

ORIGINAL RESEARCH

Sexual Behavior in the United States: Results from a National Probability Sample of Men and Women Ages 14–94

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ABSTRACT

Introduction. Despite a demonstrated relationship between sexual behaviors and health, including clinical risks, little is known about contemporary sexual behavior.

Aims. To assess the rates of sexual behavior among adolescents and adults in the United States.

Methods. We report the recent (past month, past year) and lifetime prevalence of sexual behaviors in a nationally representative probability sample of 5,865 men and women ages 14 to 94 in the United States (2,936 men, 2,929 women).

Main Outcome Measures. Behaviors assessed included solo masturbation, partnered masturbation, giving and receiving oral sex, vaginal intercourse, and anal intercourse.

Results. Masturbation was common throughout the lifespan and more common than partnered sexual activities during adolescence and older age (70+). Although uncommon among 14- to 15-year olds, in the past year 18.3% of 16- to 17-year-old males and 22.4% of 16- to 17-year-old females performed oral sex with an other-sex partner. Also in the past year, more than half of women and men ages 18 to 49 engaged in oral sex. The proportion of adults who reported vaginal sex in the past year was highest among men ages 25–39 and for women ages 20–29, then progressively declined among older age groups. More than 20% of men ages 25–49 and women ages 20–39 reported anal sex in the past year. Same-sex sexual behaviors occurring in the past year were uncommonly reported.

Conclusions. Men and women engage in a diverse range of solo and partnered sexual behaviors throughout the life course. The rates of contemporary sexual behavior provided in this report will be valuable to those who develop, implement, and evaluate programs that seek to improve societal knowledge related to the prevalence of sexual behaviors and to sexual health clinicians whose work to improve sexual health among the population often requires such rates of behavior. **Herbenick D, Reece M, Schick V, Sanders SA, Dodge B, and Fortenberry JD. Sexual behavior in the United States: Results from a national probability sample of men and women ages 14–94. J Sex Med 2010;7(suppl 5):255–265.**

Key Words. Sexual Behavior; Adolescents; Adults; Probability Sample; United States

Introduction

Sexual health emerged during the past decade as a key unifying concept addressing clinical and public health issues as diverse as unintended pregnancy among adolescents, sexually transmit-

ted infections (STI) among young adults, and sexual dysfunctions among older adults [1–3]. In 2002, the World Health Organization (WHO) described sexual health as “. . . a state of physical, emotional, mental and social well-being related to sexuality; it is not merely the absence of

disease, dysfunction or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual responses, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination and violence.” [4]

Nationally representative up-to-date data about human sexual behavior are required to fully translate the WHO definition into public health policy and practice and to provide physicians with a suitable basis for understanding sexuality through the life course. Relatively recent national surveys (e.g., the National Survey of Family Growth [NSFG], the Youth Risk Behavior Survey, and the National Social Life, Health, and Aging Project [NSHAP]) had limited age ranges and explored a narrow range of sexual behaviors [5–7]. The most recent nationally representative survey of adult sexual behavior in the United States, conducted in 1992, was limited to adults aged 18 to 60 [8].

Much has changed since 1992 that may have influenced sexual behavior in the United States. Previously less common sexual behaviors such as oral and anal sex appear to have become more widely practiced [9–11]. Changes in oral–genital behaviors may be linked to increased rates of genital infections by Type 1 herpes simplex viruses and to increased rates of oropharyngeal cancer linked to human papilloma virus infections [12,13]. The Internet has influenced sexual knowledge, norms, and behaviors [14,15]. A vaccine for prevention of cancers associated with sexually transmitted human papilloma virus infections has been marketed amid concern about its influence on sexual behaviors [16]. Since 1997, over \$1.5 billion of federal funding for abstinence-only sexuality education has been in place although with equivocal evidence of efficacy [17,18]. Since 1998, oral medications to treat erectile dysfunction have been available; more than 6 million outpatient prescriptions were written for sildenafil in the 6 months following approval by the United States Food and Drug Administration [19]. Attitudes toward same-sex relationships have changed, with same-sex marriage and civil unions now legally recognized in several U.S. states [20]. As such, there is a need for nationally representative data that adequately captures contemporary American sexual behavior given these many social and historical changes.

Aims

The purpose of this study, the National Survey of Sexual Health and Behavior (NSSHB), was to

assess solo and partnered sexual behaviors in a national probability sample of men and women ages 14–94 years and to thus provide a comprehensive snapshot of American sexual behavior over a wide range of the sexual life course.

Methods

Data Collection

During March–May 2009, NSSHB data were collected using a population-based cross-sectional survey of adolescents and adults in the United States via research panels of Knowledge Networks (Menlo Park, CA, USA). Research panels accessed through Knowledge Networks are based on a national probability sample established using both random digit dialing (RDD) and an address-based sampling (ABS) frame. ABS involves the probability sampling of a frame of residential addresses in the United States derived from the U.S. Postal Service’s Delivery Sequence File, a system that contains detailed information on every mail deliverable address in the United States. Collectively, the sampling frame from which participants are recruited covers approximately 98% of all U.S. households. Randomly selected addresses are recruited to the research panel through a series of mailings and subsequently by telephone follow-ups to nonresponders when possible. To further correct sources of sampling and nonsampling error, study samples are corrected with a post-stratification adjustment using demographic distributions from the most recent data available from the Current Population Survey (CPS), the monthly population survey conducted by the U.S. Bureau of the Census considered to be the standard for measuring demographic and other trends in the United States. These adjustments result in a panel base weight that was employed in a probability proportional to size (PPS) selection method for establishing the samples for this study. Population specific distributions for this study were based upon the December 2008 CPS [21].

