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ORIGINAL PAPER

Declines in Sexual Frequency among American Adults, 1989–2014

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Abstract American adults had sex about nine fewer times per year in the early 2010s compared to the late 1990s in data from the nationally representative General Social Survey, $N =$ 26,620, 1989–2014. This was partially due to the higher percentage of unpartnered individuals, who have sex less frequently on average. Sexual frequency declined among the partnered (married or living together) but stayed steady among the unpartnered, reducing the marital/partnered advantage for sexual frequency. Declines in sexual frequency were similar across gender, race, region, educational level, and work status and were largest among those in their 50s, those with school-age children, and those who did not watch pornography. In analyses separating the effects of age, time period, and cohort, the decline was primarily due to birth cohort (year of birth, also known as generation). With age and time period controlled, those born in the 1930s (Silent generation) had sex the most often, whereas those born in the 1990s (Millennials and iGen) had sex the least often. The decline was not linked to longer working hours or increased pornography use. Age had a strong effect on sexual frequency: Americans in their 20s had sex an average of about 80 times per year, compared to about 20 times per year for those in their 60s. The results suggest that Americans are having sex less frequently due to two primary factors: An increasing number of individuals without a steady or marital partner and a decline in sexual frequency among those with partners.

Keywords Sexual frequency · Sexual activity · Marriage · Birth cohort · Generations · Time period

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Introduction

Sex has come out into the open in the last few decades in American culture. Americans are now much more likely to approve of premarital sex and sex between two same-sex adults (Twenge, Sherman, & Wells, 2015), young people regularly access sexual information online (Döring, Daneback, Shaughnessy, Grov, & Byers, 2015), and pornography consumption has become more commonplace and more accepted (Lykke & Cohen, 2015; Price, Patterson, Regnerus, & Walley, 2016; Wright, 2013; Wright, Bae, & Funk, 2013), particularly with discreet access via the internet (Carroll et al., 2008).

Does that mean that Americans are having more sex? A plausible argument could be made for both an affirmative and a negative answer. On the affirmative side, birth control has become more reliable and accessible, which may encourage or allow greater sexual frequency. More permissive attitudes toward premarital, casual, and same-sex sexual activity may also have increased sexual frequency (Lemer, Blodgett Salafia, & Benson, 2013). New technologies such as online dating (match.com) and hook-up apps (Tinder) make it easier for people to locate sexual partners. Additionally, interest in consensual non-monogamy (as indicated by Google searches) may be on the rise (Moors, 2017). The accessibility of information about sexuality may make sex more pleasurable and therefore more frequent. Finally, although age is a consistent predictor of lower sexual frequency and the U.S. population has aged over the decades, longer life expectancies and longer active life expec-

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tancies (Manton, Gu, & Lamb, 2006), coupled with the widespread availability of erectile function medications (Lee, Nazroo, & Pendleton, 2015), may offset some of the decline in sexual frequency expected in an aging population.

On the negative side, Americans work more hours (Greenstone & Looney, 2011) and spend more time with children (Ramey & Ramey, 2010) than in the past, possibly reducing the amount of time that can be spent on sexual intimacy. The ubiquity of entertainment and social media options in recent decades, from streaming video to gaming to Facebook, may also make sexual activity just one of an array of pleasurable options. In addition, the increased availability and consumption of pornography (Price et al., 2016) may provide sexual outlets outside of sex with a partner. Though pornography consumption is associated with a higher probability of engagement in casual sex (Wright, 2012) and more sexual partners (Morgan, 2011), pornography viewing itself is often a solitary activity, and the frequency of intercourse is negatively correlated with both the frequency of masturbation and the self-reported negative effects of pornography consumption (Hald & Malamuth, 2008). In addition, happiness among adults over 30 has declined since 2000 (Twenge, Sherman, & Lyubomirsky, 2016a), and more frequent sex is associated with higher levels of well-being and happiness (Blanchflower & Oswald, 2004; Cheng & Smyth, 2015; Michael, Gagnon, Laumann, & Kolata, 1994; Muise, Schimmack, & Impett, 2016). Depressive symptoms are higher in recent generations (Twenge, 2015), and both depression and its pharmaceutical treatments are associated with sexual dysfunctions such as reduced sexual desire and arousability (Atlantis & Sullivan, 2012; Laumann & Waite, 2008). The environment contains more estrogen-mimicking compounds, possibly reducing sex drive (at least in animal models: Dickerson & Gore, 2007). Finally, fewer Americans are partnered now compared to in the past. For example, the percentage of Americans aged 18–29 not living with a partner (married or unmarried) increased from 48% in 2005 to 64% in 2014 (Saad, 2015). Given that married people have sex more often on average than unmarried people (e.g., Michael et al., 1994), the decline in the percentage of married (and partnered) individuals may have a major impact on trends in sexual frequency.

Trends in sexual frequency are important given the link between sexual frequency and well-being (e.g., Muise et al., 2016; Wadsworth, 2014). In addition, sexual frequency is associated with relationship satisfaction, which may mediate the association between sexual frequency and overall well-being (Muise et al., 2016). Dissatisfaction with the frequency of sex is among the most common complaints in long-term relationships (Risch, Riley, & Lawler, 2003). Sexual activity is also associated with a range of physical and mental health benefits (Brody, 2010). On the other hand, sexual frequency also raises the odds for negative health outcomes such as unplanned pregnancy and sexually transmitted infections (Burchell et al., 2006; Gray et al., 2001; Wilcox, Dunson, Weinberg, Trussell, & Baird, 2001). Finally, a variety of policies, including those regarding sex education, access to contraception, and access to safe and legal abortions, may impact sexual frequency. As such, understanding base level trends in sexual frequency is key to developing better models of the complex associations between policy decisions and individual behavior.

