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Counting households containing same-sex couples: an inclusive approach

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Abstract

Though societal acceptance of same-sex unions has grown, resulting in more inclusive government programs and policies and expanded legal protections, analysts remain uncertain about how to identify and enumerate same-sex households. Presently, the counts available of same-sex households in the United States oftentimes disagree. We show that the origins of these conflicting counts can be traced back to definitional and measurement issues in household surveys. In this study, we demonstrate how counts of same-sex households conflict, mislead, and undermine the goal of accurately representing the population of households with same-sex couples. By providing alternative approaches to counting household with same-sex couples we highlight the challenges in enumerating these households. We draw upon three federal household surveys to demonstrate the inconsistencies in the counts of same-sex households and to illustrate our methods. We argue that our proposed methods lead to more comprehensive and credible counts of households containing same-sex couples.

Keywords

same-sex households; household surveys; counting methods; part-year residents; household rosters; household relationship matrices

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Introduction

Societal acceptance of diverse types of households has appreciably grown. Blended, three- and skipped-generation, single-parent, and same-sex households represent some of today's diverse household structures. Arguably, among these various types of groups forming households, the group that has garnered the most recent attention and struggled for legal recognition are same-sex couples. Today, growing support for same-sex couples has resulted in numerous countries passing laws permitting same-sex marriage and expanding policies to ensure they have access to a range of public benefits and programs [1].

Accompanying progress in social recognition of same-sex couples have been advances in household surveys' methods for classifying and enumerating same-sex households. However, accurate classification and enumeration of same-sex households are far from complete. Despite new legal protections and growing societal acceptance, the counting of same-sex households in surveys remains fraught with methodological challenges, leading to questions about the accuracy of the counts.

There are justifiable reasons for measurement errors in counting same-sex households, some of which we summarised in the background section. But beyond the background section's synopsis of explanations, we offer two additional reasons why existing counts are misleading. We argue that inaccuracies in counting same-sex households in surveys stem in part from two issues. The first issue is operationalizing what is meant by a "same-sex household." Conventionally, statistical agencies categorise households based upon a survey roster that records the relationship of all household members to a "household reference person", or householder.[1] This convention has led to official reports that define and count a same-sex household as one in which only the "household reference person" or householder has a same-sex relationship [2]. Yet, same-sex relationships *within* a household are not restricted to the household reference person. Others in the household might be in a same-sex relationship, but that relationship would remain unidentified, thus uncounted and unrepresentative of the population deserving recognition. We advocate for a more inclusive definition. Our definition identifies and counts all same-sex relationships within a household and is not contingent on a traditional survey roster, keyed only to a "household reference person."

The second issue relates to the ability of surveys to capture changes in household composition over time and the implications for counting particular types of households. Even over short periods of time, households can gain or lose members, yet the practice of cross-sectional and longitudinal household surveys is to ask questions about household composition at the time of the interview only. If there were same-sex relationships over a reference period prior to the survey interview, these valid same-sex relationships are missed. Yet, data collected by cross-sectional and longitudinal surveys at the time of the household interview are frequently used to report estimates of same-sex households [3–5]. This study underscores the importance of understanding past relationships in the household over a reference period but that no longer exist at the time of the survey interview. Calculations based on relationship status *only* at the survey interview while ignoring the dynamics of past relationships among absent household members will mis-estimate counts of same-sex households. The solution to this second issue is to recover past relationships over the relevant reference period, record them, and incorporate this household composition information into the estimated counts. By comparing counts with and without accounting for departed household members' same-sex relationships over a reference period we provide evidence that this second issue does indeed matter.

We use three federal household surveys to demonstrate these complexities of counting households containing same-sex couples. The surveys are the Survey of Income and Program Participation (SIPP), the 2017 Annual Social and Economic Supplement Research File (ASEC), and the American Community Survey, (ACS).[2] We show that by leaving unidentified current same-sex couples that do not include the householder, (issue one), and by omitting same-sex couples that were previously in the household over the references period, (issue two), results in an undercount of households containing same-sex couples. We also demonstrate how counting methods help explain disparate counts of households with same-sex couples across these surveys. Without attention to the two issues we raise, the measurement of households containing same-sex couples is compromised. Measurement errors undermine the accuracy of the counts of households with same-sex couples, bias statistical portrayals of these households' characteristics, and impair policies promoting a level-playing field across all types of households.

Background

Two themes emerge from recent efforts to produce accurate national counts of same-sex households. First, the collection of household romantic relationship data have not been made in social or political vacuums.

Changing social norms and fluctuating political contexts affected whether same-sex households were identified and, even if those households were identified, how they were ultimately classified and reported. For example, one set of political interest groups achieved passage of the Defense of Marriage Act, (DOMA), in 1996, while another set successfully had the law struck down by the Supreme Court in 2013.

Because DOMA was a federal law, thus governing the data-gathering activities of all federal agencies, the Act slowed the pace of advances in survey methods for identifying and categorizing same-sex households and procedures for processing and editing data on same-sex relationships [7, 8]. The implications of DOMA for the Census Bureau meant that data it collected on marriages was strictly limited to only "a legal union between one man and one woman as husband and wife, and the word 'spouse' [referred] only to a person of the

[1] We now refer to the "household reference person" as the householder.

[2] The American Housing Survey, (AHS), began testing questions regarding households with same-sex couples in 2013 with the revised questionnaire fielded in 2015. The first release of data that allowed identification of households with same-sex couples did not occur until 2019. Unfortunately, the lag in adoption of the revised questionnaire by AHS does not permit generation of estimates for comparison across the years relevant to our study [6]. Also, we use these other surveys because a broader set of analysts use them and they support our arguments.

opposite sex who is a husband or a wife."[3] More broadly, all federal government data collection activities had to abide by this definition of marriage whenever applicable [9–12].

Besides shifting political landscapes, public opinion was reflecting greater social acceptance of same-sex marriage [1]. Even before the Supreme Court's 2015 landmark ruling that denying same-sex couples the right to marry was unconstitutional, public opinion across the United States was shifting. By 2010, same-sex marriage was legal in five states; another two states recognized same-sex marriages performed in other states; five more provided the equivalent of state-level spousal rights to same-sex couples; and lastly, four more states offered some degree of state-wide spousal rights to same-sex couples [13].

