Changes in the Distribution of Sex Partners in the United States: 2002 to 2011–2013

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Abstract

Objective: The purpose of the current analysis is to examine subgroup differences in the distribution of opposite-sex sex partners in the United States across an approximate 10-year period to identify patterns that may inform sexually transmitted infection research and prevention.

Methods: Data were drawn from the 2002 and 2011–2013 National Survey of Family Growth, a US probability-based household survey focusing on sexual and reproductive health. The measures included in this analysis were lifetime opposite-sex sex partners and opposite-sex sex partners in the past year. Analyses were conducted separately for men and women. All analyses were conducted in R and R-studio with the "survey" package, focusing on medians, the 80th, and 95th quartile.

Results: In 2002, there were significant differences between men and women in median number of lifetime sex partners with men reporting more lifetime partners. However, in the 2011–2013 data, these differences are no longer significant. Still, the findings suggest that the top 20% and top 5% of men are reporting significantly more lifetime partners than their female counterparts. In comparison, partners in the past year remain relatively unchanged for both men and women.

Conclusions: These findings suggest that there were important changes in the distribution of sex partners between 2002 and 2011–2013 that have implications for sexually transmitted infection prevention. Median lifetime partners are no longer different for women and men: however, the distribution of lifetime partners among men is becoming even more skewed.

The distribution of number of sex partners in a population is an important determinant of sexually transmitted infection (STI) risk. For instance, heterogeneity in the number of sex partners has been identified as a factor in STI transmission within a population.[1] The shape of the distribution of number of sex partners as well as the average numbers of sex partners may change over time as a result of age, period, or birth cohort effects. Moreover, one

point in time analyses of number of sex partner distributions may mask intercohort changes in this parameter. Recent analyses have suggested that over the past 4 decades distribution of number of sex partners and other sexual behavior and sexual attitude parameters have undergone intercohort changes in some countries. Analyses of data collected through the National Surveys of Sexual Attitudes and Lifestyles (Natsal) have shown increases in some sexual behaviors (eg, oral and anal sex) in Britain over time,[2] particularly among women who also reported increases in same-sex sexual activity. Data collected for the National Health and Nutrition Examination Survey in the United States have also suggested inter-cohort changes in the sexual behaviors of the United States population.[3] It has been argued that the observed changes may indicate a convergence between the behaviors of the general population and those of core groups.[4]

In a recent study of US adults based on the nationally representative General Social Survey, those surveyed in 2000–2012 had more sex partners, were more likely to have had sex with a casual sex partner, and were more accepting of most nonmarital sex than those surveyed in the 1970s and 1980s. Further analysis separating effects of period, generation (birth cohort) and age showed that the trend toward greater sexual permissiveness was primarily due to cohort effects.[5] Acceptance of nonmarital sex rose steadily between those born between 1901 and 1924 and baby boomers (born 1946–1964); dipped slightly among early Generation Xers (born 1965–1981), and then rose again such that millennials (born 1982–1999) were the most accepting of nonmarital sex. Number of lifetime sex partners since age 18 years increased steadily between those born 1901 to 1924 and 1960s-born Generation Xers, and then declined among millennials to return to baby boomer levels. An examination of raw number of sex partners found that generation accounted for more variance than period. The median number of lifetime partners was 1 for those born in the 1910s to 1920s, 2 for the 1930s cohort, 3 for the 1940s, 4 for the 1950s to 1960s, and then back to 3 for those born in the 1970s to 1990s. Generational shifts in attitudes and behavior were larger for men and for blacks, as compared with women and whites, respectively. In another examination of the same data,[6] some of the cohort replacement effect—older cohorts being replaced with younger cohorts—related to attitudes toward premarital sex was found to be due to differences in rates of religious service attendance and educational attainment.

The purpose of this study is to extend previous research and examine changes in the distribution of sex partners between the 2002 and 2011–2013 National Survey of Family Growth (NSFG) to identify patterns that may impact STI risk. We examined the median, top 20%, and top 5% of number of reported opposite-sex sex partners, lifetime and in the past year.

