels may bias who selects into a sample of sexual minority people. Thus, comparing distinct sampling approaches also requires attention to intended sample frames, but also other recruitment or inclusion criteria for a study such as sex and gender, age, race and ethnicity, or location.

Current Study

We compare the sample characteristics of participants from two companion studies, each designed to capture the same demographic profile of U.S. sexual minority adults. One sample was recruited for the first national probability survey of U.S. sexual minority adults. The other sample came from the screener survey that was collected to identify a community sample from four U.S. regions. Recruitment for the screener survey used a venue-based targeted nonprobability approach (Frost et al., 2018). Given known differences among sexual minorities in sociodemographic characteristics, for each sample we examine whether sociodemographic characteristics varied based on sexual identity.

Methods

Study design and recruitment

This study uses data from the *Generations Study (*www.generations-study.com), designed to examine identity, stress, health outcomes, and health services utilization in three generations

of sexual minority adults who came of age during different historical contexts. Two samples were collected, referred to as the national *probability* and the *community* screener samples. Eligibility criteria for both the *probability* and *community* samples included (a) identification with a sexual minority identity label (e.g., gay, lesbian, bisexual, queer); (b) reported ages 18–25, 34–41, or 52–59 at the time of recruitment[1]; (c) residence in the United States between ages 6–13 (to most closely capture those who "came of age" during the historical contexts defining each cohort); and (d) completion of at least a 6th grade education. The study was reviewed and approved by the UCLA Office of the Human Research Protection Program. The combined final analytic sample included 2,637 participants: 1,507 from the probability sample and 1,130 from the community sample.

Probability sample.—The probability sample was drawn using a dual-frame sampling procedure. First, Gallup, Inc., a survey research consulting company (http://www.gallup.com/), administered a telephone interview (both landline and cell phone) to a daily national probability sample of 1,000 adults ages 18 and older between March 2016 and March 2018. At the end of the telephone interview, participants were assessed for preliminary eligibility for the *Generations* survey with the following question: "I have one final question we are asking only for statistical purposes. Do you, personally, identify as lesbian, gay, bisexual, or transgender?" In total, 366,644 respondents were screened, 3.5% of which identified as LGBT. Those responding affirmatively were subsequently screened for *Generations* study enrollment criteria.

In addition to the criteria for enrollment described above, enrollment in the *Generations Study* survey was limited in two other ways. First, enrollment was limited to participants who identified as a member of one of three racial/ethnic groups: White or Caucasian, Black or African American, or Latinx. Analysis of racial and ethnic diversity among sexual minorities was a focal goal of the *Generations Study*. Preliminary estimates from Gallup indicated that in collecting the national sample there would be only sufficient numbers of the three racial/ethnic groups of sexual minority people to permit statistical analyses. Second, enrollment was limited to respondents who identified as sexual minorities. Respondents who identified as transgender in response to the Gallup preliminary eligibility question, regardless of their sexual identity, were screened for participation in a sibling study, *TransPop* (http://www.transpop.org).

Based on these criteria, 27.5% met eligibility, and in total, 1,518 eligible participants completed the *Generations* survey; 11 respondents were removed from analysis because they identified with a non-heterosexual identity label at the time of the initial telephone interview but subsequently identified as heterosexual on the survey (analytic n=1,507). All respondents from the *probability sample* were compensated with a $25 Amazon gift card or cash. A comprehensive description of the study design and recruitment method are

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[1]Age parameters for each cohort were established based on when respondents experienced specific LGBT-related historical events (e.g., Stonewall uprising, discovery of AIDS, legalization of same-sex marriage) in the course of their development (e.g., puberty, early adulthood). For example, the oldest cohort experienced early adulthood in the post-Stonewall era of heightened visibility and collective identity mobilization for LGBT people. By contrast, the middle cohort experienced early adulthood with the emergence of the internet as a new tool for social interaction, and the younger cohort experienced early adulthood with the legalization of same-sex marriage and the rising visibility of sexual and gender diversity. For more details about the definition of cohorts, see Frost et al. (2019).

published elsewhere (Krueger, Lin, Kittle, & Meyer, 2020; Meyer, Marken, Russell, Frost, & Wilson, 2020).