The second theme emerging is that advances in measuring household relationships came from innovative empirical analyses, survey design enhancements, in-depth surveys of cohabiting couples, and intensive interviews with same-sex couples. For example, starting in 2005, the ACS counted the number of same-sex households, allocating these households between couples reporting themselves as spouses or unmarried partners. But the counts of same-sex couples reporting themselves as spouses between 2005 and 2007 were too high (Gates 2009); the percentage of married same-sex couples among all same-sex couples ranged between 45% to 50%. Skepticism about the counts of married same-sex couples and further research led to improvements in processing and editing rules as well as format and layout of the 2008 ACS questionnaire [14]. The result was that while the 2008 ACS count of same-sex unmarried partners (414,787) was statistically no different from the 2007 count (412,770), the number of couples reporting themselves as same-sex spouses was markedly lower in 2008 (149,956) than in 2007 (340,848). Thus, researchers showed that improvements in data quality resulted in a marked reduction in same-sex households reporting as spouses: 27% of all same-sex couple households in 2008 compared to 45% in 2007 [14].

Besides analyses of the ACS, high counts of same-sex spousal households in the 2010 Census also motivated research studies. The cumulative effect of these studies that examined the 2010 Census has been to advance methodologies for accurately identifying same-sex households. O'Connell and colleagues explained why the 2010 Census count of same-sex spousal households, (349,000), was much higher than the 2010 ACS count, (152,000) using a combination of novel empirical approaches [15, 16]. One approach was to examine if the data gathered for the 2010 Census and 2010 ACS was affected by the mode of survey delivery and by phases of data collection [15]. Findings from this comparison led them to conclude that the mode of survey delivery and the phases of data collection did impact the final counts. The higher counts in the 2010 Census were largely due to the questionnaire format used to follow-up with households that had left uncompleted the original Census long-form questions on the household roster. Conversely, the 2010 ACS mode of survey delivery which included automated edits on the telephone and personal visit data collection phases greatly reduce same-sex couple over-reports. The second strategy O'Connell and colleagues used was to construct a statistical "names directory" that yielded the odds that the sex for a particular name had been incorrectly marked [15]. Findings from this strategy found that about 28% of the 2010 Census same-sex couple households resulted from mismarks, meaning couples were in all likelihood opposite-sex couples, not same-sex couples.

The measurement error that generated the high number of same-sex spousal households in the 2010 Census spurred other studies, too. Debunking the hypothesis that the higher number of same-sex spousal households in the 2010 Census was because more unmarried same-sex couples adopted the term husband/wife to describe their partners, a study of same-sex couples found agreement between how same-sex couples identified their relation- ship status on the Census form and the legal relationship status in their State of residence [17]. Nearly all individuals who had no legal relationship reported using unmarried partner on the census form, (97%), and only 16% of couples in civil unions or registered domestic partnerships selected husband/wife. Likewise, Lofquist's (2012) analyses of the 2010 ACS found substantial consistency between same-sex couples' responses to the household roster and marital status questions: couples who identified as unmarried partners reported themselves as something other than "now married," and couples who reported themselves as spouses reported being "now married" [18].

Qualitative research has lent further support to arguments that changes to household surveys were necessary to more accurately identify same-sex households [17, 18]. For example, focus group research highlighted the importance of identifying the legal status of the partner of the household head on the Census form. The same studies also reported that focus group members felt that survey questionnaires needed to be redesigned to attain more accurate counts of same-sex households [19]. Chief among recommendations was adding new categories to reflect other legal arrangements for same-sex couples, e.g., a civil unions, and that household rosters needed to reformat partnership lists to raise the visibility of the "unmarried partner" category [19].

These studies spurred development of two alternative relationship questionnaires for testing. Both versions of the questionnaires were tested in cognitive interviews conducted by the Census Bureau [20] and one of the versions was also tested by the National Center for Health Statistics [21]. Respondents in both studies reported that the questionnaire that best reflected their relationship to the householder was the version that clearly identified their legal partnership status with them. The redesigned questionnaire that followed explicitly added "spouse" to the "husband/wife" category; moved up the "unmarried partner" category to the second place in the list of relationships; and, delineated "same-sex" and "opposite-sex" qualifiers before the "husband/wife/spouse" and "unmarried partner" categories. The redesign reduced occurrences of different-sex couples misreporting sex because of automated instrument checks in the delineated spouse and partner categories [20].

The aforementioned research indicates progress has been made in the counting of same- sex households and helps explain how disparities in the counts occurred. Yet, we argue further improvements to counts are possible if several factors are taken into account. First, a change is made in conceptualizing what is meant by a "same-sex" household.

[3] For the specifications of the act, see http://thomas.loc.gov/cgi-bin/bdquery/z?d104:HR03396.

In this study, what we mean by a "same-sex household" is that a household *contains* one or more same-sex couple who may or may not head that household. Second, methods for counting households with same-sex couples are reconsidered and revised. We argue that more inclusive and realistic counts are generated when researchers study whether annual counts change after a full enumeration of all romantic relationships within households. The cited studies based refinements in counts of same-sex households on household members' relationships to the householder only. In other words, improvements in counts were based solely on expanding the traditional household roster. Third, when survey data are collected on a household's composition over a reference period, not just at the time of the survey interview, researchers can further ascertain whether counts at the time of the survey interview are consistent with counts taken over time. By using the 2017 ASEC and the finer-grained monthly data from the SIPP, we show how these subtleties and additional counting refinements affect variations in counts.[4]

Data description

To investigate the range of estimates of households with same-sex couples that are possible to derive from alternative counting approaches, we used data from the first waves of the 2014 and 2018 panels of the SIPP and the 2017 ASEC Research File.[5] These two federal household surveys are the first to expand relationship categories to include same-sex married and unmarried partners [26], thereby addressing some of the measurement errors highlighted in the background section.

The SIPP is a rich source of information on short- to medium-term dynamics of household composition, employment, income, and public program participation. A redesign of the SIPP in early 2010s lengthened the reference period from a quarter-year to a full calendar year, accompanied by a new annual, rather than quarterly, interview schedule. Although the recall period was now longer, the SIPP was still mandated to deliver monthly measures of various socioeconomic factors and household composition. To accomplish this charge, the SIPP implemented recording household composition and relationships on a *monthly basis* [25, 27]. The redesign introduced a monthly household relationship matrix tied to an event history calendar. The monthly household relationship matrix was described by a set of questions that encoded an extensive range of relationship information among all members of a household. Included in the matrix are also relationships to individuals who were part-year residents of the household. These part-year residents who were *no longer* members at the time of the annual interview were called in the SIPP documentation as "Type 2 persons" [28], though other researchers preferred the label "part-year residents" [27, p.98].