METHODS

Data from the 2002 and 2011–2013 NSFG were used for this analysis. National Survey of Family Growth is a national household survey focusing on sexual and reproductive health with oversamples of African-American/Black, Hispanic/Latino, and adolescents. The survey includes a computer-assisted personal interview (CAPI) and a self-administered audio-computer self-interview; data for these analyses were from the CAPI only. We used the CAPI data because it did not include any missing data. Respondents provided informed

consent with parents of minors providing consent and minor assent. The surveys were approved by the institutional review board of the National Center for Health Statistics at the Centers for Disease Control and Prevention.

Data for the 2002 survey were collected between March 2002 and March 2003 with a response rate of 80% for women and 78% for men. Data for the 2011–2013 survey had a response rate of 73% for women and 72% for men. In 2006, NSFG changed survey administration to continuous interviewing in which interviews are done throughout a 2-year period rather than for a single year; therefore, 2 years of data were needed for 2011–2013 to obtain a national estimate.

The analyses included 2 measures of number of opposite-sex sex partners where sex was defined as vaginal intercourse: (a) lifetime opposite-sex sex partners and (b) opposite-sex sex partners in the past year. Lifetime opposite-sex sex partners were truncated at 50 by NSFG for both women and men. We only focused on measures of vaginal intercourse because of the comparability of these items between 2002 and 2011–2013 NSFG. For opposite-sex sex partners in the past year, we recoded the maximum number for women to 7 partners to match the NSFG truncation for males. Demographics that were included consisted of race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black, non-Hispanic, other), age (15–19, 20–24, 25–34, 35–44 years), highest education level (less than high school, high school graduate/general educational development, some college, or bachelor's degree or higher), and poverty level (<133% and 134%). The poverty level is the poverty income ratio and is household income divided by the poverty threshold and was set at the current federal poverty rate for Medicaid expansion (<133%, referred to as Medicaid threshold).

All analyses were conducted in R and R-studio using the "survey" package to adjust for the complex sampling procedures used by NSFG.[7] All analyses were weighted to represent the non-institutionalized US population and were conducted separately for women and men. To assess distribution, we calculated medians as well as percentiles corresponding to the top 20% and 5% of reported opposite-sex sex partners including their associated 95% confidence intervals (CIs) by each of the demographic factors. There are few options for conducting significance tests for quantiles within probability samples. Recently, researchers released a method using Mood's median test to test for differences in medians and quantiles.[8] However, these methods were designed for describing subgroup differences in a single survey and are not yet flexible enough to account for complex comparisons across multiple survey years. Therefore, nonoverlapping 95% CIs were used to determine statistically significant differences.

RESULTS

Lifetime Opposite-Sex Sex Partners

Women—We did not find significant changes in the median number of lifetime opposite-sex sex partners reported by females over time overall (change from 3 in 2002 to 4 in 2011–2013; ns Table 1), or among subgroups. Similarly, no significant changes were identified among women in the top 20% (change from 7 in 2002 to 8 in 2011–2013; ns Table 1) and

top 5% (unchanged from 20 in 2002 to 20 in 2011–2013; ns Table 1), overall, and among subgroups.

Males—Median lifetime opposite-sex sex partners for males between 2002 and 2011–2013 remained unchanged at 5 opposite-sex sex partners (Table 2), nor were changes identified among subgroups of men.

Conversely, we found an overall statistically significant increase in reported lifetime opposite-sex sex partners overall for men in the top 20% from 12 in 2002 to 15 in 2011–2013 (95% CIs, 11–14 and 15–15, respectively) and for men with a high school degree/general educational development from 15 in 2002 to 20 in 2011–2013 (95% CIs, 12–15 and 16–20, respectively; Table 2). However, we found no changes for all remaining subgroups of men in the top 20%. Similarly, there was a statistically significant overall increase in reported lifetime partners for men in the top 5% from 38 in 2002 to 50 in 2011–2013 (95% CIs, 30–40 and 50–50, respectively), as well as a significant increase for men living above the Medicaid threshold (40–50, 95% CIs, 31–45 and 50–50, respectively). Again, no changes were noted for the remaining subgroups.