Once the sample frame was established, all individuals within that frame received a recruitment message from Knowledge Networks that provided a brief description of the NSSHB and invited them to participate. Adolescent recruitment included obtaining consent from a parent (or legal guardian) and, if provided, subsequently from the adolescent. A total of 2,172 parents (or legal guardians) reviewed a study description, including the survey, and 62% (N = 1,347) consented for

their child to be invited to participate. Of 1,347 adolescents contacted electronically, 831 responded, with 99.0% (N = 820) consenting to participate. An electronic recruitment message was sent to 9,600 potential adult participants, of whom 6,182 (64%) responded, with 82% (N = 5,045) consenting to participate. All study protocols were approved by the Institutional Review Board of the primary authors' academic institution.

All data were collected by Knowledge Networks via the Internet; participants in a given Knowledge Networks panel were provided with access to the Internet and hardware if needed. Multiple researchers have used Knowledge Networks for multiple health-related studies, substantiating the validity of such methods for obtaining data from nationally representative samples of the U.S. population [22–28].

Main Outcome Measures

Some participant characteristics were previously collected by Knowledge Networks for purposes of sample stratification and for sample adjustments using post-stratification data weights. These measures included gender, age, race (black, Hispanic, white, other), U.S. geographic region (Midwest, North, South, West), and sexual orientation (heterosexual/straight, homosexual/gay/lesbian, bisexual, asexual, other). Household income included an adult's reported household income; for adolescents household income was reported by their parent or guardian. Additionally, level of educational attainment and marital status were collected from adult participants.

Participants were asked to report whether or not they had engaged in certain solo and partnered sexual behaviors and, if so, how recently each behavior had occurred (never, within the past month, within the past year, more than 1 year ago), consistent with other nationally representative studies of sexual behaviors [27,28].

Measures of oral sex were specific to the participant's role and partner's sex (receiving from male, receiving from female, giving to female, giving to male). Also assessed were receptive (men and women) and insertive (men only) anal intercourse.

Analyses

The proportions of participants reporting histories of participating in each sexual behavior are reported based upon whether that behavior occurred within the past month, past year, or at some other point during one's lifetime. For each

percentage of individuals reporting a history of participating in a behavior during the specified periods of time, corresponding 95% confidence intervals using the Adjusted Wald method [29,30], were calculated and are presented by age group. During analyses, post-stratification data weights were applied to reduce variance and minimize bias caused by nonsampling error. Distributions for age, race, gender, Hispanic ethnicity, education, and U.S. census region were used in post-stratification adjustments. These distributions were based upon the December 2008 CPS [21].

Results

A total of 5,865 individuals (2,936 men, 2,929 women) ages 14 to 94 years participated. The weighted demographic characteristics of the sample are presented in Table 1.

Men's Sexual Behaviors

Men's sexual behaviors are presented in Table 2.

Masturbation

Solo masturbation was reported with the most consistency, as 27.9% to 68.6% of men in each age group reported masturbation during the past month. The majority of men in all age groups reported masturbation during the past year with the exception of the 14- to 15-year-old and 70+ age groups. Solo masturbation (past month and past year) was more commonly reported than most partnered sexual behaviors for ages 14 through 24 years and among those aged 50 years or older.

Vaginal Intercourse

Although most men in the 18- to 19-year-old age group had experienced vaginal intercourse, it was not a fixed aspect of every man's experience. For example, although about 85% of men in their 20s and 30s reported engaging in vaginal intercourse in the previous year, this proportion decreased to 73.6% among men in their 40s and to 57.9% among men in their 50s. For men ages 25 to 49 years, vaginal intercourse was more common than other sexual behaviors.

Partnered Noncoital Behaviors

Partnered noncoital behaviors were reported by at least some men in all age groups. Although a minority of those ages 14–15 years had ever engaged in partnered masturbation (5.7%) or received oral sex from a female (13.0%), among the 16- to 17-year-old cohort, approximately one-fifth reported having engaged in partnered mas-

Table 1 Weighted participant characteristics (N = 5,865)

Characteristics	Adolescents (N = 820)				Adults (N = 5,045)			
	Males N = 414 (50.5%)		Females N = 406 (49.5%)		Males N = 2,522 (49.9%)		Females N = 2,523 (50.1%)	
	N	%	N	%	N	%	N	%
Gender								
Males	414	100.0	—	—	2,522	100.0	—	—
Females	—	—	406	100.0	—	—	2,523	100.0
Age								
14–15	193	46.7	190	46.8	—	—	—	—
16–17	221	53.3	216	53.2	—	—	—	—
18–19	—	—	—	—	73	2.9	50	2.0
20–24	—	—	—	—	203	8.1	145	5.8
25–29	—	—	—	—	341	13.5	394	15.6
30–39	—	—	—	—	410	16.2	430	17
40–49	—	—	—	—	522	20.7	502	19.9
50–59	—	—	—	—	466	18.5	452	17.9
60–69	—	—	—	—	322	12.8	342	13.6
≥70	—	—	—	—	184	7.3	207	8.2
Race or ethnic group	(N = 413)		(N = 405)					
White	253	61.3	241	59.6	1,735	68.8	1,737	68.8
Hispanic	77	18.6	74	18.2	376	14.9	317	12.6
Black	55	13.4	59	14.6	250	9.9	303	12.0
Other	28	6.7	31	7.6	161	6.4	166	6.6
Sexual orientation					(N = 2,521)		(N = 2,521)	
Heterosexual	398	96.1	367	90.5	2,325	92.2	2,348	93.1
Gay or Lesbian	7	1.8	1	0.2	105	4.2	23	0.9
Bisexual	6	1.5	34	8.4	66	2.6	92	3.6
Other	2	0.1	3	0.9	25	1	58	2.3
Geographic region			(N = 405)					
South	145	35.0	143	35.4	922	36.5	1,065	36.4
West	96	23.2	96	23.7	591	23.4	668	22.8
Midwest	95	23.0	92	22.7	552	21.9	622	21.1
Northeast	78	18.7	74	18.2	458	18.1	573	19.7
Education completed [†]								
Less than high school	—	—	—	—	342	13.6	290	11.5
High school	—	—	—	—	757	30.0	760	30.1
Some college	—	—	—	—	685	27.2	750	29.7
College degree or higher	—	—	—	—	737	29.2	723	28.7
Marital status [†]								
Married	—	—	—	—	1,206	47.8	1,118	44.3
Never married	—	—	—	—	709	28.1	601	23.8
Divorced	—	—	—	—	278	11.0	334	13.2
Living with partner	—	—	—	—	227	9.0	222	8.8
Widowed	—	—	—	—	53	2.1	185	7.3
Separated	—	—	—	—	50	2.0	63	2.5
Annual income (\$)‡								
<25,000	52	12.6	52	12.8	506	20.1	605	24.0
25,000–49,999	86	20.8	92	22.6	745	29.6	773	30.7
50,000–74,999	86	20.8	85	21.0	522	20.7	548	21.7
≥75,000	190	45.8	177	43.6	749	29.7	597	23.7