Behavioral and attitudinal trends over time can involve three different processes (Schaie, 1965; Yang, 2008). First, change can be due to age or development. For example, sexual frequency declines with age (i.e., Schick et al., 2010). Second, change can be due to time period change that affects people of all ages, also known as a cultural change. Perhaps Americans of all ages have sex more (or less) frequently than they did in previous decades, due to the reasons previously mentioned. Third, changes in prevalence could be due to cohort (also known as generation), a cultural change that affects young people the most. Perhaps more recent cohorts have sex more (or less) frequently than previous cohorts at the same age. Recently introduced mixed-effects models based on hierarchical linear modeling allow the separation of the three effects using a technique known as age-period-cohort analysis (APC: Yang, 2008; Yang & Land, 2013).

In this article, we explore trends in sexual frequency among American adults, drawing from the General Social Survey, a nationally representative sample of Americans that has asked participants about how often they have sex since 1989. To separate the effects of age, time period, and cohort, we employed APC analysis. We also examined possible moderators such as gender, race, education level, region, marital status, living with a partner, and having children in the household, as well as possible explanations for trends in sexual frequency such as longer working hours and pornography use.

Method

Participants

The GSS is a nationally representative sample of Americans over 18 years old, collected in most years between 1972 and 2014 ($N = 56{,}859$; for the variables in the current analysis, $N = 26{,}620$). The GSS data and codebooks are available online (Smith, Marsden, Hout, & Kim, 2015). As suggested by the GSS administrators, we weighted the descriptive statistics by the variable WTSSALL to make the sample nationally representative of individuals rather than households. The weighting variable primarily corrects for the greater probability of those in smaller households to be included, as only one person per household is surveyed.

Measures

Since 1989, the GSS has included the item, "About how often did you have sex during the last 12 months?" with choices ranging from 0 = "not at all," to 6 = "more than three times a week." Non-

response was uncommon (5.7% refused to answer and .2% answered "don't know," for a 94% response rate).

To estimate the number of times a year participants had sex, we recoded the responses as: "not at all" = 0 to "More than three times a week" = 5 × 52 = 260. We used these numbers as an estimate only and not for standardized effect sizes, instead basing effect sizes on the original 0–6 scale. It should also be kept in mind that these estimates are right skewed, with those who have sex very frequently pulling the numbers upward.

The 2012 dataset was an extreme outlier that suggested a coding issue. Only 3.1% were in the "not at all" (not having sex in the last year) category, while in other years of data collection this response averaged 18.6% with little variation. Missing data—primarily those who were not asked the question—were 36.9% in 2012 compared to 53.2% in other years, also suggesting a coding issue. The 2014 data resembled the years before 2012, making it seem unlikely this was a time-based trend. Thus, we excluded the 2012 data.

The GSS also included demographic variables, making it possible to determine whether changes in sexual frequency differed by group. We analyzed moderation by gender (men vs. women), race (White, Black, and Other), education level (high school graduate and below vs. 2-year college degree and above), US region (Northeast, Midwest, South, and West), labor force status (working full time vs. part time or not at all), and marital status (married, widowed, divorced, separated, and never married; we also compared married individuals to unmarried individuals, combining widowed, divorced, separated, and never married—although separated individuals are technically married, we included them with unmarried individuals for ease of analysis). The presence of minor children was obtained from the variables noting the number of children in the household of various ages. A single item asked about pornography use ("Have you seen an X-rated movie in the past year?" with possible responses of "yes" or "no"). We also examined an item asking participants how many hours they worked in the last week.

An item asking about living with partners was asked in a limited number of years (2000, 2004, 2006, 2012, and 2014), with choices of married and living in the same household (abbreviated in the tables as married, living together), living "as married and my partner and I together live in the same household" (living together, not married), married or with a "steady partner but we don't live in the same household" (married or partner, not living together), and "don't have a steady partner" (no steady partner). To examine effects of the length of the relationship, we used the item asking when the participant was first married (asked in 1989–1994 and 2006), excluding those who were divorced, separated, or widowed.

Procedure

We took several approaches to analyzing the data. First, we examined correlations between the year of data collection and sexual frequency, both bivariate and controlled for age, marital status, and race. Second, we examined sexual frequency by 5-year blocks of time for all participants and within demographic groups, including an effect size (*d*, or difference in terms of standard deviations). Third, we examined the trend in the correlation between marital status and sexual frequency. Fourth, we performed an APC analysis to determine the unique effects of age, time period, and cohort on sexual frequency. Fifth, we matched yearly averages for working hours and pornography consumption with average sexual frequency to discover whether the variables changed in the same pattern.

In describing the trends, we occasionally employ common labels for the generations such as the Silent (born 1925–1945), Boomers (1946–1964), GenX (1965–1979), Millennials (1980–1994), and iGen (1995–2012; for reviews, see Twenge, 2014, 2017). These birth year cutoffs are arbitrary and are not necessarily justified by empirical evidence, but are useful labels for those born in certain eras.