Community sample.—Between April 2015 and April 2016, sexual minority participants were recruited from four U.S. metropolitan areas (New York City Metro area, San Francisco Bay area, Tucson, AZ area, and Austin, TX area) to be considered for selection into an interview study (Frost et al., 2019). A targeted nonprobability sampling strategy was used to recruit participants who would represent the diverse lived experiences of sexual minorities (Meyer et al., 2008; Watters & Biernacki, 1989). Venues frequented by sexual minority individuals across multiple communities and platforms were identified by researchers at each of the four study sites, including but not limited to bars and clubs, coffee shops and restaurants, churches, and parks and outdoor spaces. Online venues were also used (e.g., Facebook, Craigslist, local list servs) to reach individuals who might not attend physical venues, and study advertisements were placed on websites and social media platforms (e.g., Facebook). Recruitment was avoided from venues which, by design, over-represent individuals with mental health problems (e.g., mental health service providers, 12-step programs). For detailed information related to the recruitment method, refer to Frost et al. (2018). Interested respondents were directed to a brief online screening survey which was used to assess eligibility. In total, 3,407 screener surveys were completed. However, in order to compare the two samples for the current study, the community sample was limited to respondents matching the same eligibility criteria as for the probability sample (n=1,130). Participants were not compensated for participation in the community sample screener survey (those who were selected for participation in the interview study were compensated for participation in that study).

Study Variables

For the current study, parallel measures were developed for each sample to allow analysis in a combined, merged datafile.

Sexual identity.—In the probability sample, respondents were asked "Which of the following best describes your current sexual orientation (straight/heterosexual, lesbian, gay, bisexual, queer, same-gender loving, other)?" In the community sample, respondents were asked "do you think of yourself as…? (straight or heterosexual, gay or lesbian, bisexual, other)." Respondents who identified as straight/heterosexual were excluded (n=11 in the probability sample, n=16 in community sample). Respondents who selected "other" (n=70 in the probability sample; n=191 in the community sample) were asked to write-in their preferred label. Using an inductive approach similar to that in Russell et al., (2009), write-in responses that closely matched existing response options (e.g., "gay," "lesbian") were re-categorized as such. Next, new categories were created for commonly endorsed write-in responses: "pansexual" in the probability sample, and "queer" and "pansexual" in the community sample. The remaining write-in responses were coded as "other" due to low frequency of endorsement (e.g., "fluid," "asexual"). Respondents who identified as "same-gender loving" (n=25) in the probability sample, a response option not available to respondents in the community sample, were combined with "other" category. The result was

a combined measure with five response categories: two "traditional" identities (gay/lesbian, bisexual) and three "newer" (or newly-reclaimed) identities (queer, pansexual, other).

Birth sex was assessed with the same question for each sample, "What sex were you assigned at birth, on your original birth certificate?" Response options were "female" and "male."

Gender identity included three response categories: woman, man, genderqueer/non-binary. In the probability sample, respondents were asked, "If you had to choose only one of the following terms, which best describes your current gender identity?" (woman, man, non-binary/genderqueer). In the community sample, respondents were asked "what is your current gender identity?" (male, female, trans male/trans man, trans female/trans woman, genderqueer/gender non-conforming, a different identity [please specify]). Fifty-eight community sample respondents provided a write-in response. Using an inductive approach as described for sexual identity, write-in responses were first categorized into existing categories when appropriate (e.g., "ciswoman" was coded as "woman"). Next, "non-binary" was recoded as "genderqueer/gender non-conforming." All remaining responses were excluded from analysis (n=12), as no equivalent response options were available in the probability survey. Because transgender respondents were excluded at screening from the probability sample, and since the community sample was limited to respondents meeting the same eligibility criteria, there were no transgender respondents (n=13 transgender respondents were excluded from the community sample who otherwise met inclusion criteria).

Education was assessed with the question: "What is the highest level of school you have completed or the highest degree you have received?" In the probability sample, response options ranged from "less than high school diploma" to "post graduate work or degree." In the community sample, response options ranged from "less than 5th grade (or no schooling)" to "postgraduate or professional degree, including master's, doctoral, medical, or law degree (e.g., MA, MS, PhD, MD, JD)." The combined variable had five response categories: less than high school, high school, some college, college, more than college.