[†]Education and marital status data presented only for adult participants.

[‡]Income levels for adolescents based on parental income level reported by parent or guardian.

turbation and one-third having received oral sex from a female partner. The highest proportions who reported having engaged in recent (past month) partnered masturbation and who reported oral sex with a woman (giving and receiving) were between 25 and 49 years.

Anal Intercourse

Insertive anal intercourse was less common than other partnered behaviors but was not rare, being reported in the past year by more than 5% of 16-

to 19-year olds, 10.8% of those ages 20–24 years, greater than 20% of those 25–49 years and 11.3% of men in their fifties. More than 40% of men ages 25–59 years reported ever having engaged in insertive anal intercourse during their lifetime.

Same-Sex Sexual Behavior

Sexual activity between men was relatively uncommon. Among men ages 18 to 59, 4.8% to 8.4% reported having received oral sex from another man in the previous year. However, 13.8% of men

ages 40–49 years and 14.9% ages 50–59 years reported such lifetime behavior. A total of 4.3% to 8.0% of men aged 18–59 years reported having performed oral sex on another man in the previous year; however, more than 10% of men in the 18–19, 40–49, and 50–59 age groups reported having ever engaged in this behavior. Receptive penile-anal intercourse was the least common behavior reported (less than 6% of men in any age group in the past year). Lifetime receptive anal intercourse was most prevalent among 20- to 24-year olds (10.8%) and those aged 40–49 and 50–59 years (8.5% and 9.5%, respectively).

Women's Sexual Behaviors

Women's sexual behaviors are presented in Table 3.

Masturbation

Solo masturbation was reported by more than 20% of women in all age groups during the past month and by more than 40% of all women within the past year, with the exception of those over 70 years. A greater proportion of those ages 14 to 17 reported lifetime solo masturbation compared with any other sexual behavior.

Vaginal Intercourse

Beginning with women ages 18–19 years (26.0% of women reported solo masturbation and 43.1% reported vaginal intercourse during the previous month), vaginal intercourse was the sexual behavior that more women in all age groups reported as having occurred during the past month compared with all other sexual behaviors assessed. Beginning in the cohort in their thirties, increasing proportions of women reported having had no vaginal intercourse during the previous year; this was the case for approximately one-fourth of women ages 30–39, nearly 1/3 of women 40–49, one-half of women ages 50–59, and ultimately nearly four-fifths of women ages 70 years and older.

Partnered Noncoital Behaviors

Masturbation with a partner during the previous month and year was most commonly reported by women ages 16 through 49 and most women between the ages of 25–49 reported this behavior in their lifetime. Approximately 10% of 14- to 15-year-old women and 23.5% of 16- to 17-year-old women reported receiving oral sex from a male partner in the previous year. More than half of women in the age groups between 18 and 49 had received oral sex from a male partner in the previous year as had 34.2% of females ages 50–59 and 24.8% of females ages 60–69 years.

A total of 11.8% of 14- to 15-year-old women and 22.4% of 16- to 17-year-old women reported having given oral sex to a male partner in the past year. Also, most women in the age groups between 18 and 49 years reported having given oral sex to a man in the past year. Oral-genital sex given to male partners during the previous month was rarely reported by women in the 70+ age group in the past year (6.8%) though 42.7% had done so in their lifetime.

Anal Intercourse

A total of 4% or less of 14- to 17-year-old women and those aged 50 or older reported anal intercourse in the previous year. However, 18.0% of 18- to 19-year-old females and more than 20% of those between the ages of 20 and 39 reported anal sex in the past year. Lifetime anal sex was reported by 40% or more of women ages 20–49 years, and by about 30% or more of women ages 50–69 years.

Same-Sex Sexual Behavior

Sexual activity between women was relatively uncommon. Fewer than 5% of women in most age groups reported having received oral sex in the past year from a female partner, with the exception of the 8.5% of women ages 20–24 who reported having performed oral sex on a woman in the past year. A total of 2.0% to 9.2% of those ages 16 to 49 years reported having given oral sex to another woman in the past year.

Discussion

These findings provide a detailed picture of solo and partnered sexual behavior through a lifespan, showing that one's sexual repertoire varies across different age cohorts, with masturbation relatively more common in young and older individuals and vaginal intercourse being more common than other sexual behaviors from early to late adulthood. Partnered noncoital sexual behaviors (oral and anal sex) also appear to be well established aspects of a contemporary sexual repertoire in the United States. The baseline rates of behavior established by the analyses provided in this report will be helpful to sexuality educators who develop, implement, and evaluate programs that seek to improve societal knowledge related to the prevalence of sexual behaviors and to sexual health clinicians whose work to improve sexual health among the population often requires such rates of behavior.