Results

Trends in Sexual Frequency by Year

American adults had sex less often in recent years, with an especially steep decline after 2000 (see Table 1). The decline in sexual frequency appeared among men and women; Blacks, Whites, and those of other races; those with more and less education; in the East, Midwest, South, and West; among those with minor children in the household and those without; among married and divorced individuals; and among married individuals and those living together. The decline was largest among those in their 50s, Whites, those with a college degree, married individuals, those with children aged 6–12 in the household, and those who had not seen a pornographic movie in the last year (see Table 1). The largest declines appeared among the highly educated ($d = -.28$) and those married and living together ($d = -.31$). The decline was not significant among those over 60, with children under age 6, who did not live with their partners, without a steady partner, or the never married.

Using the estimates for yearly sexual frequency, American adults had sex about seven times per year less often in the early 2010s (vs. the early 1990s) and about nine times a year less often than in the late 1990s. As recently as 2002, the average adult American had sex approximately 64 times a year, but by 2014 that declined to about 53 times a year (see Table 2; Fig. 1). The decline in sexual frequency was the largest among those with a college degree (about 15 fewer times a year), in the South (about 13 fewer times a year), and among married or divorced individuals (about 11 fewer times a year). As for main effects, younger people had sex more often than older people, men more often than women, Non-Whites more than Whites, residents of the West more than other regions, those who lived together more

Table 1 Changes in sexual frequency (0–6 scale) among American adults, 1989–2014

	n	1989–1994	1995–1999	2000–2004	2005–2009	2010–2014	Change in sex acts per year (1st to last), *d*	Change in sex acts per year (max), *d*
All adults	26,620	3.02 (1.90)	3.09 (1.88)	3.01 (1.93)	2.86 (1.96)	2.74 (1.95)	−.15***	−.18***
Age groups (time-lag design = cohort + time period)								
18–29	6050	3.46 (1.94)	3.49 (1.94)	3.52 (1.96)	3.45 (1.92)	3.32 (1.99)	−.07	−.10*
30–39	5761	3.76 (1.55)	3.67 (1.57)	3.78 (1.58)	3.65 (1.66)	3.62 (1.65)	−.09*	−.10*
40–49	5497	3.34 (1.61)	3.41 (1.62)	3.26 (1.71)	3.24 (1.79)	3.18 (1.78)	−.10*	−.14**
50–59	4114	2.80 (1.73)	2.84 (1.79)	2.60 (1.79)	2.52 (1.84)	2.45 (1.77)	−.20***	−.22***
60–69	2742	1.98 (1.74)	2.02 (1.74)	1.99 (1.69)	1.90 (1.76)	1.81 (1.73)	−.10	−.12
Over 70	2455	.86 (1.37)	.95 (1.45)	.93 (1.51)	.88 (1.36)	.96 (1.42)	−.07	.01
Gender								
Men	12,212	3.21 (1.80)	3.27 (1.79)	3.20 (1.88)	3.04 (1.90)	2.95 (1.88)	−.14***	−.17***
Women	14,408	2.86 (1.96)	2.94 (1.95)	2.84 (1.96)	2.71 (2.00)	2.55 (1.99)	−.16***	−.20***
Race								
White	21,386	3.01 (1.89)	3.09 (1.87)	2.97 (1.92)	2.80 (1.93)	2.70 (1.93)	−.16***	−.21***
Black	3264	3.11 (1.93)	2.96 (1.95)	3.15 (2.00)	3.04 (2.07)	2.81 (2.01)	−.15**	−.17**
Other	1970	2.98 (1.92)	3.29 (1.87)	3.23 (1.90)	3.16 (1.98)	2.87 (1.96)	−.06	−.22**
Education								
High school degree or less	17,974	2.94 (1.96)	3.02 (1.94)	2.97 (2.00)	2.84 (2.02)	2.73 (2.02)	−.11***	−.15***
2-year college degree or more	8598	3.23 (1.71)	3.25 (1.75)	3.09 (1.79)	2.90 (1.85)	2.75 (1.81)	−.27***	−.28***
Region								
East	4909	2.94 (1.90)	2.96 (1.92)	2.85 (1.93)	2.68 (1.90)	2.67 (1.91)	−.14**	−.15**
Midwest	6435	3.02 (1.88)	3.03 (1.90)	3.02 (1.92)	2.73 (1.91)	2.72 (1.93)	−.16***	−.16***
South	9357	3.06 (1.90)	3.13 (1.88)	3.09 (1.95)	2.95 (1.96)	2.72 (1.94)	−.18***	−.22***
West	5919	3.04 (1.91)	3.20 (1.82)	3.01 (1.91)	2.98 (2.01)	2.83 (2.01)	−.11*	−.19***
Marital status								
Married	14,885	3.47 (1.58)	3.53 (1.54)	3.44 (1.58)	3.23 (1.68)	3.10 (1.67)	−.23***	−.27***
Widowed	1554	.52 (1.28)	.99 (1.70)	.67 (1.43)	.50 (1.26)	.59 (1.35)	.05	−.26**
Divorced	3038	2.64 (2.08)	2.62 (2.14)	2.41 (2.11)	2.41 (2.17)	2.20 (2.12)	−.21***	−.21***
Never married	6434	2.65 (2.09)	2.82 (2.05)	2.89 (2.12)	2.80 (2.11)	2.75 (2.09)	−.05	−.07
Unmarried (all combined)	11,731	2.33 (2.13)	2.52 (2.12)	2.49 (2.17)	2.43 (2.16)	2.35 (2.14)	.01	−.08**
Living situation								
Married, living together	2276	–	–	3.49 (1.54)	–	3.00 (1.64)	−.31***	−.31***
Living together, not married	430	–	–	3.97 (1.55)	–	3.57 (1.86)	−.25*	−.25*
Married or partner, not living together	368	–	–	3.64 (1.76)	–	3.27 (1.96)	−.20	−.20
No steady partner	1323	–	–	1.79 (2.03)	–	1.72 (1.99)	−.03	−.03
Children under 18 in household								
No	16,645	2.62 (1.97)	2.79 (1.95)	2.69 (.199)	2.52 (1.99)	2.49 (1.97)	−.07**	−.15***
Yes (any age)	9776	3.59 (1.65)	3.55 (1.67)	3.55 (1.70)	3.51 (1.73)	3.34 (1.77)	−.15***	−.15***
Under 6	4432	3.80 (1.54)	3.83 (1.48)	3.79 (1.57)	3.71 (1.64)	3.67 (1.63)	−.08	−.10
Ages 6–12	4899	3.73 (1.54)	3.56 (1.63)	3.61 (1.69)	3.70 (1.71)	3.32 (1.76)	−.26***	−.26***
Ages 13–17	4174	3.34 (1.75)	3.38 (1.79)	3.41 (1.76)	3.29 (1.82)	3.13 (1.81)	−.12*	−.16**
Work status								
Full time	14,120	3.42 (1.70)	3.43 (1.70)	3.39 (1.78)	3.29 (1.83)	3.14 (1.80)	−.16***	−.17***
Part time or not working	12,499	2.58 (2.01)	2.64 (2.01)	2.57 (2.01)	2.41 (1.99)	2.35 (2.00)	−.11***	−.14***
Watched pornographic movie in last year								
Yes	3999	3.74 (1.70)	3.59 (1.71)	3.62 (1.84)	3.46 (1.84)	3.47 (1.82)	−.15***	−.15***
No	11,706	2.83 (1.89)	2.87 (1.90)	2.76 (1.92)	2.63 (1.95)	2.42 (1.93)	−.22***	−.24***