Opposite-Sex Sex Partners in the Past Year

Women—Overall, the median number of opposite-sex sex partners (1 in 2002 to 1 in 2011–2013; ns Table 3) and the number reported by the top 20% (1 in 2002 to 1 in 2011–2013; ns Table 3) and 5% (2 in 2002 to 2 in 2011–2013; ns Table 3), and among all subgroups, remained unchanged between 2002 and 2011–2013 (Table 3).

Men—Overall, the median number of opposite-sex sex partners (1 in 2002 to 1 in 2011–2013; ns Table 4) and the number reported by the top 20% (1 in 2002 to 1 in 2011–2013; ns Table 3) and 5% (3 in 2002 to 3 in 2011–2013; ns Table 3), and among all subgroups, remained unchanged between 2002 and 2011–2013 (Table 4).

Comparisons by Gender

Lifetime Opposite-Sex Sex Partners—Overall, in 2002, men reported significantly higher numbers of lifetime opposite sex partners than females (medians, 5, 3; 95% CIs, 4–5 and 3–3, for men and women, respectively); however, this difference was no longer significant in 2011–2013 (medians, 5, 4; 95% CIs, 4–5 and 3–4, for men and women, respectively). Within subgroups, gender differences disappeared over time among Hispanics (men: medians, 4, 4; 95% CIs, 4–5 and 3–5; women: medians, 2, 2; 95% CIs, 1–2, and 2–3), 25–34 year olds (men: medians, 6, 6; 95% CIs, 6–6 and 5–7; women: medians, 4, 5; 95% CIs, 4–4, and 4–5), and those at every level of education (men, less than high school: medians, 2, 2; 95% CIs, 2–3 and 1–3; women, less than high school: medians, 1, 1; 95% CIs, 1–1 and 1–1; men, high school: medians, 6, 6; 95% CIs, 5–6 and 5–7; women, high school: medians, 4, 4; 95% CIs, 4–4 and 4–5; men, some college: medians, 6, 6; 95% CIs, 5–6 and 5–6; women, some college: medians, 3, 4; 95% CIs, 3–4 and 4–5; men, bachelor's degree: medians, 5, 5; 95% CIs, 5–6 and 4–6; women, bachelor's degree: medians, 3, 4; 95% CIs, 3–4 and 3–4), with females in these groups beginning to catch up to males in their reported numbers of lifetime partners. No gender differences among the remaining

subgroups remained at both time points. Differences in lifetime partners between men and women in the top 20% and top 5% remained significant across time (see Tables 1 and 2), with men in the top 20% and top 5% continuing to report larger numbers of lifetime partners than women in those groups. Among subgroups in 2011–2013, men in the top 20% and top 5% reported larger numbers of lifetime partners than their female counterparts with the exception of 15–19 year olds in the top 20% (men, median, 4; 95% CI, 3–4; women, median, 2; 95% CI, 2–3) and 20–24 years in the top 20% (men, median, 11; 95% CI, 10–13; women, median, 8; 95% CI, 7–10).

Opposite-Sex Sex Partners in the Past Year—Conversely, women and men reported the same numbers of partners in the past year with no significant differences in medians in either 2002 (male median, 1; 95% CIs, 1–1; female median, 1; 95% CIs, 1–1) or 2011–2013 (male median, 1; 95% CIs, 1–1; female median, 1; 95% CIs, 1–1). The same pattern was found for those in the top 20% of reported partners, with the exception of non-Hispanic blacks, for whom men in the top 20% reported significantly more opposite-sex partners than women in both 2002 and 2011–2013 (male medians, 2–2; 95% CIs, 2–2 and 2–2; female medians, 1–1; 95% CIs, 1–1 and 1–1). However, overall and for several subgroups, men in the top 5% reported significantly higher numbers of partners in the past year than women in the top 5%, particularly in 2011–2013 (see Tables 3 and 4). These subgroups included Hispanics (difference in 2002 only), non-Hispanic blacks (difference at both time points), non-Hispanic whites (difference in 2011–2013 only), 20–24 year olds (2002 only), 25–34 year olds (2002 and 2011–2013), those with an education level that is less than high school (2011–2013 only) or high school degree (2011–2013 only), and among those both below (2011–12013 only) or above the Medicaid poverty threshold (2002 and 2011–2013).