[4]We did not analyze data collected from the ACS ourselves, because official counts of same-sex households have been published and thoroughly examined [22, 23].

[5]The housing surveys used share a common sampling frame of households. This sampling frame is based on the master address file, (MAF), maintained by the U.S. Census Bureau. Household samples for each survey are selected by stratified random selection to be representative of U.S. households [24, 25].

Calendar year 2013 was the Wave 1 reference period for the 2014 SIPP panel. For the 2018 panel, the first reference period was the 2017 calendar year. We chose Wave 1 from both panels to maximize sample sizes, avoid repeated observations of households, and preclude attrition bias. Our approach based on use of Wave 1 data permitted annual calendar year estimates that were conceptually the closest possible to the ACS and ASEC. The unweighted counts of households during Wave 1 that completed the survey are 29,685 and 26,215 for the 2014 and 2018 SIPP panels, respectively.

The ASEC is one of the most widely used data sources in the United States [24, 29]. Its popularity stems from timely annual releases, large sample sizes, questions about household composition, and a set of specific weights which allow for straightforward estimation procedures. The 2017 ASEC Research file was the first version of the ASEC data in the public domain to capitalize upon updated editing routines of the relationship and demographic data [30–32]. For this study the inclusion of two pointer variables that link every respondent to a spouse or unmarried partner in the same household is important. While the pointers fully enumerate married and unmarried couples, the ASEC still lacks the data necessary for constructing a complete household relationship matrix. Nonetheless, the pointers permit calculating ASEC-based estimates that are conceptually equivalent to those from the SIPP panels. By leveraging the larger 2017 ASEC sample—69,957 households—we contrast findings from it with the SIPP and published counts from the 2013 and 2017 ACS [23].

Measurement methodology

Definitions and classification

Our unit of analysis is the household. We classify every household by the number of couples in that household as well as by their type—meaning whether the couples in the household are married or cohabiting and whether they are same- or opposite-sex couples. The household classification does not depend on whether the household head is necessarily part of a couple. First, we identify "zero-couple" households, denoted as category (1). Then, we partition households with couples into the following broad categories by marital or cohabiting status: (2) single-couple households, opposite-sex [married or cohabiting], (3) single-couple households, same-sex [married or cohabiting], (4) multi-couple households, only opposite-sex [all married, or all cohabiting, or mixture of the two], (5) multi-couple households, only same-sex [all married, or all cohabiting, or mixture of the two], and (6) multi-couple households, opposite- ***and*** same-sex [all married, or all cohabiting, or mixture of the two]. For further details and explanation see Appendix B.

Table 1 shows the weighted distribution according to our household classification scheme. Our classification scheme does not count multiple couples within a household as separate households. Rather, we identify the *number* of couples in a household and their type of relationship, i.e., married or cohabiting and same- or opposite-sex. As there are few households containing two or more couples, (about 1% of all households), we restrict our analyses to one-couple households

Table 1: Estimated counts of households by number of couples and couple type

	(1)	(2)		(3)	(4)		(5)		(6)	
	Number of	Households			Opposite-sex[a]		Same-sex[a]		Both[b]	
	Couples	Count	%		Count	%	Count	%	Count	%
2014 SIPP	0	56,264,995	44.8		—		—		—	
	1	68,209,944	54.3	Married	59,207,248	87.9	214,924	25.9		
				Unmarried	8172238	12.1	615534	74.1		
	2+	1,236,362	1	Married	757,852	62.4			9,416	43.1
				Unmarried	74838	6.2			3306	15.1
				Both[c]	381813	31.4			9137	41.8
2018 SIPP	0	57,318,294	44.4		—		—		—	
	1	70,591,356	54.6	Married	60,160,444	86.5	571,968	53.2		
				Unmarried	9356725	13.5	502219	46.8		
	2+	1,309,203	1	Married	878,141	68.5			1,506	5.4
				Unmarried	58266	4.5			5053	18
				Both[c]	344775	26.9			21462	76.6
2017 ASEC	0	55,421,331	43.9		—		—		—	
	1	69,640,694	55.2	Married	61,495,017	89.7	450,519	40.9		
				Unmarried	7044022	10.3	651136	59.1		
	2+	1,098,079	0.9	Married	802,584	75.6			11,315	31.2
				Unmarried	51058	4.8				
				Both[c]	208155	19.6			24968	68.8

Sources: 2014 and 2018 SIPP Panels, Wave 1; 2017 ASEC Research File.
Notes: 'a'—household contains couple(s) of this type only (e.g., opposite-sex couple(s) only); 'b'—household contains both opposite- and same-sex couples (multi-couple households); 'c'—household contains both married and unmarried couples (multi-couple households). Sample sizes: 2014 SIPP—29,611; 2018 SIPP—26,153; 2017 ASEC—69,733. See Table A.1 for the lower and upper bounds at the 95% confidence level. Standard errors are available upon request.

where that couple is either same-sex married or same-sex cohabiting.

Counting methods

We now describe the counting methods used. In the SIPP and ASEC, the household roster and the household relationship matrix were designed to provide different approaches for enumerating and characterizing household composition. Only the household roster is included in the ACS. Below we summarize how these approaches depict the complexity of households, and then describe how they generate divergent counts of households with same-sex couples.

The ACS, ASEC and SIPP all compile a household roster that enumerates every member of a household and relates that member to a householder [25, 29, 33]. The surveys define a householder as the individual who owns the dwelling or signed a rental agreement. Relationship information is captured by encoding each person's relationship to the householder. From these relationship data, classifications for households are created.

Essentially, the household roster approach predicates household classification on the relationship between household members and the householder. The SIPP in 2014 and ASEC in 2017 updated their survey instruments to better capture same-sex couples. Now, respondents can choose among 20 categories, including opposite- or same-sex and married or unmarried partner of the householder. To enumerate same-sex couples under the household roster approach, we locate all households in the SIPP and ASEC where the householder and another member report they share a same-sex relationship.