Race/ethnicity.—In the probability sample, race and ethnicity were assessed by Gallup in the initial interview with two questions: "Which of the following describes your race?" (White, Black or African American, Asian, American Indian or Alaska Native, Native Hawaiian or Pacific Islander) and "Are you of Hispanic, Latino, or Spanish origin – such as Mexican, Puerto Rican, Cuban, or other Spanish origin?" (yes, no). In the community sample, race/ethnicity was assessed with one question: "How do you identify your race or ethnicity?" (American Indian or Alaska Native, Asian/Pacific Islander, Black/African American, Hispanic/Latino, White, Other). Those who provided an "other" response were asked to write-in their race/ethnicity, and responses that closely matched an existing option (e.g., "White") were re-categorized as such. In both samples, respondents may have selected multiple races/ethnicities. However, prior to enrollment into the study, probability sample respondents were categorized into single race/ethnicity groups using the following criteria. First, those who selected Hispanic/Latino ethnicity or race were categorized as Latino, regardless of other races selected. Second, those who selected Black were categorized as

Black, regardless of other races endorsed (except if they had selected Latino/Hispanic). Third, remaining respondents who selected White were categorized as such. A combined variable was created with three mutually exclusive response categories: Black, Latinx, or White. For the comparative analytic purposes for the current study, respondents from the community sample were also categorized in this way.

Age.—In the probability sample, respondents were asked, "In what year were you born?" Age was calculated by subtracting the year a respondent completed the survey (2016–2018) by the year in which they were born. In the community sample, respondents were asked "what is your birthday? (mm/dd/yyyy)." Age in years was calculated on the date the survey was completed. Inclusion was restricted to those in eligible age ranges for the *Generations Study*, and three age-cohort groups were included: younger (18–25), middle (34–41), and older (52–59).

Urbanicity was assessed using the Rural/Urban Commuting Area (RUCA) classification system (USDA, 2013) based on respondents' zip codes of home addresses. Using established USDA cutoffs, RUCA scores less than 4 were categorized as urban, while RUCA scores of 4 or greater were categorized as non-urban. In total, 22 respondents from the probability sample, and 6 from the community sample were missing a RUCA score, due either to missing zip code data, or because zip codes were reported which did not have matching RUCA codes.

Recruitment characteristics.—For **geographic variation**, participants in the probability sample were assigned to 1 of 4 Census regions, based upon their zip code: Northeast, Midwest, South, West. Participants in the community sample were recruited from within an 80-mile radius of each of four metropolitan areas (Austin, TX; New York, NY; San Francisco, CA; and Tucson, AZ). Surveys received from outside the radius of one of these four sites were excluded from analysis. **Recruitment source** was assessed in the community sample. Respondents who did not indicate a recruitment source were coded as "no sources listed."

Data analysis

Missing demographic data in the probability survey was imputed using Predictive Mean Matching by the *Generations* study team (Krueger et al., 2020). For all demographic variables, less than 2% of respondents had missing responses. With the exception of zip code, demographic information was required in the community sample screener, so no imputation was required.

Demographic characteristics were presented for each sample, and differences were assessed across the two samples as follows: frequencies obtained for each characteristic in the probability sample were used to estimate expected frequencies in the community sample. Expected frequencies were then compared to the obtained frequencies from the community sample, and differences were assessed using chi-square goodness of fit tests. Effect sizes of each comparison were estimated with Cohen's W statistic. The cutoffs used for interpreting the effect sizes were <0.3 (small), 0.3–0.5 (medium), and >0.5 (large) (Cohen, 1988). Next, demographic and recruitment differences were assessed across the three sexual identity

categories (lesbian/gay, bisexual, and "newer" [i.e., queer, pansexual, other]), separately for each sample (See Table S1 for comparisons across all five sexual identity groups, separately). For tests in which an overall difference was found, post hoc pairwise comparisons assessed differences between each of the subgroups. To account for the use of survey weights, design-adjusted F-tests assessed differences in the probability sample. Pearson chi-square tests assessed differences in the community sample.