SDs in parentheses

d difference in standard deviations

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 2 Changes in sexual frequency (estimated times per year) among American adults, 1989–2014

	n	1989–1994	1995–1999	2000–2004	2005–2009	2010–2014	Change in estimated sex acts per year (1st to last)	Change in estimated sex acts per year (max)
All adults	26,620	60.35	62.36	62.03	58.05	53.71	−6.64	−8.65
Age groups (time-lag design = cohort + time period)								
18–29	6050	81.29	83.60	86.60	81.30	78.50	−2.79	−8.10
30–39	5761	80.28	76.34	83.08	79.76	77.84	−2.44	−5.24
40–49	5497	62.79	65.66	63.34	65.62	63.22	.43	−2.44
50–59	4114	46.31	48.76	43.08	43.12	38.29	−8.02	−10.47
60–69	2742	27.01	28.78	26.55	26.64	25.03	−1.98	−3.75
Over 70	2455	9.68	10.66	13.13	9.00	10.88	1.20	−4.13
Gender								
Men	12,212	64.76	66.48	68.20	62.22	58.92	−5.84	−9.28
Women	14,408	56.76	58.82	56.64	54.52	49.24	−7.52	−9.58
Race								
White	21,386	59.61	62.12	59.85	54.70	51.67	−7.94	−8.18
Black	3264	66.44	60.07	71.75	68.98	60.22	−6.22	−11.53
Other	1970	58.94	69.79	69.85	70.42	59.57	.63	−10.85
Education								
High school degree or less	17,974	60.08	62.09	63.67	60.24	56.84	−3.24	−6.83
2-year college degree or more	8598	60.88	63.07	58.80	54.25	48.16	−12.72	−14.91
Region								
East	4909	57.58	58.40	55.84	48.96	49.23	−8.35	−9.17
Midwest	6435	58.92	60.22	62.20	51.50	52.64	−7.42	−9.56
South	9357	61.97	64.23	66.19	60.55	52.76	−9.21	−13.43
West	5919	62.01	65.34	60.75	66.09	59.25	−2.76	−6.84
Marital status								
Married	14,885	67.31	68.84	66.85	61.45	55.96	−11.35	−10.89
Widowed	1554	8.37	17.40	10.91	8.03	10.19	1.82	−7.21
Divorced	3038	55.88	56.90	51.57	53.33	46.23	−9.65	−10.67
Never married	6434	57.00	60.89	67.47	63.61	60.81	3.81	−6.66
Unmarried (all combined)	11,731	49.74	54.07	56.25	54.13	51.31	1.57	−4.94
Living situation								
Married, living together	2276	–	–	66.90	–	50.52	–	−16.38
Living together, not married	430	–	–	93.02	–	86.16	–	−6.86
Married or partner, not living together	368	–	–	84.39	–	74.92	–	−9.47
No steady partner	1323	–	–	36.87	–	32.97	–	−3.90
Children under 18 in household								
No	16,645	50.14	54.56	53.80	48.68	47.42	−2.72	−7.14
Yes (any age)	9776	74.92	74.19	75.65	75.84	69.54	−5.38	−6.30
Under 6	4432	82.08	82.33	82.68	82.49	80.63	−1.45	−2.05
Ages 6–12	4899	78.48	73.16	77.65	81.85	69.08	−9.40	−12.77
Ages 13–17	4174	67.16	70.21	72.36	69.42	61.62	−5.54	−11.74
Work status								
Full time	14,120	69.09	69.69	71.48	69.24	62.55	−6.54	−8.93
Part time or not working	12,499	50.73	52.61	50.94	46.03	45.21	−5.52	−7.40
Watched pornographic movie in last year								
Yes	3999	85.31	79.61	87.04	78.70	78.97	−6.34	−8.07
No	11,706	53.18	54.78	52.13	50.07	43.51	−9.67	−11.27