Although the largest proportion of adults reported vaginal intercourse during the past month throughout most of the reproductive year

Table 2 Men's sexual behaviors past month, past year, and lifetime (N = 2,857)

	Adolescents (N = 410)		Adults		
	14–15 191	16–17 219	18–19 72	20–24 196	25–29 334
	Percent (95% confidence interval)				
Masturbated alone					
Past month	42.9% (36.1%–50.0%)	58.0% (51.4%–64.3%)	61.1% (49.5%–71.5%)	62.8% (55.8%–69.3%)	68.6% (63.4%–73.3%)
Past year	62.1% (55.0%–68.7%)	74.8% (68.6%–80.1%)	80.6% (69.9%–88.2%)	82.7% (76.8%–87.4%)	83.6% (79.2%–87.2%)
Lifetime	67.5% (60.6%–73.7%)	78.9% (73.0%–83.8%)	86.1% (76.1%–92.5%)	91.8% (87.0%–95.0%)	94.3% (91.2%–96.4%)
Masturbated with partner					
Past month	3.6% (1.6%–7.4%)	7.1% (4.3%–11.4%)	14.5% (8.0%–24.6%)	15.0% (10.6%–20.7%)	20.5% (16.5%–25.2%)
Past year	5.2% (2.7%–9.4%)	16.0% (11.7%–21.5%)	42.0% (31.3%–53.5%)	43.5% (36.7%–50.5%)	49.3% (44.0%–54.6%)
Lifetime	5.7% (3.1%–10.1%)	20.3% (15.5%–26.1%)	49.3% (38.1%–60.6%)	54.5% (47.5%–61.3%)	69.0% (63.8%–73.7%)
Received oral from female					
Past month	7.8% (4.7%–12.6%)	17.5% (13.0%–23.1%)	22.9% (14.6%–33.9%)	34.7% (28.4%–41.6%)	45.5% (40.2%–50.9%)
Past year	11.9% (8.0%–17.3%)	30.9% (25.1%–37.3%)	53.6% (42.2%–64.6%)	62.8% (55.8%–69.3%)	77.2% (72.4%–81.4%)
Lifetime	13.0% (8.9%–18.6%)	34.4% (28.4%–40.9%)	59.4% (47.9%–70.0%)	73.5% (66.9%–79.2%)	91.0% (87.4%–93.7%)
Received oral from male					
Past month	0.5% (–0.2%–3.2%)	1.4% (0.3%–4.2%)	1.5% (–0.4%–8.3%)	5.2% (2.8%–9.4%)	1.2% (0.4%–3.2%)
Past year	0.5% (–0.2%–3.2%)	2.8% (1.2%–6.1%)	5.9% (2.0%–14.3%)	6.2% (3.5%–10.6%)	4.8% (2.9%–7.7%)
Lifetime	1.6% (0.3%–4.8%)	3.2% (1.4%–6.6%)	8.8% (3.9%–17.9%)	9.3% (5.9%–14.3%)	7.6% (5.2%–11.0%)
Gave oral to female					
Past month	2.6% (0.9%–6.1%)	13.8% (9.8%–19.0%)	20.3% (12.5%–31.1%)	28.1% (22.3%–34.8%)	40.4% (35.3%–45.7%)
Past year	7.8% (4.7%–12.6%)	18.3% (13.7%–24.0%)	50.7% (39.4%–61.9%)	54.9% (47.9%–61.7%)	73.5% (68.5%–78.0%)
Lifetime	8.3% (5.1%–13.2%)	20.2% (15.4%–26.0%)	60.9% (49.3%–71.4%)	70.9% (64.2%–76.8%)	85.6% (81.4%–89.0%)
Gave oral to male					
Past month	1.0% (0.0%–3.9%)	0.9% (0.0%–3.5%)	1.4% (–0.5%–8.2%)	5.2% (2.8%–9.4%)	2.7% (1.4%–5.1%)
Past year	1.0% (0.0%–3.9%)	2.3% (0.8%–5.4%)	4.3% (1.0%–12.2%)	6.7% (3.9%–11.2%)	4.8% (2.9%–7.7%)
Lifetime	1.6% (0.3%–4.8%)	2.8% (1.2%–6.1%)	10.1% (4.8%–19.5%)	9.3% (5.9%–14.3%)	6.3% (4.1%–9.5%)
Vaginal intercourse					
Past month	7.9% (4.8%–12.7%)	16.1% (11.8%–21.6%)	31.0% (21.5%–42.5%)	52.0% (45.0%–58.9%)	74.4% (69.5%–78.8%)
Past year	8.9% (5.6%–13.9%)	30.3% (24.6%–36.7%)	52.8% (41.4%–63.9%)	63.3% (56.4%–69.7%)	85.7% (81.5%–89.1%)
Lifetime	9.9% (6.4%–15.0%)	30.3% (24.6%–36.7%)	62.5% (50.9%–72.8%)	70.3% (63.6%–76.3%)	89.3% (85.5%–92.2%)
Inserted penis into anus					
Past month	0.5% (–0.2%–3.2%)	1.4% (0.3%–4.2%)	0% (–1.0%–6.1%)	6.2% (3.5%–10.6%)	10.3% (7.4%–14.1%)
Past year	3.1% (1.3%–6.8%)	5.5% (3.1%–9.4%)	5.6% (1.8%–13.9%)	10.8% (7.1%–16.0%)	26.6% (22.1%–31.6%)
Lifetime	3.7% (1.7%–7.6%)	6.0% (3.5%–10.1%)	9.7% (4.5%–19.0%)	23.7% (18.3%–30.1%)	45.2% (39.9%–50.6%)
Received penis in anus					
Past month	1.0% (0.0%–3.9%)	0.9% (0.0%–3.5%)	1.4% (–0.5%–8.2%)	2.1% (0.6%–5.4%)	0.9% (0.2%–2.7%)
Past year	1.0% (0.0%–3.9%)	0.9% (0.0%–3.5%)	4.2% (1.0%–12.1%)	5.2% (2.8%–9.4%)	4.0% (2.3%–6.7%)
Lifetime	1.0% (0.0%–3.9%)	0.9% (0.0%–3.5%)	4.3% (1.0%–12.2%)	10.8% (7.1%–16.0%)	5.2% (3.2%–8.2%)

age cohorts, the reproductive years are not marked exclusively by potentially procreative sex. Sizable proportions of individuals ages 18 and 49 years reported solo masturbation, partnered masturbation, oral sex, and anal sex during the previous year, a common time frame between wellness visits, particularly for women.