Results

Table 1 presents sample characteristics of the two samples. Nearly half (46.9%) of respondents in the probability sample identified as gay/lesbian, and an additional 40.6% identified as bisexual. The remaining 12.5% identified with a newer identity label. In comparison, over half of respondents in the community sample identified as lesbian/gay (56.2%), and roughly one quarter (26.5%) identified as bisexual. The remaining 17.3% identified with a newer identity label. The distribution of sexual identities between the samples differed significantly ($\chi^2=117.56$, P<0.001), a moderate effect size difference (W=0.32). The samples did not differ significantly on the basis of birth sex, with 59.6% of the probability sample and 59.2% of the community sample being assigned female at birth ($\chi^2=0.06$, P >0.05, W=0.01). The samples were also similar in terms of gender identity, with 7.5% in the probability sample, and 9.7% in the community sample identifying as genderqueer/non-binary. Though the samples differed significantly ($\chi^2=9.99$, P<0.01), the effect size was small (W=0.09).

The samples differed significantly in terms of race ($\chi^2=24.75$, P<0.001): nearly two-thirds of respondents in the probability sample were White (62.3%), compared to 55.6% in the community sample, though the effect size was small (W=0.15). The two samples differed considerably in terms of education ($\chi^2=526.40$, P<0.001, W=0.68), with 41.8% in the probability sample having a high school education or less, compared to 12.7% in the community sample. Despite marked educational differences between the samples, both samples were similarly young, with 61.8% of the probability sample and 57.0% of the community sample being in the youngest cohort, respectively. This difference was significant ($\chi^2=11.14$, P<0.01) but the effect size was small (W=0.10). The majority of both samples lived in urban zip codes (85.4% in the probability sample vs. 97.1% in the community sample), though a greater proportion of respondents in the probability sample lived in non-urban zip codes ($\chi^2=123.79$, P<0.001, W=0.33).

Table 2 presents demographic and recruitment characteristics by sexual identity, separately for each sample; specific pairwise differences are highlighted below. In the probability sample, several demographic differences were found across sexual identity labels. Compared to gay/lesbian-identified respondents (39.0%), greater proportions of bisexual (76.8%) respondents and respondents using newer identity labels (80.9%) were assigned female at birth (F=84.81, P<0.001). Greater proportions of bisexual (74.6%) and newer identity respondents (49.9%) also identified as women, compared to gay/lesbian respondents (38.4%). Further, a greater proportion of respondents using a newer identity label (39.3%) identified as genderqueer/non-binary, compared to both gay/lesbian (2.4%) and bisexual (3.6%) respondents (F=88.88, P<0.001). Smaller proportions of bisexual respondents

completed college (17.1%), compared to gay/lesbian (31.9%) and respondents using newer identity labels (31.3%; F=5.20, P<0.001), and greater proportions of both bisexual respondents (73.1%) and those using newer identity labels (76.7%) were in the youngest cohort, compared to gay/lesbian respondents (48.0%, F=38.08, P<0.001). There were no significant differences between sexual identity groups within the probability sample in terms of race/ethnicity, urbanicity, or Census region.

There were also several demographic differences by sexual identity in the community sample, which largely mirrored those seen in the probability sample. Greater proportions of bisexual respondents (79.9%) and those using newer identity labels (81.6%) were assigned female at birth compared to gay/lesbian respondents (42.5%; χ^2=167.20, P<0.001). A greater proportion of respondents using newer identity labels also identified as genderqueer/ non-binary (30.6%), compared to gay/lesbian (4.7%) and bisexual (6.7%) respondents (χ^2=276.75%, P<0.001). While the community sample was more highly-educated than the probability sample overall, bisexual respondents similarly had lower educational attainment than other respondents, with 42.8% of bisexuals, 48.2% of lesbian/gay respondents, and 52.0% of respondents using a newer identity having completed college or more (χ^2=17.22, P<0.05). Similar to the probability sample, in the community sample, greater proportions of bisexual respondents (67.2%) and respondents using newer identity labels (65.8%) were in the youngest cohort, compared to gay/lesbian respondents (49.5%; χ^2=52.19, P<0.001). Although a greater proportion of respondents in the community sample lived in an urban zip code overall (χ^2=9.61, P<0.01), bisexual respondents were less likely (95.3%) than gay/ lesbian respondents (98.3%) and respondents using newer identities (99.0%) to live in an urban zip code. Finally, there were significant differences across groups by recruitment source (χ^2=33.88, P<0.05), with a greater proportion of bisexual respondents (35.1%) than lesbian/gay respondents (28.5%) having been recruited by website/listserv, and a greater proportion of those using newer identity labels having been recruited by social media (29.6%), compared to either lesbian/gay (19.8%) and bisexual (19.4%) respondents. There were no sexual identity differences by race/ethnicity or recruitment site.