In contrast to the SIPP and 2017 ASEC, the ACS prior to 2019 offered a more limited set of relationship categories. The relevant categories then were husband/wife or unmarried partner of the householder [2, 33]. Faced with fewer categories, analysts had to perform additional steps to compare the sex of the householder and reported partner to confirm whether their relationship was opposite- or same-sex. Still, like determinations made in the SIPP and ASEC, the householder remains the pivotal person for classifying household relationships. We refer to the household roster approach for counting same-sex couples as the household roster only method, or "HR only".

We demonstrate that the "HR only" method leads to undercounts of households with same- or opposite-sex couples whenever neither of the two romantic partners is the householder. The emphasis placed on relating household members to the person responsible for the dwelling will downwardly bias counts of relationships within the household. For example, we predict that the "HR only" method will undercount cohabiting couples because these romantic unions are more likely to be short-term and less likely to head households [34].

Deficiencies in the "HR only" method can be overcome, however, by employing additional questions aiming to enumerate *all* spousal and cohabiting relationships within a household. The ASEC questionnaire design overcomes limitations of the household roster by providing the pointers

that allow matching all married and unmarried partners [29]. The SIPP goes beyond pointers and encodes relationships between any two members of a household. Every relationship is identified using the same set of detailed categories as those in the SIPP's household roster. Thus, the SIPP provides a complete constellation of relationships characterizing households at a point in time and over time. We refer to this rectangular array portraying household relationships as household relationship matrix, (HRM). The matrix allows us to distinguish and extract same-sex married and unmarried couples without further data manipulations. We refer to the household relationship matrix approach for counting same-sex couples as the "HRM only" method.

Instead of administering a set of questions that can produce a HRM, the ASEC contains questions that only link romantic partners. These questions create the important pointer variables. Conceptually, the pointer variables yield an incomplete household relationship matrix. But because there is *no* missing data on married and cohabiting relationships, we can construct methodologically equivalent "HRM only" estimates from the ASEC, then compare those counts with the "HRM only" counts obtained from the SIPP.

The HRMs in the SIPP also capture relationships of part-year residents within the reference period, i.e., those referred to as "Type 2 persons." Their inclusion plays a pivotal role in counting households with same-sex couples. To reiterate, the SIPP redesign moved to an annual interview schedule. This longer recall period necessitated measures that could pro- vide data on "Type 2 persons" who exited the household prior to the annual survey interview [25].[6] Relationship measures for "Type 2 persons" enabled us to augment the "HR only" and "HRM only" counting methods. We refer to these augmented methods as "HR + Type 2 Persons" and "HRM + Type 2 Persons," respectively.

There is, however, a caveat when comparing the SIPP and ASEC counts from the HRM- based methods. In the SIPP, the HRM directly identifies relationships as opposite- or same-sex and married or unmarried. In contrast, the ASEC pointer variables only identify relationships as married or unmarried. Hence, in the ASEC the sex of respondents is necessary to determine whether the relationship is same- or opposite-sex. Relying on reported sex values, tied to mismarking errors [15, 16, 35], risks the accuracy of the counts which cannot be cross-validated. We follow other researchers who report statistics on households with same-sex couples, while knowledgeable of these ASEC constraints [36]. Finally, the ACS data omits questions that support the HRM-based methods. So, no relationship data beyond the conventional household roster is available in the ACS.

Sample reliability checks

Ensuring the most reliable sample of households with same-sex couples is essential. Prior research offers a roadmap for selecting a sample in which the sex and/or marital status of one or both partners is not in doubt [22]. Adjustments to our counts are based on the consistency and imputation checks recommended in past research and our own additional consistency checks since we can capitalized on the SIPP's richer data [22]. Gates excludes couples from his study if: (1) the sex or marital status of a partner or spouse is imputed; (2) spouses report different years of the current marriage; and (3) same-sex spouses report the year of marriage earlier than 2004 [22]. Our stricter consistency checks are fully described and tabulated in Appendix B.[7] Our final sample sizes for households were 29,611 and 26,153 for the 2014 and 2018 SIPP, respectively, and 69,733 for the 2017 ASEC. To these samples we apply the recommended household weights to derive nationally representative calendar year counts [25, 29].

Findings from alternative counting approaches

Counts of households with and without couples

Table 1 displays counts of households from the SIPP panels and the 2017 ASEC. Column 1 of the table shows that households are classified according to the number of couples in the household. Column 2 gives the initial distribution of households across three mutually exclusive categories: no couples, one couple only, and two or more couples. Then, we disaggregate those initial counts by relationship types in columns 3 through 6. Two facts, with implications for our study design, stand out from Table 1. First, all three surveys suggest that the proportion of households containing *no* couples was about 44 or 45 percent of all households by the mid-2010s; and second, only a minuscule proportion, about 1%, of households contain two or more couples. Naturally, both facts affected our final analytical sample.

Among households containing two or more opposite-sex couples, (column 4), approximately two-thirds or more are composed of married couples only, (62.4%, 68.5%, and 75.6% in the in the 2014 and 2018 SIPPs and the 2017 ASEC, respectively). In these same households, Table 1 shows that there are a sizable proportion of opposite-sex married and unmarried couples, (category "Both" in column 4), but these estimates vary substantially. Alternatively, less variability across surveys is found in households with two or more couples all of which are unmarried couples, (6.2%, 4.5%, and 4.8% in the 2014 and 2018 SIPPs and in the 2017 ASEC, respectively).

Turning to column 5, we found no households containing two or more couples where all would have been same-sex couples. This finding, we suspect, reflects small sample sizes across the three surveys rather than indicating that there are no such households. Finally, Table 1 suggests that there are extremely few households where there is a mixture of opposite- and same-sex couples (column 6).

The finding from all three household surveys that about 1% of households contain two or more couples justified our decision to limit the sample to households containing one same-sex couple only, see column 5. Including multi-couple households with a same-sex couple would only trivially increase counts without affecting proportions, and possibly take away from rather than advanced our primary aim of contributing to

[6] The Census Bureau aimed to ensure that the 2014 and 2018 SIPPs could still show how "Type 2 persons" affected the composition and economic profiles of households [25, 27].

[7] ASEC permits an analogous exercise, but the ACS data did not [22].