The figures for times per year are estimated using ranges and thus are not precise

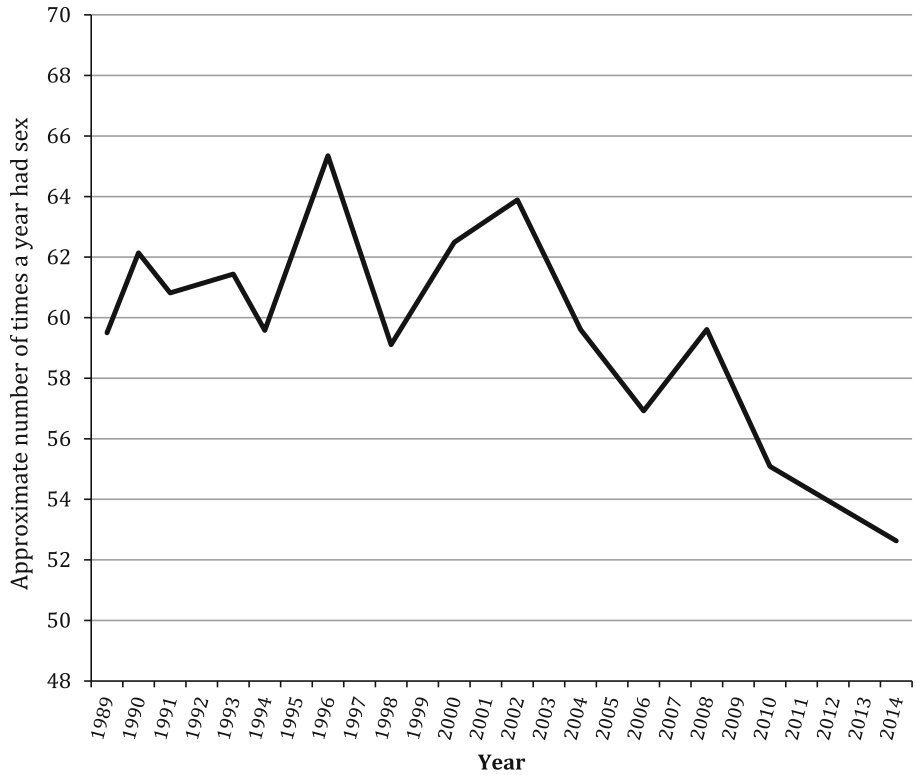

Fig. 1 Estimated times per year American adults had sex, 1989–2014

than those who were married, those with minor children in the household more than those without, and those who watched a pornographic movie in the last year more than those who did not.

Trends in Sexual Frequency Controlled for Age, Race, and Marital (or Living) Status

The bivariate correlation between year and sexual frequency was $r(26{,}620) = -.05$, $p < .001$. Thus, sexual frequency declined over the years in a linear fashion.

The average age of the GSS sample rose from 43.76 in 1989 to 47.46 in 2014, the percentage of married individuals declined from 62 to 53%, and the percentage of participants who were White declined from 86 to 74%. Thus, we also examined the correlation between sexual frequency and year controlled for age, marital status, and race. The negative correlation between sexual frequency and year remained when controlled for age, $r(26{,}759) = -.03$, $p < .001$, marital status (married vs. unmarried), $r(26{,}613) = -.04$, $p < .001$, and race (White vs. Non-White), $r(26{,}617) = -.05$, $p < .001$. A regression equation with all three variables still yielded a significant effect for year, Beta $= -.02$, $p = .004$. This suggested that shifts in age, marital status, and race partially, but not fully, accounted for the decline in sexual frequency.

In a limited number of years (2000, 2004, 2006, and 2014), the GSS asked participants about their living situation (see Table 1). Thus, we can also compare those with steady partners (whether married or unmarried) to those without. The percentage with no steady partner increased from 26% in 2006 to 33% in 2014. During the four data collections when this question was asked, the bivariate correlation between year and sexual frequency was $r(8{,}891) = -.06$, $p < .001$. When controlled for age, race, and having a steady partner (vs. not), $r(4{,}387) = -.05$, $p = .001$. Like the results for marital status, this suggests that the decline in sexual frequency was partially, but not fully, due to shifts in living situations.

The GSS collects only limited data on the length of partnerships, but we were able to examine the effect of marriage length in the subsample in intact first marriages (those who had never been divorced, separated, or widowed). Those who had been married for longer had sex less frequently, $r(2730) = -.54$, $p < .001$, but this correlation dropped to non-significance after age was controlled, $r(2727) = .02$. However, age was still significantly correlated with sexual frequency after length of marriage was controlled, $r(2727) = -.23$, $p < .001$. This suggests that length of marriage (at least in this subsample) did not account for the decline in sexual frequency as much as age did.