Data about sexual activity in the previous year inform clinicians about the proportions of patients who are likely to have engaged in various sexual behaviors since their last clinical exam and who may benefit from annual, detailed sexual history taking. Also, the lack of sexual behavior experienced by some groups has clinical relevance. For example, the decreasing proportion of men in their forties engaging in vaginal intercourse may reflect, at least in part, a growing incidence of erectile dysfunction that may be related to cardiovascular disease or diabetes [31,32]. Similarly, the decreasing proportion of sexual activity among women as they age may, for some, reflect pain with vaginal

intercourse (caused by vaginal dryness), lower libido, or other sexual health concerns [33,34].

Also related to important clinical concerns, the rates of behavior established in this report may be helpful to those dedicated to reducing rates of human immunodeficiency virus, STIs, and unintended pregnancy. The rates of these sexual health challenges do provide a rationale for continued surveillance of sexual behaviors among both adults and adolescents in order to inform health-related policy and practice. However, given the purpose of this particular report, the analyses presented do not consider the situational or partner-related variables that influence the extent to which a sexual behavior poses the potential for negative impacts to sexual health, and those using these data to substantiate public health programs should consider the lack of context that underlies the rates presented here. The NSSHB did collect such variables, and additional in-depth analyses from the NSSHB are presented in multiple other reports

Adults (N = 2,447)				
30-39 396	40-49 499	50-59 454	60-69 317	70+ 179
Percent (95% confidence interval)				
66.4% (61.6%–70.9%)	60.1% (55.7%–64.3%)	55.7% (51.1%–60.2%)	42.3% (37.0%–47.8%)	27.9% (21.8%–34.9%)
80.1% (75.9%–83.7%)	76.0% (72.1%–79.5%)	72.1% (67.8%–76.0%)	61.2% (55.7%–66.4%)	46.4% (39.2%–53.7%)
93.4% (90.5%–95.5%)	92.0% (89.3%–94.1%)	89.2% (86.0%–91.8%)	90.2% (86.4%–93.0%)	80.4% (73.9%–85.6%)
22.9% (19.0%–27.3%)	19.2% (16.0%–22.9%)	14.4% (11.5%–17.9%)	10.3% (7.4%–14.2%)	4.1% (1.9%–8.2%)
44.7% (39.9%–49.6%)	38.1% (33.9%–42.4%)	27.9% (24.0%–32.2%)	17.0% (13.2%–21.5%)	12.9% (8.7%–18.7%)
68.3% (63.6%–72.7%)	61.5% (57.2%–65.7%)	51.9% (47.3%–56.5%)	37.0% (31.9%–42.4%)	31.6% (25.2%–38.7%)
49.4% (44.5%–54.3%)	37.7% (33.6%–42.0%)	24.4% (20.7%–28.6%)	18.6% (14.7%–23.3%)	12.4% (8.3%–18.1%)
77.6% (73.2%–81.4%)	62.1% (57.8%–66.2%)	48.5% (43.9%–53.1%)	37.5% (32.3%–43.0%)	19.2% (14.1%–25.6%)
89.7% (86.3%–92.3%)	86.2% (82.9%–89.0%)	82.6% (78.8%–85.8%)	75.3% (70.3%–79.7%)	57.6% (50.3%–64.6%)
2.0% (0.9%–4.0%)	4.6% (3.1%–6.8%)	4.7% (3.1%–7.1%)	1.0% (0.2%–3.0%)	0% (–0.4%–2.5%)
5.5% (3.6%–8.2%)	5.8% (4.0%–8.2%)	8.4% (6.2%–11.3%)	2.6% (1.3%–5.1%)	2.4% (0.8%–6.0%)
9.0% (6.5%–12.3%)	13.8% (11.0%–17.1%)	14.9% (11.9%–18.5%)	8.7% (6.0%–12.4%)	7.7% (4.5%–12.7%)
38.1% (33.5%–43.0%)	32.6% (28.6%–36.8%)	20.8% (17.3%–24.8%)	14.3% (10.8%–18.6%)	12.4% (8.3%–18.1%)
68.7% (64.0%–73.1%)	57.4% (53.0%–61.7%)	44.1% (39.6%–48.7%)	34.3% (29.3%–39.7%)	24.3% (18.6%–31.1%)
88.2% (84.6%–91.0%)	84.4% (80.9%–87.3%)	77.3% (73.2%–80.9%)	72.5% (67.3%–77.1%)	61.6% (54.3%–68.4%)
2.8% (1.5%–5.0%)	4.7% (3.1%–7.0%)	6.4% (4.5%–9.1%)	1.3% (0.4%–3.4%)	0% (–0.4%–2.5%)
5.0% (3.2%–7.7%)	6.7% (4.8%–9.3%)	8.0% (5.8%–10.9%)	2.6% (1.3%–5.1%)	3.0% (1.2%–6.8%)
7.3% (5.1%–10.3%)	13.2% (10.5%–16.5%)	13.1% (10.3%–16.5%)	5.6% (3.5%–8.8%)	5.3% (2.7%–9.7%)
71.3% (66.7%–75.5%)	61.0% (56.7%–65.2%)	44.1% (39.6%–48.7%)	38.9% (33.7%–44.4%)	28.2% (22.1%–35.2%)
85.3% (81.5%–88.5%)	73.6% (69.6%–77.3%)	57.9% (53.3%–62.4%)	53.5% (48.0%–58.9%)	42.9% (35.9%–50.2%)
92.6% (89.6%–94.8%)	89.3% (86.3%–91.7%)	85.8% (82.3%–88.7%)	86.9% (82.7%–90.2%)	88.1% (82.5%–92.1%)
7.1% (4.9%–10.1%)	7.2% (5.2%–9.8%)	3.3% (2.0%–5.4%)	4.2% (2.4%–7.1%)	0% (–0.4%–2.5%)
23.9% (20.0%–28.3%)	21.2% (17.8%–25.0%)	11.3% (8.7%–14.6%)	5.8% (3.7%–9.0%)	1.7% (0.4%–5.1%)
44.5% (39.7%–49.4%)	43.1% (38.8%–47.5%)	40.4% (36.0%–45.0%)	26.7% (22.1%–31.8%)	13.8% (9.4%–19.7%)
1.3% (0.5%–3.1%)	2.0% (1.0%–3.7%)	2.9% (1.7%–4.9%)	0% (–0.2%–1.4%)	0% (–0.4%–2.5%)
3.3% (1.9%–5.6%)	4.4% (2.9%–6.6%)	4.6% (3.0%–7.0%)	6% (0.0%–2.4%)	1.7% (0.4%–5.1%)
6.3% (4.3%–9.2%)	8.5% (6.3%–11.3%)	9.5% (7.1%–12.6%)	3.8% (2.1%–6.6%)	4.7% (2.3%–9.0%)