Table 2: Estimated counts of households with same-sex couples, by counting method and relationship type

	2014 SIPP		2018 SIPP		2017 ASEC		2013 ACS		2017 ACS	
	Count	%	Count	%	Count	%	Count	%	Count	%
HRM + Type 2 Persons	830,458		1,074,187		1,101,655					
Married	214,924	25.9	571,968	53.2	450,519	40.9				
Unmarried	615,534	74.1	502,219	46.8	651,136	59.1				
HRM only	787,315		975,220							
Married	210,217	26.7	543,518	55.7						
Unmarried	577,098	73.3	431,702	44.3						
HR + Type 2 Persons	816,502		1,042,295		1,063,465		726,600		935,229	
Married	214,924	26.3	560,145	53.7	441,943	41.6	251,695	34.6	555,492	59.4
Unmarried	601,578	73.7	482,150	46.3	621,522	58.4	474,905	65.4	379,737	40.6
HR only	781,579		953,456							
Married	210,217	26.9	531,695	55.8						
Unmarried	571,362	73.1	421,761	44.2						

Sources: 2014 and 2018 SIPP Panels, Wave 1; 2017 ASEC Research File; 2013 and 2017 ACS 1-year official estimates of same-sex couple households.
Notes: 'HR only'—Household roster only, 'HRM only'—Household relationship matrix only. Sample sizes: 2014 SIPP—181; 2018 SIPP—210; 2017 ASEC—611. See Table A.2 for the lower and upper bounds at the 95% confidence level. Standard errors are available upon request.

the measurement and counting of households with same-sex couples.

Counts by relationship type

Table 2 displays estimated counts by relationship type for the SIPP, ASEC, and ACS. The "HRM + Type 2 Persons" estimated 830,458 and 1,074,187 households containing same-sex couples for 2014 and 2018 SIPPs, respectively. For the 2017 calendar year, employing the "HRM + Type 2 Persons" counting method produced comparable SIPP count of households with same-sex couples to those reported by the 2017 ASEC. Arguably, a small difference in absolute terms of only 27,468 households, or a difference in percentage terms of 2.6% relative to the 2018 SIPP.

Counts of households in the first two columns of Table 2 imply a potential weakness in the SIPP for counting households with same-sex couples depending upon the counting method adopted. Estimated counts of 830,458 and 1,074,187 reflect a tally that combines the "HRM only" method with counts of "Type 2 persons". The ACS and ASEC are cross-sectional surveys aiming to measure household relationships at one point in time. Hence, there is no survey design rationale to ascertain who was in the household in prior months. As such, the 2013 and 2017 ACS and the ASEC have no conceptual counterparts to the "Type 2 persons" in the SIPP panels. The counts generated from the alternative "HRM only" method in Table 2 suggest that failing to include "Type 2 persons" to counts obtained from the "HRM only" method downwardly bias counts of households. Adopting just the "HRM only" method would disregard 43,143 and 98,967 households with a same-sex couple from the 2013 and 2017 SIPP counts. A similar pattern holds for the "HR only" and "HR + Type 2 Persons"—the differences are 34,923 and 88,839, respectively.

By ignoring those tens of thousands of households containing a same-sex couple from counts, both SIPP panels would underestimate the number of households, particularly when compared to the 2017 ASEC. The ACS published counts are considerably lower than the SIPP and 2017 ASEC counts. The difference stems from lower counts of households with unmarried same-sex couples. We can only surmise that editing and processing of the ACS data has influenced these counts, since these data collection and preparation occurred before the introduction of a new questionnaire design on relationships [2].

Another striking change apparent in Table 2 is the reversal in proportions of households that contain a married or cohabiting same-sex couple. In the intervening years between 2013 and 2017 both the SIPP and ACS surveys enumerated significantly more households with spouses. In 2013, the proportion of spouses in households with same-sex couples for the SIPP and ACS were 26.3% and 34.6%, respectively. By 2017, counts in both surveys had sizable changes. By that year, proportions of married couples in the SIPP and ACS had risen dramatically to 53.7% and 59.4%, respectively.

We used the Gallup survey to confirm the count of households with a married same-sex couple in the 2018 SIPP. That calculation was within a few thousand of our SIPP count [37, 38].[8] The proportion of spouses in the 2017 ASEC of 41.6% appears to contradict the SIPP and ACS' representation of households with a married same-sex couple. However, we believe there is an alternative interpretation for the lower and potentially misleading 2017 ASEC number.

[8]The final number, to the nearest thousand, is 577,000 which is remarkably close to the estimate of 571,968 in Table 2. Specifically half of the product of the following three terms: 251,400,193 (2017 U.S. population, ages 18 or older), 0.045 (proportion of LGBTQ+ in the general population according to Gallup [38], and 0.102) (proportion of the married to same-sex partner among the LGBTQ+ population [37]), yields an estimated count of 576,963 same-sex married couples.

Table 3: Estimated counts of households with same-sex couples, by counting method and sex

	2014 SIPP		2018 SIPP		2017 ASEC		2013 ACS		2017 ACS	
	Count	%	Count	%	Count	%	Count	%	Count	%
HRM + Type 2 Persons	830,458		1,074,187		1,101,655					
Male-to-male	325,491	39.2	550,926	51.3	484,646	44.0				
Female-to-female	504,967	60.8	523,261	48.7	617,009	56.0				
HRM only	787,315		975,220							
Male-to-male	321,164	40.8	521,897	53.5						
Female-to-female	466,151	59.2	453,323	46.5						
HR + Type 2 Persons	816,502		1,042,295		1,063,465		726,600		935,229	
Male-to-male	325,491	39.9	533,987	51.2	469,845	44.2	352,624	48.5	451,494	48.3
Female-to-female	491,011	60.1	508,308	48.8	593,620	55.8	373,976	51.5	483,735	51.7
HR only	781,579		953,456							
Male-to-male	321,164	41.1	511,924	53.7						
Female-to-female	460,415	58.9	441,532	46.3						

Sources: 2014 and 2018 SIPP Panels, Wave 1; 2017 ASEC Research File; 2013 and 2017 ACS 1-year official estimates of same-sex couple households.
Notes: 'HR only'—Household roster only, 'HRM only'—Household relationship matrix only. Sample sizes: 2014 SIPP—181; 2018 SIPP—210; 2017 ASEC—611. See Table A.3 for the lower and upper bounds at the 95% confidence level. Standard errors are available upon request.