Discussion

We compared demographic characteristics between two companion samples of sexual minority adults in the U.S. – one a national probability sample and one that used community-based recruitment. Although the community screener sample was not recruited with the intent of fully representing the national population of sexual minority adults, it was recruited with the intention of capturing a diversity of lived experiences (Frost et al., 2019). Generally, we found that the community-driven recruitment strategy yielded a sample that differs from the probability sample in small ways (in terms of effect sizes) across the sample design parameters: sex assigned at birth, age/cohort, and the three race/ethnic groups. This pattern of findings underscores the utility of community-based sampling methods for identifying sexual minority populations.

Recruiting community-based samples of sexual minority people

In prior studies that have compared community to general population-based samples of sexual minorities, those from community samples have tended to be older, employed, have higher incomes, and be more highly educated, as compared to respondents in population-based samples (Dodds et al., 2006; Drabble et al., 2018; Salway et al., 2019). Our results generally support some of these prior findings, with significant differences across most demographic characteristics. However, our results also provide additional insights. Like in the probability sample, birth sex, race/ethnicity, and age cohort were included in the sampling design of the community sample and despite statistically significant differences between the samples across these characteristics, the effect sizes were relatively small.

There were, however, marked differences between the samples across other characteristics, highlighting areas to consider when recruiting community samples of sexual minority adults. Notable differences were found across sexual identities. Roughly 35% more bisexuals were recruited in the probability sample, compared to the community sample (40.6% vs. 26.5%). Since the probability sample was weighted to the U.S. adult population of sexual minorities, this suggests that bisexuals were underrepresented in our community sample. This finding is consistent with a recent systematic review, which showed that bisexual-identified respondents tend to be underrepresented in community-based samples compared to general population surveys (Salway et al., 2019). It is possible that this difference was related to a selection bias in our community sampling strategy; prior research has shown that bisexual people feel less connection than gay and lesbian people to the LGB community, on average (Frost & Meyer, 2012), and so fewer members of this population may have been recruited from the sexual minority-specific spaces targeted for recruitment (e.g., LGBTQ book shops, Pride events). To capture a diverse array of lived experiences, future community-based recruitment efforts should consider targeted recruitment of bisexual, queer, and pansexual respondents. Successful recruitment from these populations may be challenging in more traditional, brick-and-mortar spaces (e.g., LGBTQ bars), and more luck may be found online. Indeed, over half of bisexual respondents (54.5%) and respondents using newer identity labels (62.8%) in our community sample reported that they were recruited on websites and social media – significantly more than gay/lesbian respondents (48.3%).

There were small racial/ethnic differences between the samples, with a greater proportion of White respondents in the probability sample, and a slightly greater proportion of Latinx participants in the community sample. Yet for both samples there were no significant racial/ethnic differences by sexual identity. There were also marked differences between the samples in terms of education, consistent with prior research (Drabble et al., 2018). Nearly twice as many respondents in the community sample as in the probably sample had a college degree or more. This highlights the education bias common among community-based samples, especially those conducted around universities. Results also showed lower reported levels of education for bisexuals relative to gay/lesbian people across both samples. Future community-based studies may consider making explicit efforts to seek participant diversity in education levels to offset the education bias – and the potential overrepresentation of lesbian/gay-identified respondents.