that provide rates of condom use for both adolescents and adults [35], and those that consider the situational characteristics and potential health consequences of recent sexual events among both adolescents [36] and adults [37], including reports focused specifically on the aging population [38] and ethnic minorities [39].

Although not longitudinal, a strength of this study, compared with other studies that have focused on more narrow age ranges, is that a developmental trajectory of sexual expression is apparent. A minority of 14- to 17-year-old adolescents report engaging in partnered sexual activity with sharply raised proportions of partnered sexual behavior reported among 18- to 24-year olds. Although partnered sexual activity remains common throughout the 20s, 30s, and 40s, there is a clear decline in partnered activity for both genders in their 50s and 60s and a sharper decline as individuals reach age 70. The latter echoes findings from the recent NSHAP, which found substantial

declines in sexual activity among individuals aged 74 or older in association with partner loss and health problems [7]. Of course, differences in sexual behavior between various age groups are likely to be influenced not only by development throughout the life course but also by cohort effects that reflect socialization related to sexuality.

Compared with the 1992 National Health and Social Life Survey (NHSLs), in this present study more men and women have engaged in oral sex and a significantly greater proportion have engaged in anal sex. The larger proportions of those who had engaged in anal sex were not limited to the youngest cohorts. Most participants in all adult (18+) age groups had engaged in oral sex with the exception of females in the 70+ age group, of whom slightly less than half had done so. Anal sex was reported by sizable proportions of adults ages 20 to 49 and twice the proportion of 18- to 19-year-old females reported lifetime receptive anal sex (20.0%) as the proportion of 18- to

Table 3 Women's sexual behaviors past month, year, and lifetime (N = 2,813)

	Adolescents (N = 400)		Adults		
	14–15 188	16–17 212	18–19 50	20–24 142	25–29 383
N	Percent (95% confidence interval)				
Masturbated alone					
Past month	24.1% (18.5%–30.7%)	25.5% (20.1%–31.8%)	26.0% (15.8%–39.7%)	43.7% (35.8%–51.9%)	51.7% (46.7%–56.7%)
Past year	40.4% (33.6%–47.5%)	44.8% (38.3%–51.5%)	60.0% (46.2%–72.4%)	64.3% (56.1%–71.7%)	71.5% (66.8%–75.8%)
Lifetime	43.3% (36.4%–50.4%)	52.4% (45.7%–59.0%)	66.0% (52.1%–77.6%)	76.8% (69.2%–83.0%)	84.6% (80.6%–87.9%)
Masturbated with partner					
Past month	4.3% (2.1%–8.4%)	11.2% (7.6%–16.2%)	18.4% (9.8%–31.5%)	16.1% (10.9%–23.1%)	24.1% (20.1%–28.6%)
Past year	7.5% (4.4%–12.3%)	18.9% (14.2%–24.7%)	36.0% (24.1%–49.9%)	35.9% (28.5%–44.1%)	48.2% (43.2%–53.2%)
Lifetime	9.0% (5.6%–14.0%)	19.7% (14.9%–25.6%)	38.8% (26.5%–52.7%)	46.9% (38.9%–55.1%)	64.0% (59.1%–68.6%)
Received oral from female					
Past month	0% (–0.4%–2.4%)	2.3% (0.8%–5.5%)	0% (–1.4%–8.5%)	1.4% (0.1%–5.3%)	5% (0.0%–2.0%)
Past year	1.1% (0.1%–4.1%)	4.7% (2.5%–8.5%)	3.9% (0.3%–14.1%)	8.5% (4.8%–14.4%)	2.6% (1.4%–4.8%)
Lifetime	3.8% (1.7%–7.7%)	6.6% (3.9%–10.9%)	8.0% (2.6%–19.4%)	16.8% (11.5%–23.9%)	10.8% (8.0%–14.3%)
Received oral from male					
Past month	3.7% (1.7%–7.6%)	16.4% (12.0%–22.0%)	32.0% (20.7%–45.9%)	38.0% (30.4%–46.2%)	36.1% (31.4%–41.0%)
Past year	10.0% (6.4%–15.2%)	23.5% (18.3%–29.7%)	58.0% (44.2%–70.6%)	70.4% (62.4%–77.3%)	71.8% (67.1%–76.1%)
Lifetime	10.1% (6.5%–15.3%)	25.8% (20.4%–32.1%)	62.0% (48.1%–74.2%)	79.7% (72.3%–85.5%)	88.1% (84.5%–91.0%)
Gave oral to female					
Past month	0.5% (–0.2%–3.2%)	4.2% (2.1%–7.9%)	2% (–1.3%–8.8%)	1.4% (0.1%–5.3%)	1.1% (0.3%–2.8%)
Past year	1.6% (0.3%–4.8%)	7.1% (4.3%–11.5%)	2.0% (–0.6%–11.5%)	9.2% (5.3%–15.2%)	2.6% (1.4%–4.8%)
Lifetime	5.4% (2.9%–9.7%)	9.0% (5.8%–13.7%)	8.2% (2.8%–19.6%)	14.0% (9.2%–20.7%)	9.5% (6.9%–12.9%)
Gave oral to male					
Past month	8.0% (4.8%–12.9%)	14.6% (10.4%–20.0%)	34.7% (23.0%–48.6%)	47.2% (39.2%–55.4%)	49.9% (44.9%–54.9%)
Past year	11.8% (7.9%–17.3%)	22.4% (17.3%–28.5%)	58.5% (44.7%–71.1%)	74.3% (66.5%–80.8%)	75.9% (71.4%–79.9%)
Lifetime	12.8% (8.7%–18.4%)	29.1% (23.4%–35.6%)	61.2% (47.3%–73.5%)	77.6% (70.0%–83.7%)	89.0% (85.4%–91.8%)
Vaginal intercourse					
Past month	5.9% (3.2%–10.3%)	20.8% (15.9%–26.8%)	43.1% (30.3%–56.8%)	61.9% (53.7%–69.5%)	74.3% (69.7%–78.4%)
Past year	10.7% (7.0%–16.0%)	29.7% (23.9%–36.2%)	62.0% (48.1%–74.2%)	79.9% (72.5%–85.7%)	86.5% (82.7%–89.6%)
Lifetime	12.4% (8.4%–17.9%)	31.6% (25.7%–38.1%)	64.0% (50.1%–75.9%)	85.6% (78.8%–90.5%)	90.7% (87.3%–93.2%)
Received penis in anus					
Past month	3.2% (1.3%–7.0%)	0.5% (–0.2%–2.9%)	8.0% (2.6%–19.4%)	7.3% (3.9%–12.9%)	5.3% (3.4%–8.1%)
Past year	3.7% (1.7%–7.6%)	4.7% (2.5%–8.5%)	18.0% (9.5%–31.0%)	23.4% (17.2%–31.0%)	21.1% (17.3%–25.5%)
Lifetime	4.3% (2.1%–8.4%)	6.6% (3.9%–10.9%)	20.0% (11.1%–33.2%)	39.9% (32.2%–48.1%)	45.6% (40.7%–50.6%)