The ASEC's lower proportion for married households with same-sex couples, 41.6% prob- ably reflects new demographic editing routines conducted by the Census Bureau [31, 32]. This estimate could be misleading because subsequent counts from the 2019 ASEC and ACS show well over 50% in the proportion of same-sex married couples. Thus, the SIPP counts accord with these latter estimates from the ASEC and ACS [23, 39]. (With respect to the demographic editing routines, in 2015 the Census Bureau revised the relationship to householder question. The adjustments to the editing process meant that data could identify households with same-sex married and unmarried partners.)

Notwithstanding controversy over the 2017 ASEC estimate, the counts lead us to hypothesize, similar to others that the substantial rise in households with same-sex spouses was due to the 2015 Supreme Court decision legalizing same-sex marriage [37].

Counts by reported sex

Turning to Table 3, a pattern consistently shown by the 2017 ASEC and by the one-year 2013 and 2017 ACS surveys is that there are more female-to-female same-sex couples in households than male-to-male same-sex couples in households. The ACS proportions of female-to-female same-sex couples are stable over time, 51% in 2013 and 52% in 2017. Likewise, across counting methods, the 2017 ASEC proportions of female-to-female same-sex couples remained consistent at 56%.

The stable demographic patterns exhibited in the two ACS surveys and 2017 ASEC held for the 2014 SIPP panel as well. Regardless of counting method, the proportion of female-to-female same-sex couples in 2014 SIPP remained stable in a narrow band between 59% to 61%. However, those 2014 SIPP percentages were nearly 9 points higher than the proportion found for the two ACS surveys. A 95% confidence interval for the counts of the 2014 SIPP includes counts from the two ACS surveys, (see Appendix A). Thus, we infer that estimated counts for the 2014 SIPP are the same, while the count for the 2017 ASEC differed statistically.

Yet by 2017, the proportions and counts of male-to-male and female-to-female same-sex couples in the SIPP had changed appreciably. As a result, those changes in counts and proportions caused the SIPP to deviate from the stable pattern in the two ACS surveys and 2017 ASEC. Reflecting our observation for the counts by relationship type, the inclusion of the "Type 2 persons" into the 2018 SIPP counts of households with a same-sex couple moderate SIPP's deviation from patterns observed in the ACS surveys and the 2017 ASEC. We discuss reasons for the remaining disparities in the 2017 counts by sex, even after the mitigating effect of "Type 2 persons" in the next section.[9]

Discussion and conclusions

Based on the overall counts of households containing a same-sex couple, we make two broad conclusions. First, more recent consistent numbers emerging from the surveys suggest there are more same-sex couples across households in the United States than previously inferred. Findings in Table 2 for "HR + Type 2 persons" confirm that there were at least one million households with same-sex couples in 2017. Yet, the more inclusive "HRM + Type 2 persons" counting method lead both the SIPP and ASEC to suggest an even higher count, closer to 1.1 million.

[9] Generating counts of same-sex spouses and unmarried partners by couples' reported sex were feasible, but we considered cell sizes too small to yield reliable estimates.

Our second broad conclusion is that the counts from these surveys have trended towards convergence. Several factors help explain this growing uniformity in survey counts. First, the rising uniformity in counts may reflect new-found confidence within the LGBTQ+ community about reporting their relationships due to the 2015 Supreme Court decision validating same-sex marriage. Second, their reporting occurs within the context of an American society growing acceptance of legalized same-sex unions. And third, questions across these surveys that ask about romantic unions reflect increasing conformity in questionnaire items. The 2017 ASEC, for example, implemented the same relationship categories as the 2018 SIPP. Essentially, both surveys count relationships similarly. The ACS followed suit starting in 2019 [2].

There are inconsistencies in the counts, however. Findings in Tables 2 and 3 show considerable variation in counts of households by the type of same-sex relationship and reported sex. Examining Table 2 for partnership type shows that spousal counts for the 2018 SIPP and 2017 ASEC are dissimilar for both counting methods that include Type 2 persons. The explanation for the difference in counts between the 2018 SIPP and 2017 ASEC is found in a Census Bureau technical report which demonstrated how the revised editing and processing routines impacted the estimated counts, including generating many fewer married same-sex couples and many more same-sex unmarried couples [31, 32]. We conclude that our estimated counts, which are closer to the 2017 ACS counts and corroborated by independent estimates from Gallup, (see footnote 8), are more representative of the number of married and unmarried same-sex couples within households.

There is another inconsistency in Table 2. The table shows that counts for unmarried partners in the 2018 SIPP and 2017 ACS diverge. We can only speculate on reasons for this difference. One possibility is happenstance: Hurricane Maria caused a rare cessation in data collection for the 2017 ACS in Florida and Texas [40]. These two states were among the three most populous states in 2017 with high LGBTQ+ population proportions [41, 42], thereby perhaps affecting national counts of same-sex couples across households. Or, the difference may stem from controls used to create survey weights. But then we should have observed similar divergences in other counts produced by the "HRM + Type 2 persons" method or in 2013, which we did not. For example, weighted numbers from the SIPP and ACS for 2017 for married households with same-sex couples are close.[10]

Another facet of the counts by relationship type is the striking reversal in the proportion of same-sex married and cohabiting couples. This reversal shown in Table 2 validates an earlier hypothesis that as same-sex couples gained social acceptance and legal rights, the proportion of married same-sex couples would rise [43]. There is speculation that in the future the proportion of same-sex married couples would converge to that of opposite-sex married couples [43]. Future research we believe using these household surveys will continue to show the convergence.

In Table 3 counts of households by sex display considerable fluctuation in 2017. In the 2018 SIPP for the "HR + Type 2 Persons" counting method, the male-to-male count is 533,987 and the ASEC equivalent is 469,845. Likewise, a comparison of the female-to-female count in the 2018 SIPP and the 2017 ACS count, again using the "HR + Type 2 Persons" method shows these counts noticeably differ. We suspect that these discrepancies result from an interaction between a methodological imperfection in the 2018 SIPP and an important underlying economic dynamic. The methodological imperfection we are referring to is the calibration of household weights in the 2018 SIPP. When we examined these weights, those for households with male-to-male couples were consistently larger compared to weights for households with female-to-female couples. The differential in household weights combined with wealth disparities by gender [44, 45]. We suspect that the interaction between survey weight differences and underlying economic disparities created the observed variability across surveys. Although counts vary, proportions of households by sex in the 2018 SIPP track closer to the 2017 ACS than do the same proportions in the 2017 ASEC.