Trends in the Marital (and Partnered) Advantage for Sexual Frequency

Married individuals in the 1990s had sex more times per year than never married individuals, but by the mid-2000s never married individuals had sex more times than the married (see Table 2; Fig. 2). This likely reflects fewer married individuals having sex at a very high frequency, perhaps due to the rising age

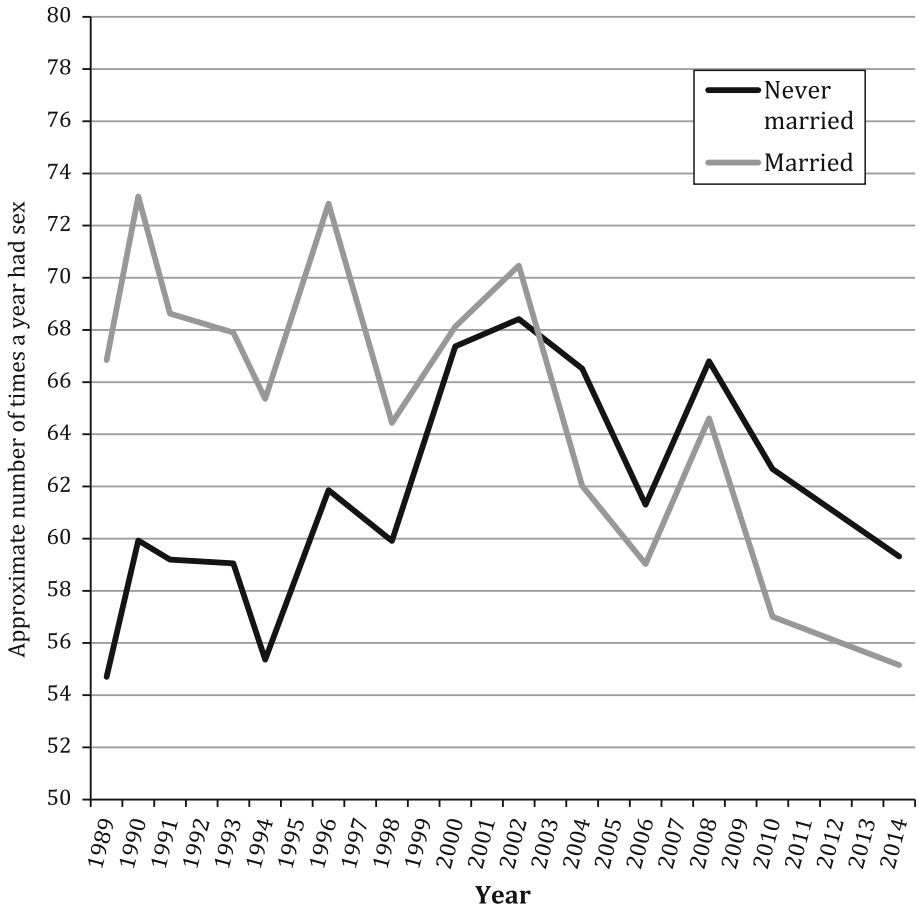

Fig. 2 Estimated times per year American adults had sex, by marital status, 1989–2014

at first marriage (which was 23 for women in 1990 and is now 27; U.S. Census, 2016). Nevertheless, married individuals still had sex with more consistency and thus still exhibited higher sexual frequency on the 0–6 scale (see Table 1).

We also examined the trend in the correlation between marital status and sexual frequency (weighting by *n*). That should reveal whether the marital advantage in sexual frequency has shrunk or disappeared. We found that the correlation between marital status (married vs. never married) and sexual frequency (estimated sex acts per year) was positive (with married individuals having sex more often than never married) during the 1990s, but, beginning in 2004, was negative (with never married individuals having sex more often), with the beta ($df = 13$) between r and year $= -.93$, $p < .001$ (see Fig. 3a). With age controlled, the correlation still grew smaller by the year, but no longer shifted to negative, beta $= -.85$, $p < .001$ (see Fig. 3b). For example, the correlation between marital status (married vs. never married) and sexual frequency on the 0–6 scale was $r = .23$ in 1990 and $r = .10$ by 2014; controlled for age, it was $r = .44$ in 1990 and $r = .32$ in 2014. The correlation between marital status (married vs. not) and sexual frequency (estimated times per year) was $r = .36$ in 1990 and .20 in 2014; controlled for age, it was $r = .27$ in 1990 and $r = .17$ in 2014. Thus, the marital advantage for sexual frequency has grown smaller over time.

We found a similar effect comparing those with a steady partner and without (in the limited number of years this question was asked): The correlation between sexual frequency and having a steady partner (vs. not) declined from $r = -.44$ in 2000 to $r = -.34$ in 2014. Controlled for age, the correlation declined from $r = -.50$ in 2000 to $r = -.41$ in 2014. Those with steady partners still have sex more often than those without, but the steady partner advantage in sexual frequency has shrunk. Thus, as Tables 1 and 2 also show, the decline in sexual frequency is more pronounced among the married and those with steady partners and less pronounced among the never married and those without steady partners.