Perhaps not surprisingly, our probability sample was able to capture more urban/rural diversity than the community sample. This is largely due to the recruitment design of the community sample, for which data were collected within an 80-mile catchment of four cities. Given an established urban bias in much population research, relatively little is known about rural sexual minority populations (Leedy & Connolly, 2008), and future community-based recruitment efforts could specifically target rural sexual minority populations. While there were no sexual identity differences in urban/rural residence in the probability sample, there were significant identity-based differences found in the community sample, with bisexual respondents being more likely to live in non-urban settings than other groups. Together, this finding may suggest that in order to increase the proportion of bisexual respondents in community-based surveys, researchers should be more intentional about recruiting in non-urban spaces.

Measuring sexual identity on probability surveys

This study also offers important lessons for future research using probability samples. Large-scale, population-based studies that include measures of sexual identity often rely on measures that capture historically "traditional" sexual minority identities (e.g., lesbian, gay, or bisexual identities) (e.g., National Epidemiologic Survey on Alcohol and Related Conditions). However, research has shown that sexual minority identities span a great diversity of labels not captured by these standard measures (Horner, 2007; Morandini et al., 2017; Savin-Williams, 2005), and so measures typically used in probability-based sample surveys may fail to capture the full sexual minority population (Igartua, Thombs, Burgos, & Montoro, 2009; Vrangalova & Savin-Williams, 2012). Notably, 12.5% of respondents from the probability sample identified with a newer identity label, compared to 17.4% in the community sample. It is possible that the proportion in the probability sample is smaller than in the community sample because a subset of the queer and pansexual populations did not respond affirmatively to the initial Gallup interview question (which asked about LGBT identity). Further, appreciable proportions of both samples selected the "write-in" sexual identity option. While these response options present challenges for data cleaning and management, including such an option on population-based surveys may allow researchers to capture a greater diversity – and thus may elicit participation by a sample more representative – of sexual minorities, while also accounting for changes in the use of sexual identity labels over time.

Limitations

Respondents in the probability sample were invited to participate by interviewers at Gallup, while those recruited into the community sample were recruited across multiple venues, including by different recruiters. The sample composition and findings here cannot be distinguished from factors specific to the study recruitment. Further, there was a small amount of missingness for several demographic variables from the probability sample (less than 2% for all variables).

There are limitations with the measures of sociodemographic characteristics. Sexual orientation encompasses multiple domains (i.e., identity, attraction, and behaviors), yet, respondents were recruited on the basis of sexual identity for both surveys. Thus, people

who do not identify as sexual minorities (e.g., those who are heterosexual but same-sex attracted) were omitted, and therefore our study only pertains to sexual minority-identified adults. We also acknowledge that many people, especially non-monosexual people, use multiple labels to describe their sexual identities (Galupo, Mitchell, & Davis, 2015). Therefore, the discrete categorization of bisexual people and people who use newer labels may not capture the lived experiences of people who use bisexual, pansexual, and queer interchangeably or in different contexts. In addition, the "other" sexual identity category included a heterogeneous mix of responses (e.g., asexual, fluid). Low frequencies of endorsement precluded us from examining these "other" identities separately. Thus, we continue to know little about these groups of sexual minorities. Further, by design, our samples did not include transgender-identified respondents, but *did* include genderqueer/non-binary respondents. We acknowledge that genderqueer/non-binary is sometimes included under the larger transgender umbrella, and as such it is possible that our samples include some who might have identified as genderqueer/non-binary *plus* transgender, given the opportunity to select multiple options.

Finally, there are several important limitations with the reliance on three racial/ethnic categories. On one hand, this design choice was to allow development of a probability sample of LGB adults for which robust race/ethnic group comparisons could be made. Yet this measure by definition excludes groups (e.g., Asian American and Pacific Islander Americans; Native Americans) whose numbers are too few to allow statistical comparison, or they are hidden within one of the 3 primary groups which include some multi-racial respondents. (Indeed, 17.3% in the community sample and 8.5% in the probability sample reported multiple or "other" race/ethnicities beyond the single-race categories used in this study; however, in sensitivity analyses, results did not vary between models that included vs. excluded multirace and "other" race participants). Such an approach to racial/ethnic categorization is problematic for individual study participants who must decide "which box to check" (Eisenhower, Suyemoto, & Lucchese, 2014), and ultimately, the approach obscures complexity and diversity in racial and ethnic identities among sexual minorities. Such complexity and diversity deserves further attention in studies designed to explicitly explore the intersections of sexual, racial, and ethnic identities.