The counting methods show that producing different estimates of the number of same-sex couples contained in households are possible. Depending upon method used, estimated numbers can vary substantially and predictably. The household roster method produces counts of households with same-sex couples that are consistently biased downward for both sex and relationship type. If only estimates are wanted of households *headed* by a same-sex couple then the household roster suffices. But, if an estimate of *all* households containing same-sex couples is sought, then the household relationship matrix method is required. Tables 2 and 3 show that counts of households with same-sex couples increase when the HRM method is adopted. This method is superior because married and cohabiting same-sex couples who are not householders, i.e., not household reference persons, are represented in counts.

Findings emphasize that if longitudinal data is used to produce cross-sectional estimates of households with same-sex couples—and for that matter any demographic group of households—that part-year residents, i.e., the SIPP's Type 2 persons, must be identifiable. Designers of longitudinal surveys should ensure that sufficient information on part-year residents is captured and their relationships with all household members are recorded. Without such information, counts of any demographic group's relationships are likely downwardly biased. Furthermore, inclusion of the part-year residents generates greater differentials *within* the counting methods, e.g., the "HR only" and "HR + Type 2 Persons" counting methods, relative to the differences *between* the HR- and HRM-based counting methods, e.g., "HR only" and "HRM only". This difference we reveal is a significant issue and it is function of the length of a reference period.

There are caveats to our study. We recognize this study does not address issues about measuring sexual orientation. Understanding a person's sexual identity and orientation and appreciating how that personal identification affects romantic partnering decisions is imperative. Research continues in this area [46–50]. While acknowledging that there is a connection between sexual orientation and the counting of same-sex couples within households, we are constrained by the available data. Indeed, research continues on the measurement of sexual orientation and the challenges of including such measures in

[10] Communications with the Census Bureau on the difference in total counts for 2017 provided no clarification.

household surveys [51]. Nevertheless, we show how there is still room for methodological improvements in the enumeration of households with same-sex couples.

Another limitation is the sample sizes of households with same-sex couples in the two SIPP panels. The weighted counts generated from the SIPP panels are sensitive to minor changes in sample selection decision rules. We took a conservative strategy in selecting our sample, building upon an earlier methodology [22] hence, we chose greater certainty in the accuracy of our final sample over more ambiguity embedded in a larger-sized sample. To that final sample of households, we applied the annual calendar survey weights recommended by the Census Bureau [25, 29].

Mindful of the limitations, this study challenges the currently published counts of "same- sex households." The alternative counts we report give pause to attaching a definitiveness to any given set of point estimates. Any one set of published counts of "same-sex households," we argue, should not gain in the public's eye an unwarranted exactitude or determinacy, especially given the issues we have highlighted. Therefore, we suggest that researchers take these steps: (1) identify households containing same-sex couples as oppose to identifying households headed by same-sex couples; (2) publish the range of possible counts using standard statistical conventions; (3) discuss the counts and ranges that have been reported from several household surveys; and, finally (4) list commonalities and differences among surveys. Moreover, the HRM method is recommended as the most inclusive for counting households with same-sex couples. Such best practices in our judgement are more informative while leaving room for debate about the counts and methods for improving them. Ultimately, a broader range of numbers and counting methods, comprehensible by the public, will better serve the LBGTQ+ community and promote a more inclusive, informed society.

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Statement of conflicts of interest

The authors have none to declare.

Ethics statement

This study did not require ethical approval because all data downloaded, analyzed, and archived is in the public domain and no human subjects were used in this study.

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Appendix A: 95% confidence intervals for the ASEC and SIPP Counts in Table 1, Table 2, and Table 3

Table A.1: Estimated lower and upper bounds at 95% confidence level for counts in Table 1

	(1)	(2)		(3)	(4)		(5)		(6)	
	Number of	Households			Opposite-sex[a]		Same-sex[a]		Both[b]	
	Couples	LB	UB		LB	UB	LB	UB	LB	UB
2014 SIPP	0	55,272,903	57,257,086		—	—	—	—	—	—
	1	67,607,497	68,812,391	Married	58,550,447	59,864,049	142,372	287,476		
				Unmarried	7,788,320	8,556,157	500,310	730,758		
	2+	1,085,461	1,387,262	Married	650,463	865,241			0	24,091
				Unmarried	40,770	108,907			0	7,663
				Both[c]	290,393	473,233			0	21,582
2018 SIPP	0	56,387,907	58,248,681		—	—	—	—	—	—
	1	69,986,175	71,196,536	Married	59,487,482	60,833,405	459,101	684,835		
				Unmarried	8,968,353	9,745,096	392,420	612,018		
	2+	1,154,260	1,464,146	Married	740,978	1,015,305			0	4,431
				Unmarried	23,880	92,652			0	11,989
				Both[c]	2,65,378	4,24,172			2,338	40,587
2017 ASEC	0	54,681,960	56,160,702		—	—	—	—	—	—
	1	69,141,176	70,140,212	Married	60,995,978	61,994,055	384,978	516,060		
				Unmarried	6,783,618	7,304,427	571,902	730,370		
	2+	994,523	1,201,635	Married	717,445	887,723			3,153	19,477
				Unmarried	30,338	71,777				
				Both[c]	163,477	252,833			12,113	37,823

Sources: 2014 and 2018 SIPP Panels, Wave 1; 2017 ASEC Research File.
Notes: 'a'—household contains couple(s) of this type only (e.g., opposite-sex couple(s) only); 'b'—household contains both opposite- and same-sex couples (multi-couple households); 'c'—household contains both married and unmarried couples (multi-couple households). Sample sizes: 2014 SIPP—29,611; 2018 SIPP—26,153; 2017 ASEC—69,733. See Table 1 for the point estimates. Standard errors and bounds are estimated using replicate weights. Standard errors are available upon request.