We were able to test two other possible explanations for lower sexual frequency in recent years: longer working hours and the increased use of pornography (which might provide an alternative sexual outlet). First, working hours among those who were employed, $r(17{,}191) = .08$, $p < .001$, and pornography use, $r(15{,}705) = .20$, $p < .001$, were both positively, not negatively, correlated with sexual frequency. This was true even when age was controlled, $r(17{,}167) = .09$, $p < .001$, for working hours, and $r(15{,}677) = .10$, $p < .001$, for pornography use. In addition, those who worked full time had sex more frequently than those who worked part time or not at all (see Tables 1, 2). When matched by year, sexual frequency was higher in years

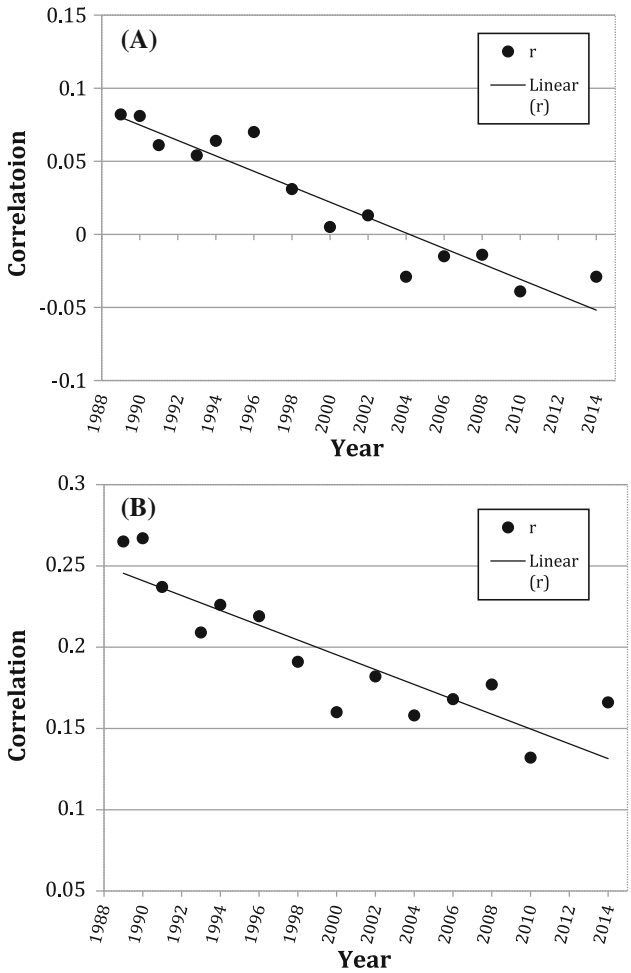

Fig. 3 Trend in the correlation (r) between marital status (married vs. never married) and sexual frequency (estimated times per year), **a** bivariate and **b** controlled for age

with a higher average number of working hours and more pornography use, though the correlations were not significant given the low number of years, $r(13) = .40$, and pornography use $r(13) = .33$. Thus, it does not appear that the decline in sexual frequency was due to longer working hours or to more people viewing pornography. If anything, these factors were connected to higher sexual frequency.

APC Analyses Separating Age, Period, and Cohort

We employed APC analysis to separate the effects of age, time period, and cohort. This analysis revealed that the decline in sexual frequency was primarily driven by cohort rather than time period (SD for time period = 1.13; SD for cohort = 2.28).[1] For example, with age and time period controlled, Americans born in the 1930s (the Silent generation) had sex approximately 63 times per year (the highest of any cohort) while those born in the 1990s (late Millennials and early iGen) had sex approximately 57 times a year (the lowest of any cohort), $d = -.32$ (see Fig. 4a, b). The cohort differences were fairly similar across gender, race, region, and education level but were smaller for those employed full time ($d = -.09$) compared to those who were not employed or employed part time ($d = -.37$).

The cohort differences were smaller when examined separately for married individuals ($d = -.13$ from the highest, Silent/Boomer 1940s cohort to the lowest, GenX 1970s, cohort; there were not enough married individuals in the 1990s-born cohort to include them in the comparison). Similar to the descriptive analyses (see Table 1), the pattern of change for unmarried individuals was inconsistent (see Fig. 5).

The lower effect sizes within marital status suggested that the decline in the number of married individuals might be partially behind the decline in sexual frequency. Thus, we conducted an APC analysis controlled for marital status (married vs. unmarried). This analysis revealed that more recent cohorts still had sex less often, $d = -.11$ comparing those born in the 1930s (Silent) versus the 1990s (Millennials/iGen). The reduction in this effect size (from −.32 to −.11) suggests that approximately two-thirds of the decline in sexual frequency was due to the decline in the number who were married. The remainder seems to be due to the decline in sexual frequency among married individuals.

The APC analyses also revealed a striking decline in sexual frequency with age when controlled for time period and cohort ($b_{\text{linear}} = -.20$, $t = -31.55$; $b_{\text{quadratic}} = -.02$, $t = -9.53$, $b_{\text{cubic}} = .0009$, $t = 11.51$). While those in their 20s had sex more than 80 times a year, this declined to about 60 times a year by 45 and 20 times a year by 65 (see Fig. 6a, b). For each year of age after the peak in sexual frequency at 25, participants reported having sex 1.18 fewer times per year. Put another way, individuals over age 25 have sex 96.8% as often as the previous year (so with each year of age after age 25, the number of sex acts per year declined by 3.2%).

Discussion

American adults reported having sex about nine times a year less often in the 2010s than in the late 1990s. APC analyses separating the effects of age, time period, and cohort suggest that the

[1] The APC analyses provided a unique opportunity to better understand the anomalous 2012 data. If there was a coding issue as we suspected, the APC analyses should show a large time period effect for 2012. As such, we also conducted the APC analyses including the 2012 data. Consistent with the idea of a coding error, analyses with the 2012 data demonstrated a substantially larger variance component for time period and a large time period effect for 2012. Thus, we concluded that including the 2012 data would be highly misleading and continued to exclude it from all other analyses. Importantly, the pattern of cohort effects for the APC analysis was nearly identical even with the 2012 data included. Thus, this anomaly had little impact on the main APC results.