19-year-old males who reported lifetime insertive anal sex (9.7%). These proportions were twice as large for each gender in the 20- to 24-year-old cohort.

Neither the NHSLs nor the NSHAP included questions about mutual masturbation or the gender of respondents' oral sex partners [7,8]. As such, it is not known to what extent mutual masturbation, or same-sex vs. other-sex oral sex behaviors, may have changed over time. Little is known about same-sex behaviors from nationally representative studies, as none—including ours—have oversampled those who identify as homosexual or bisexual, leaving the numbers too few for adequate statistical analysis. However, findings reflect those from the NHSLs and from the Kinsey interview data in that a greater number of males and females have engaged in same-sex sexual behaviors than identify as homosexual or bisexual [8,40,41].

The current study is only the second nationally representative study of sexual behavior of adults living in the United States and the first to include such an expansive range of ages. Although Alfred Kinsey and his team reported data from adults

about their sexual lives from childhood through older age, sampling was not nationally representative, people married at younger ages, the life expectancy was lower when data were collected (late 1930s to early 1950s) and older age was experienced in clinically different ways that likely impacted sexuality [40,41]. The social changes occurring since both of the large-scale studies of sexual behavior have been significant and up-to-date data about human sexual behavior among different age groups is important.

Depending on the country and time period in which sexual behavior has been studied, previous studies of sexual behavior in the United States and in other countries have recruited participants and collected data via in-person interviews, computer-assisted interviews, questionnaires, RDD phone interviews, computer-assisted telephone interviewing, intercept methods, or door-to-door sampling [42–49]. In our study, by recruiting participants and collecting data over the Internet, respondents may have felt more comfortable reporting taboo sexual behaviors compared with the NHSLs data, which were collected via in-person interviews.