Table A.2: Estimated lower and upper bounds at 95% confidence level for counts in Table 2

	2014 SIPP		2018 SIPP		2017 ASEC	
	LB	UB	LB	UB	LB	UB
HRM + Type 2 Persons	696,229	964,687	921,406	1,226,969	998,307	1,205,003
Married	142,372	287,476	459,101	684,835	384,978	516,060
Unmarried	500,310	730,758	392,420	612,018	571,902	730,370
HRM only	659,361	915,269	824,090	1,126,350		
Married	136,850	283,585	430,196	656,841		
Unmarried	464,922	689,274	326,554	536,850		
HR + Type 2 Persons	684,975	948,028	891,890	1,192,700	962,018	1,164,911
Married	142,372	287,476	448,140	672,150	377,837	506,048
Unmarried	487,436	715,719	374,508	589,792	543,769	699,275
HR only	654,028	909,131	803,385	1,103,528		
Married	136,850	283,585	419,262	644,128		
Unmarried	459,729	682,995	316,987	526,536		

Sources: 2014 and 2018 SIPP Panels, Wave 1; 2017 ASEC Research File.
Notes: 'HR only'—Household roster only, 'HRM only'—Household relationship matrix only. See Table 2 for the point estimates. Standard errors and bounds are estimated using replicate weights. Standard errors are available upon request.

Table A.3: Estimated lower and upper bounds at 95% confidence level for counts in Table 3

	2014 SIPP		2018 SIPP		2017 ASEC	
	LB	UB	LB	UB	LB	UB
HRM + Type 2 Persons	696,229	964,687	921,406	1,226,969	998,307	1,205,003
Male-to-male	245,842	405,140	441,351	660,501	422,579	546,713
Female-to-female	398,612	611,322	421,933	624,590	537,468	696,549
HRM only	659,361	915,269	824,090	1,126,350		
Male-to-male	241,455	400,874	413,544	630,249		
Female-to-female	363,518	568,783	352,548	554,099		
HR + Type 2 Persons	684,975	948,028	891,890	1,192,700	962,018	1,164,911
Male-to-male	245,842	405,140	425,991	641,983	407,448	532,242
Female-to-female	385,797	596,224	406,198	610,417	516,473	670,767
HR only	654,028	909,131	803,385	1,103,528		
Male-to-male	241,455	400,874	404,018	619,830		
Female-to-female	358,172	562,658	340,243	542,821		

Sources: 2014 and 2018 SIPP Panels, Wave 1; 2017 ASEC Research File.
Notes: 'HR only'—Household roster only, 'HRM only'—Household relationship matrix only. See Table 3 for the point estimates. Standard errors and bounds are estimated using replicate weights. Standard errors are available upon request.

Appendix B: Household classification and sample selection criteria

In Table B.1 we specify our household classification scheme. Fourteen detailed categories partition all households into mutually exclusive groups, leaving no household unclassified. The categories are self-explanatory with a possible exception in the case of the last one— opposite- and same-sex, married and unmarried. This is a residual category for households with two or more couples. The prototypical household in this category contains an older opposite-sex married couple and a younger same-sex cohabiting couple, whose one partner is an adult child of the older couple. The key for this category is the simultaneous presence of married and unmarried as well as opposite- and same-sex couples.

As the table shows, the scheme builds on two basic characteristics of household composition: number of couples in household and their types (married or unmarried and opposite- or same-sex). At any point in time these two characteristics assign a given household to exactly one category, thus strictly precluding the possibility of double- or under-counting. In the case of the longitudinal SIPP panels, we classify the households in every month of the reference period. A small number of households—802 in the 2014 SIPP and 680 in the 2018 SIPP—migrate from one classification category to another. We handle these cases by prorating their household calendar weight in proportion to the number months they are assigned to the relevant categories.

We take considerable effort to rigorously cross-check and validate data relating to couples and households. After identification of all couples, we ensure that both partners report the same type of relationship and list each other as their respective partners. Next, we exclude couples from the sample in the following cases: (1) couples which are constituted by a respondent who claims more than one partner simultaneously; (2) sex reported by each partner is inconsistent with the reported type of relationship ; (3) couples with statistically imputed marital status (we retain couples with logically imputed marital status); (4) same-sex married couples claiming marriage prior to 2004, (when the state of Massachusetts granted the right to marry to same-sex couples); (5) either partner is under 18 years of age.

Since the 2017 ASEC Research file was an experimental data, variables with imputation information were omitted from the public release. Unlike the SIPP, it also did not ascertain the year of marriage for those currently married.

Table B.1: Classification scheme of households by number couples and their type

Number of couples	Marital status and sex		
0	No couple	—	—
1	Opposite-sex, married	Same-sex, married	
	Opposite-sex, unmarried	Same-sex, unmarried	
2+	Opposite-sex, married only	Same-sex, married only	Opposite- & same-sex, married only
	Opposite-sex, unmarried only	Same-sex, unmarried only	Opposite- & same-sex, unmarried only
	Opposite-sex, married & unmarried	Same-sex, married & unmarried	Opposite- & same-sex, married & unmarried

Table B.2: Sample counts of couples and households after exclusion

Panel A: Couples

	2014 SIPP		2014 SIPP		2017 ASEC	
	Opposite-sex	**Same-sex**	**Opposite-sex**	**Same-sex**	**Opposite-sex**	**Same-sex**
Initial count	14,426	206	14,759	239	41,022	634
Shared partner	38	2	2	4	—	—
Inconsistent sex	10	2	—	—	—	—
Imputed sex	3	2	—	4	—	—
Imputed marital status	1	—	1	—	—	—
Marriage before 2004	—	10	—	12	—	—
Age below 18	15	2	9	1	27	2
Valid couples	16,359	188	17,747	218	40,995	632
Valid couples in one-couple households		181		210		611

Panel B: Households

	2014 SIPP	**2018 SIPP**	**2017 ASEC**
Initial count	29,685	26,215	69,957
With invalid couples	51	20	20
Missing replicate weight	23	42	—
Non-civilian household/group quarters	—	—	204
Valid households	29,611	26,153	69,733

Sources: 2014 and 2018 SIPP Panels, Wave 1; 2017 ASEC Research File.
Notes: Full discussion of these numbers can be found in Appendix B.

For a summary of the cases excluded from our analyses see panel A in Table B.2. The households containing invalid couples are excluded from the household sample. Further, missing replicate weights in the SIPP files resulted in elimination of another 65 households. Likewise, we exclude 204 households in the ASEC file that lived in either group quarters or identified by the Census Bureau as non-civilian households. The final household sample counts are displayed in panel B of Table B.2.