Conclusions

We compared companion probability and community samples of sexual minorities that were designed to identify the same intended population of sexual minority adults. Community samples have been criticized for lacking representativeness, but we found small differences between sexual minority people recruited into our community sample and those recruited into the probability sample across several sociodemographic characteristics (i.e., sex at birth, gender identity, race/ethnicity, age cohort). Future community-based surveys may consider study designs and recruitment strategies that explicitly seek to include variation across characteristics such as sexual identity, urbanicity, and education. Future probability-based surveys may consider including "write-in" answer choices for questions about sexual identity. Ultimately, our findings reveal that well-designed community-based sampling strategies continue to be an important approach for collecting data on the lives and wellbeing of sexual minority people.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Sociodemographic Characteristics, Generations Probability and Community Samples

	Probability Sample (N=1,507)		Community Sample (N=1,130)			
	N	Weighted %	N	%	Chi2	W
Sexual Identity					117.56***	0.32
Gay/Lesbian	833	46.9	635	56.2		
Bisexual	493	40.6	299	26.5		
Queer	88	5.8	114	10.1		
Pansexual	41	3.4	31	2.7		
Other	52	3.4	51	4.5		
Birth sex					0.06	0.01
Female	803	59.6	669	59.2		
Male	704	40.4	461	40.8		
Gender identity					9.99**	0.09
Woman	741	54.5	579	51.2		
Man	672	38.0	441	39.0		
Genderqueer/gender non-conforming/non-binary)	94	7.5	110	9.7		
Race/ethnicity					24.75***	0.15
Black	235	16.4	202	17.9		
Latinx	295	21.2	300	26.6		
White	977	62.3	628	55.6		
Education					526.40***	0.68
Less than HS	31	5.2	13	1.2		
High School	269	36.6	131	11.6		
Some College	492	32.3	450	39.8		
College	427	16.1	263	23.3		
>College	288	9.7	273	24.2		
Generational cohort					11.14**	0.10
18–25	664	61.8	644	57.0		
34–41	369	20.7	262	23.2		
52–59	474	17.5	224	19.8		
Urbanicity					123.79***	0.33
Not urban	180	12.5	27	2.4		
Urban	1,305	85.4	1,097	97.1		
Missing	22	2.2	6	0.5		

Cross-sample comparisons were computed using Chi-Square Goodness of Fit Tests and Effect Sizes were computed using Cohen's W Statistic.

***
p<0.001;

**
p<0.01;

*
p<0.05.

Table 2.

Sociodemographic and Recruitment Differences by Sexual Identity, Generations Probability and Community Samples