DISCUSSION

Our findings display 3 important patterns. First, our data reflect some significant increases in lifetime numbers of partners among some males, but no significant change in numbers of partners over the past year. This difference appears consistent with findings from recent studies of sexual attitudes and sexual behaviors of the general population in the United States which reported intercohort increases in both attitudes (ie, acceptance of nonmarital sex) and behaviors(ie, lifetime number of sex partners) that were not observed in period comparisons.[3,5] Differences between birth cohort (as evidenced by changes in lifetime numbers of partners) and period patterns (as evidenced by no change in partners over a 1 year time frame) in behavior and attitudes may be the net result of multidimensional concurrent changes in different aspects of behavior, such as both overall numbers of partners and the timing of partner accumulation. Delays in accumulation of sex partners (eg, having more sex partners at an older age rather than a younger age) may result in changes in the age curve of partner accumulation which may be coupled with decreases in period differences in numbers of sex partners and lack of change or increases in intercohort comparisons. Thus, numbers of sex partners over the past year may not tell the whole story about sexual behavior.

Second, our results indicate inconsistencies between measures of central tendency in numbers of sex partners such as the mean and median and measures that reflect numbers

of sex partners among the outliers, such as the most sexually active top 5% and 20% of the population, particularly among men. More specifically, although we found no change in median numbers of sex partners (past year and lifetime), we found significant increases in the numbers of sex partners reported by the top 5% and 20%. This pattern may reflect changes in the behaviors of so-called core groups of individuals with a larger number of partners and disproportionate STI risk. Changes in the behaviors of these core groups may have a significant impact on the spread of STIs. Interestingly, a similar pattern has been observed in New Zealand among men who have sex with men and individuals with frequent partner change (the "long-tail" in a partnering distribution) have been labeled Long Tail men who have sex with men and have been identified as an important target for prevention efforts.[9] Our data may reflect the presence of Long Tail Heterosexuals in the general population in the United States who may also constitute an important target for prevention efforts, particularly among heterosexual men.

Third, although no statistically significant changes were observed among women, our data reflect interesting gender differences in temporal patterns of sex partner accumulation. Over time, median numbers of sex partners among men have tended to remain constant, whereas those among women have increased (nonsignificant changes for lifetime partners) and are no longer significantly different from men. This pattern suggests that women may be becoming more similar to men over time in their sexual behaviors; a finding which mimics the findings of analyses of Natsal data on the sexual behaviors of the general population in Britain.[2] To the extent that these changes possibly reflect increases in concurrent partnerships among females and are associated with increases in mutual concurrency, they may result in important increases in the spread of STIs in heterosexual populations.[10,11]

Our analyses have some limitations. Data were self-reported and thus subject to social desirability bias. It is possible that it is more socially acceptable for younger women to report more lifetime partners; however, identical methods were used to collect information for each time frame and we have no evidence to suggest that such bias has changed during this time frame. Also, the 2011–2013 survey had a lower response rate than the 2002 survey, but all analyses were weighted to represent the noninstitutionalized population during each time frame. Number of partners in a lifetime was top-coded at 50, which may have limited our ability to fully examine the top 5% for men. Finally, NSFG is a household survey so our findings cannot be generalized to incarcerated or homeless populations.