Adults (N = 2,413)				
30-39 412	40-49 468	50-59 435	60-69 331	70+ 192
Percent (95% confidence interval)				
38.6% (34.0%–43.4%)	38.5% (34.2%–43.0%)	28.3% (24.3%–32.7%)	21.5% (17.4%–26.3%)	11.5% (7.7%–16.8%)
62.9% (58.1%–67.4%)	64.9% (60.5%–69.1%)	54.1% (49.4%–58.7%)	46.5% (41.2%–51.9%)	32.8% (26.5%–39.7%)
80.3% (76.2%–83.9%)	78.0% (74.0%–81.5%)	77.2% (73.0%–80.9%)	72.0% (66.9%–76.6%)	58.3% (51.2%–65.0%)
19.3% (15.8%–23.4%)	12.7% (10.0%–16.0%)	6.7% (4.7%–9.5%)	5.9% (3.8%–9.0%)	2.1% (0.6%–5.4%)
43.3% (38.6%–48.1%)	34.8% (30.6%–39.2%)	17.7% (14.4%–21.6%)	13.1% (9.9%–17.2%)	5.3% (2.8%–9.5%)
63.1% (58.3%–67.6%)	56.1% (51.6%–60.5%)	46.9% (42.3%–51.6%)	36.4% (31.4%–41.7%)	17.5% (12.7%–23.5%)
1.2% (0.4%–2.9%)	8% (0.2%–2.2%)	0.7% (0.1%–2.1%)	0.3% (–0.1%–1.9%)	1.0% (0.0%–3.9%)
4.9% (3.2%–7.5%)	2.3% (1.2%–4.1%)	0.9% (0.3%–2.4%)	0.6% (0.0%–2.3%)	1.5% (0.3%–4.6%)
16.5% (13.2%–20.4%)	10.1% (7.7%–13.2%)	8.2% (5.9%–11.2%)	4.4% (2.6%–7.2%)	2.1% (0.6%–5.4%)
36.2% (31.7%–41.0%)	24.1% (20.4%–28.2%)	16.9% (13.7%–20.7%)	11.7% (8.6%–15.6%)	2.6% (0.9%–6.1%)
58.7% (53.9%–63.4%)	52.3% (47.8%–56.8%)	34.2% (29.9%–38.8%)	24.8% (20.4%–29.7%)	7.8% (4.7%–12.6%)
82.0% (78.0%–85.4%)	86.3% (82.9%–89.1%)	83.4% (79.6%–86.6%)	79.0% (74.3%–83.1%)	47.4% (40.5%–54.4%)
1% (–0.2%–1.3%)	1.1% (0.4%–2.6%)	0% (–0.2%–1.1%)	0.6% (0.0%–2.3%)	1.0% (0.0%–3.9%)
4.0% (2.4%–6.4%)	2.5% (1.4%–4.4%)	0.9% (0.3%–2.4%)	0.9% (0.2%–2.7%)	1.5% (0.3%–4.6%)
14.2% (11.1%–17.9%)	11.6% (9.0%–14.8%)	7.3% (5.2%–10.2%)	3.4% (1.9%–6.0%)	2.1% (0.6%–5.4%)
43.9% (39.2%–48.7%)	26.8% (23.0%–31.0%)	18.5% (15.1%–22.4%)	13.1% (9.9%–17.2%)	3.6% (1.6%–7.4%)
59.2% (54.4%–63.8%)	52.7% (48.2%–57.2%)	36.2% (31.8%–40.8%)	23.4% (19.1%–28.3%)	6.8% (3.9%–11.4%)
80.1% (76.0%–83.7%)	83.1% (79.4%–86.2%)	80.0% (76.0%–83.5%)	73.1% (68.1%–77.6%)	42.7% (35.9%–49.8%)
63.5% (58.7%–68.0%)	55.8% (51.3%–60.2%)	39.9% (35.4%–44.6%)	28.9% (24.3%–34.0%)	11.9% (8.0%–17.3%)
73.5% (69.0%–77.5%)	70.3% (66.0%–74.3%)	51.4% (46.7%–56.1%)	42.2% (37.0%–47.6%)	21.6% (16.3%–28.0%)
88.7% (85.3%–91.4%)	94.5% (92.0%–96.3%)	94.0% (91.3%–95.9%)	92.4% (89.0%–94.8%)	89.2% (84.0%–92.9%)
6.4% (4.4%–9.2%)	3.6% (2.2%–5.7%)	1.6% (0.7%–3.3%)	2.2% (1.0%–4.5%)	0% (–0.4%–2.4%)
21.6% (17.9%–25.8%)	11.7% (9.1%–14.9%)	5.6% (3.8%–8.2%)	4.0% (2.3%–6.8%)	1.0% (0.0%–3.9%)
40.4% (35.8%–45.2%)	40.6% (36.2%–45.1%)	34.6% (30.3%–39.2%)	29.8% (25.1%–34.9%)	21.2% (16.0%–27.5%)

In addition, while some studies have focused on only men [45–48], only women [43], or a more narrow age range [2,3,6,7,48] we sampled both women and men from adolescence through old age, resulting in a sample of individuals that spanned eight decades of age. However, a limitation of the present study is that, like the NHSLS and NSHAP, the sample was likely only accessible to those who were living in the community and so is not representative of all adults, particularly older adults, who are more likely to be hospitalized or living in long term care facilities.

A limitation of the study is that nationally representative survey data often obscures data points of minority groups, such as those who identify as gay, lesbian or bisexual. Certainly a proportion of those individuals who did not engage in sexual behaviors between women and men (such as vaginal intercourse) were likely to be gay or lesbian. The present data cannot therefore be generalized to gay, lesbian, or bisexual individuals and more detailed analyses are needed to illuminate the sexual behaviors of these individuals. Like other studies of sexual behavior, this study may

have been subject to self-selection. Although the sampling procedures ensured a lack of differences on key sociodemographic characteristics between those who chose to participate and those who refused, sexual behavior data are not available on nonresponders, and it is therefore not possible to assess the extent to which participants were different from those who either did not respond to the recruitment messages or those who responded and chose not to participate. However, the proportion of those who responded and chose to participate was slightly higher than the participation rate of the eligible, contacted individuals in the NHSLS who were recruited through in-person recruitment efforts at their homes [8].

Although statistical differences between men's and women's reports of sexual behaviors were not assessed for this particular paper, the data demonstrate that, for all age cohorts, recent (past month and past year) masturbation was strikingly more prevalent among men than women. Similarly, with the exception of the 25- to 29-year-old age cohort, more men reported vaginal intercourse in the past month and more men reported vaginal intercourse

in the past year in advanced age, likely caused by the greater number of available female partners. Compared with men's reports of insertive anal intercourse, more women in the 18- to 19-year-old age cohort reported receptive anal intercourse, which may be an artifact of having the small number of individuals in this age group or the result of younger women partnering with older men. More detailed data related to the sexual behavior of women and men in this sample can be found in other reports that have examined gender-specific behaviors and that collectively offer in-depth analyses that provide for comparisons across genders [50,51].

Conclusions

In summary, findings provide medical and public health professionals with up-to-date information about solo and partnered sexual behaviors throughout the life course. Such information should assist both educators and clinicians in their efforts to increase knowledge about contemporary sexual behaviors and provide a valuable context that can be useful particularly to health professionals during sexual history taking and during discussion with patients about sexual problems and dysfunctions.

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