N (Weighted % (probability sample), % (community sample))	Probability Sample (N=1,507)				Community Sample (N=1,130)			
	Gay/ Lesbian 833 (46.9%)	Bisexual 493 (40.6%)	Queer, Pansexual, Other 181 (12.5%)	*Design-Adjusted F*	Gay/ Lesbian 635 (56.2%)	Bisexual 299 (26.5%)	Queer, Pansexual, Other 196 (17.4%)	*Chi2*
Birth sex, %				84.81 ***				167.20 ***
Female	39.0*b,c*	76.8*a*	80.9*a*		42.5*b,c*	79.9*a*	81.6*a*	
Male	61.0	23.3	19.1		57.5	20.1	18.4	
Gender identity, %				88.88 ***				276.75 ***
Woman	38.4*b,c*	74.6*a,c*	49.9*a,b*		38.6*b,c*	74.6*a,c*	56.6*a,b*	
Man	59.2*b,c*	21.8*a,c*	10.8*a,b*		56.7*b,c*	18.7*a*	12.8*a*	
Genderqueer/gender non-conforming/non-binary)	2.4*c*	3.6*c*	39.3*a,b*		4.7*c*	6.7*c*	30.6*a,b*	
Race/ethnicity, %				0.67				4.24
Black	17.5	14.6	18.3		18.3	18.7	15.3	
Latinx	21.5	20.4	23.0		28.4	24.4	24.0	
White	61.0	65.1	58.7		53.4	56.9	60.7	
Education, %				5.20 ***				17.22 *
Less than FIS	4.7*c*	7.4*c*	0.0*a,b*		1.1	1.0	1.5	
High School	34.6	40.5	31.9		11.5*c*	15.1*c*	6.6*a,b*	
Some College	28.8*b*	35.1*a*	36.8		39.2	41.1	39.8	
College	18.5*b*	11.4*a,c*	22.3*b*		22.5	25.4	22.5	
>College	13.4*b,c*	5.7*a*	9.0*a*		25.7*b*	17.4*a,c*	29.6*b*	
Generational cohort				38.08 ***				52.19 ***
18–25	48.0*b,c*	73.1*a*	76.7*a*		49.5*b,c*	67.2*a*	65.8*a*	
34–41	22.2*c*	20.5	15.9*a*		23.8	20.4	25.5	
52–59	29.8*b,c*	6.4*a*	7.4*a*		26.8*b,c*	12.4*a*	8.7*a*	
Urbanicity, %				1.33				9.61 **
Not urban	12.4	14.3	8.6		1.7*b*	4.7*a,c*	1.0*b*	
Urban	87.6	85.7	91.4		98.3	95.3	99.0	
Census Region, %				1.81				
Northeast	18.2	19.9	20.0		-	-	-	
Midwest	17.7	22.0	21.6		-	-	-	
South	38.9	32.0	25.6		-	-	-	
West	25.2	26.1	32.8		-	-	-	
Site, %								3.53
Bay Area, CA	-	-	-		37.6	40.8	41.3	

N (Weighted % (probability sample), % (community sample))	Probability Sample (N=1,507)				Community Sample (N=1,130)			
	Gay/ Lesbian 833 (46.9%)	Bisexual 493 (40.6%)	Queer, Pansexual, Other 181 (12.5%)	*Design-Adjusted F*	Gay/ Lesbian 635 (56.2%)	Bisexual 299 (26.5%)	Queer, Pansexual, Other 196 (17.4%)	*Chi2*
New York, NY	-	-	-		34.0	32.8	29.1	
Tucson, AZ	-	-	-		14.0	14.7	16.3	
Austin. TX	-	-	-		14.3	11.7	13.3	
Recruitment Source, %								33.88 [*]
Website/listserv	-	-	-		28.5b	35.1a	33.2	
Social media	-	-	-		19.8c	19.4c	29.6a,b	
Group/organization	-	-	-		18.0	17.1	13.8	
Recruiter	-	-	-		8.5	6.7	9.2	
Coffee shop or bookstore	-	-	-		5.2	5.0	3.6	
Someone else who participated	-	-	-		3.9	3.3	4.6	
Bar or club	-	-	-		2.5b	0.0a	1.0	
Event	-	-	-		1.6	2.0	1.0	
Other	-	-	-		9.1c	9.0c	3.6a,b	
Multiple sources listed	-	-	-		1.9	1.3	0.5	
No sources listed	-	-	-		0.9c	1.0	0.0a	

Pearson chi-square tests assessed sociodemographic differences by sexual identity in the community sample. Design-adjusted F tests assessed sociodemographic differences by sexual identity in the probability sample to account for the weighted survey design.

[***] $p<0.001$;

[**] $p<0.01$;

[*] $p<0.05$. When an overall difference was found across sexual identity groups, post-hoc comparisons then assessed whether

[a] lesbian/gay,

[b] bisexual, and

[c] queer/pansexual/other respondents differed significantly from one another ($p < 0.05$), reported as subscripts.

For characteristics that were assessed across both samples, cross-sample comparisons tested whether identity groups differed across the two samples (e.g., lesbian/gay respondents were compared between the two samples). Effect Sizes were computed using Cohen's W Statistic. For education, all groups had "large" differences (W>0.50) across the two samples. For gay/lesbian respondents, there was a moderate difference in urbanicity (W=0.32). All other cross-sample comparisons had "small" (W<0.3) effect sizes.