Sexually transmitted infection prevention efforts among heterosexual populations may benefit from a focus on Long Tail Heterosexual Males who may be at higher risk for STI than the general population thus comprising a core group facilitating the spread of STIs. Additionally, changing patterns in sexual partnerships among women suggest that they may be catching up to their male counterparts in partner accumulation, thus increasing their STI risk as well. Continued examination of temporal changes in sexual attitudes and partnerships is warranted.

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TABLE 1.

Lifetime Number of Opposite-Sex Sex Partners Among Women 2002 (N = 7,643) and 2011–2013 (N = 5601)

	Median				No. Partners Among Top 20%				No. Partners Among Top 5%			
	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI
Overall	3	3–3	4	3–4	7	7–8	8	8–9	20	17–20	20	20–23
Hispanic	2	1–2	2	2–3	4	4–5	5	5–7	10	10–11	14	10–20
Non-Hispanic white	3	3–4	4	4–4	8	8–9	10	9–10	20	20–20	22	20–27
Non-Hispanic black	4	4–4	5	4–5	8	7–8	10	8–10	16	15–20	20	20–30
Non-Hispanic other	1	1–2	2	1–2	5	4–7	5	4–5	15	10–26	12	9–15
15–19y	0	0–1	0	0–1	3	2–3	2	2–3	7	6–8	7	5–8
20–24 y	2	2–3	3	2–4	6	6–7	8	7–10	15	12–18	16	15–20
25–34 y	4	4–4	5	4–5	9	8–10	10	10–11	20	20–25	25	22–30
35–44y	4	4–4	5	4–5	8	8–10	10	8–10	20	20–20	20	20–30
<High school	1	1–1	1	1–1	5	4–5	4	4–5	10	10–12	10	9–12
High school grad/GED	4	4–4	4	4–5	9	8–10	10	9–10	21	20–25	26	20–34
Some college	3	3–4	4	4–5	8	8–9	10	9–10	20	17–21	25	20–30
Bachelor's degree	3	3–4	4	3–4	7	7–8	8	7–10	16	15–20	20	18–20
<133% poverty level (Medicaid threshold)	3	3–3	3	3–4	7	6–7	8	7–9	19	15–20	22	20–25
134% Poverty level	3	3–3	4	3–4	7	7–8	8	8–10	20	17–20	20	18–23

GED, general educational development.

TABLE 2.

Lifetime Number of Opposite-Sex Sex Partners Among Males 2002 (N = 4928) and 2011–2013 (N = 4815)

	Median				No. Partners Among Top 20%				No. Partners Among Top 5%			
	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI
Overall	5	4–5	5	4,5	12	11–14	15	15–15	38	30–40	50	50–50
Hispanic	4	4–5	4	3,5	10	9–10	12	10–15	25	24–30	43	30–50
Non-Hispanic White	5	5–5	5	5,6	123	12–15	15	13–15	40	32–50	44	35–50
Non-Hispanic Black	6	6–7	9	6,10	17	15–20	30	20–40	45	38–50	50	50–50
Non-Hispanic, Other	3	2–5	2	2,3	9	7–11	9	6–15	20	12–25	26	16–50
15–19y	0	0–0.5	0	0,1	3	3–3	4	3–4	8	7–10	11	8–17
20–24 y	4	3–4	4	3,5	9	7–11	11	10–13	23	20–30	32	23–50
25–34 y	6	6–6	6	5,7	15	13–16	20	15–20	40	30–50	50	50–50
35–44y	7	6–7	7	6,8	17	15–20	20	20–25	50	50–50	50	50–50
<High school	2	2–3	2	1,3	7	7–8	7	6–10	25	19–35	30	22–50
High school grad/GED	6	5–6	6	5,7	15	12–15	20	16–20	40	30–50	50	50–50
Some college	6	5–6	6	5,6	15	12–15	15	14–20	40	31–50	50	50–50
Bachelor's degree	5	5–6	5	4,6	15	12–16	15	13–17	45	30–50	41	35–50
<133% Poverty level (Medicaid threshold)	4	3–5	4	3,4	10	10–14	14	10–15	30	25–50	50	50–50
134% Poverty level	5	5–5	5	5–6	13	12–15	15	15–19	40	31–45	50	50–50

TABLE 3.

Number of Opposite-sex Sex Partners in Past Year Among Females 2002 (N = 7643) and 2011–2013 (N = 5601)

	Median				No. Partners Among Top 20%				No. Partners Among Top 5%			
	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI
Overall	1	1–1	1	1–1	1	1–1	1	1–1	2	2–2	2	2–2
Hispanic	1	1–1	1	1–1	1	1–1	1	1–1	2	2–2	2	2–3
Non-Hispanic white	1	1–1	1	1–1	1	1–1	1	1–1	2	2–3	2	2–2
Non-Hispanic black	1	1–1	1	1–1	1	1–1	1	1–1	2	2–3	2	2–3
Non-Hispanic other	1	1–1	1	1–1	1	1–1	1	1–1	2	2–2	2	1–2
15–19y	0	0–0	0	0–0	1	1–1	1	1–1	3	3–3	2	2–3
20–24 y	1	1–1	1	1–1	1	1–2	1	1–2	3	3–3	4	3–5
25–34 y	1	1–1	1	1–1	1	1–1	1	1–1	2	2–2	2	2–2
35–44 y	1	1–1	1	1–1	1	1–1	1	1–1	2	1–2	2	2–2
<High school	1	1–1	1	1–1	1	1–1	1	1–1	3	2–3	2	2–2
High school grad/GED	1	1–1	1	1–1	1	1–1	1	1–1	2	2–3	3	2–3
Some college	1	1–1	1	1–1	1	1–1	1	1–1	2	2–3	2	2–3
Bachelor's degree	1	1–1	1	1–1	1	1–1	1	1–1	2	2–2	2	2–2
<133% Poverty level (Medicaid threshold)	1	1–1	1	1–1	1	1–1	1	1–1	3	2–3	2	2–2
134% Poverty level	1	1–1	1	1–1	1	1–1	1	1–1	2	2–2	2	2–2

TABLE 4.

Number of Opposite-Sex Sex Partners in Past Year Among Men 2002 (N = 4928) and 2011–2013 (N = 4815)

	Median				No. Partners Among Top 20%				No. Partners Among Top 5%			
	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI	2002	95% CI	2011–2013	95% CI
Overall	1	1–1	1	1–1	1	1–1	1	1–1	3	3–3	3	3–4
Hispanic	1	1–1	1	1–1	1	1–2	1	1–1	3	3–4	3	3–4
Non-Hispanic white	1	1–1	1	1–1	1	1–1	1	1–1	3	3–3	3	3–4
Non-Hispanic black	1	1–1	1	1–1	2	2–2	2	2–2	5	4–6	6	5–7
Non-Hispanic other	1	1–1	1	1–1	1	1–1	1	1–1	2	2–4	2	2–3
15–19y	0	0–0	0	0–0	1	1–2	1	1–2	3	3–3	4	3–5
20–24 y	1	1–1	1	1–1	2	2–2	2	2–2	4	4–5	5	4–6
25–34 y	1	1–1	1	1–1	1	1–1	1	1–1	3	3–4	3	3–4
35–44y	1	1–1	1	1–1	1	1–1	1	1–1	3	2–3	2	2–3
<High school	1	1–1	1	1–1	1	1–1	1	1–1	3	3–3	3	3–3
High school grad/GED	1	1–1	1	1–1	1	1–1	1	1–2	3	3–4	4	4–5
Some college	1	1–1	1	1–1	2	1–1	1	1–2	3	3–4	4	3–4
Bachelor's degree	1	1–1	1	1–1	1	1–1	1	1–1	3	2–4	3	2–3
<133% Poverty level (Medicaid threshold)	1	1–1	1	1–1	1	1–1	1	1–1	3	3–4	4	3–4
134% Poverty level	1	1–1	1	1–1	1	1–1	1	1–1	3	3–4	3	3–4