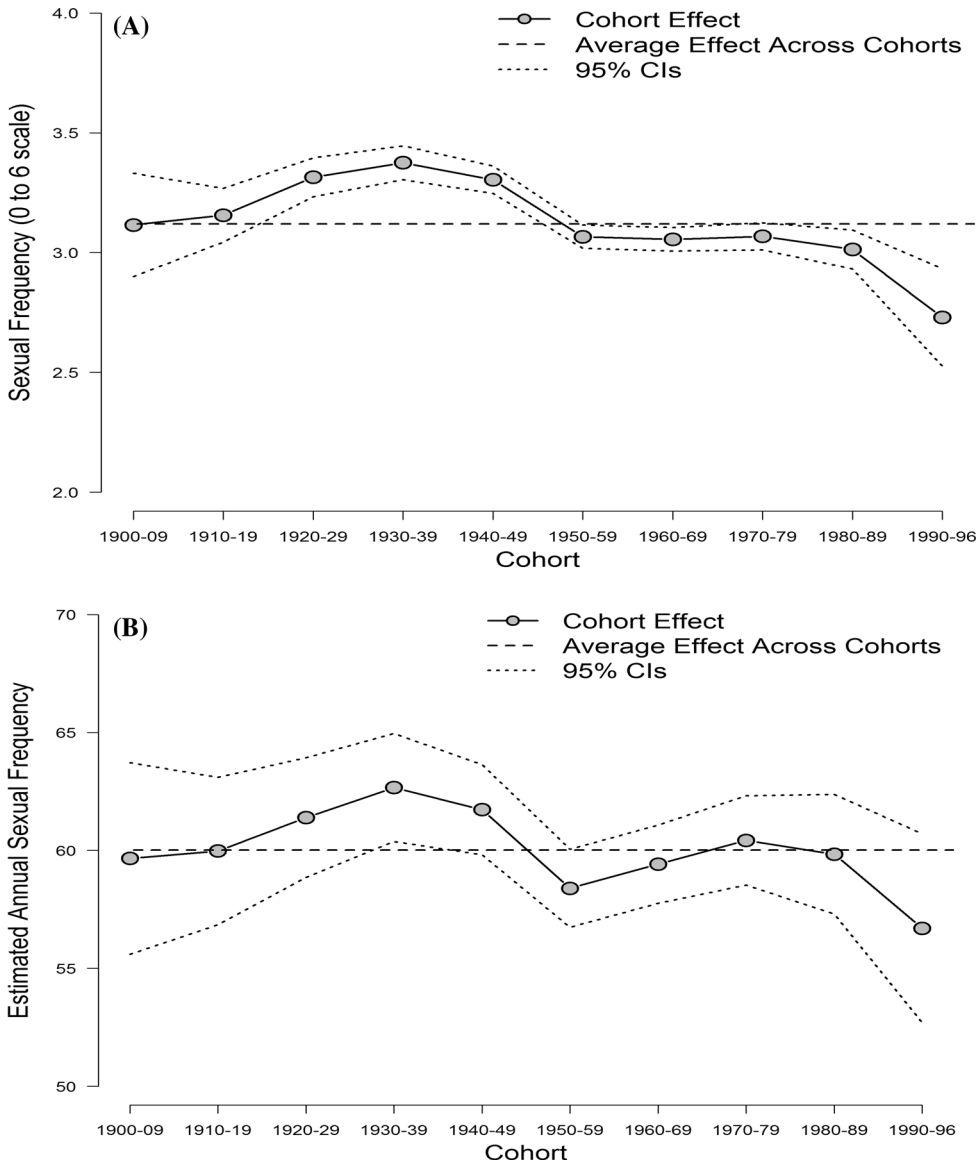

Fig. 4 Cohort differences in sexual frequency among American adults, in APC analyses controlling for age and time period, **a** 0–6 scale and **b** estimated times per year

decline in sexual frequency over time is primarily a cohort effect. The average American born in the 1990s (Millennials and iGen) had sex about six times a year less often than the average American born in the 1930s (Silent generation) when age and time period are controlled. The declines were similar across gender, race, region, and the presence of minor children in the household.

Much of the decline in sexual frequency appears to be due to the reduction in the number of individuals who are married. We found, as others have (e.g., Michael et al., 1994), that married individuals had sex more often than unmarried individuals. In addition, the percentage of Americans who had a steady partner (unmarried or married) decreased from 2006 to 2014, and those with a steady partner had sex about twice as often as those without partners. Furthermore, the decline in sexual frequency was most pronounced among married individuals compared to those with no steady partner. Thus, the "marriage advantage" for sexual frequency shrunk over time. The results suggest that Americans are having sex less frequently due to two factors: the increasing number of individuals without a steady or marital partner and a decline in sexual frequency among those with partners (both married and unmarried).

Why was there a decline in sexual frequency among married and partnered individuals? It does not appear to be due to longer work hours or the greater use of pornography, both of which were instead associated with higher sexual frequency. Other reasons remain more plausible, although none can be thoroughly explored with the current data. These include those discussed in the Introduction, including more options for entertainment and social communication (such as streaming video and social media) and declines in happiness and increases in depression. In addition, later childbearing may create a "perfect storm" for married cou-

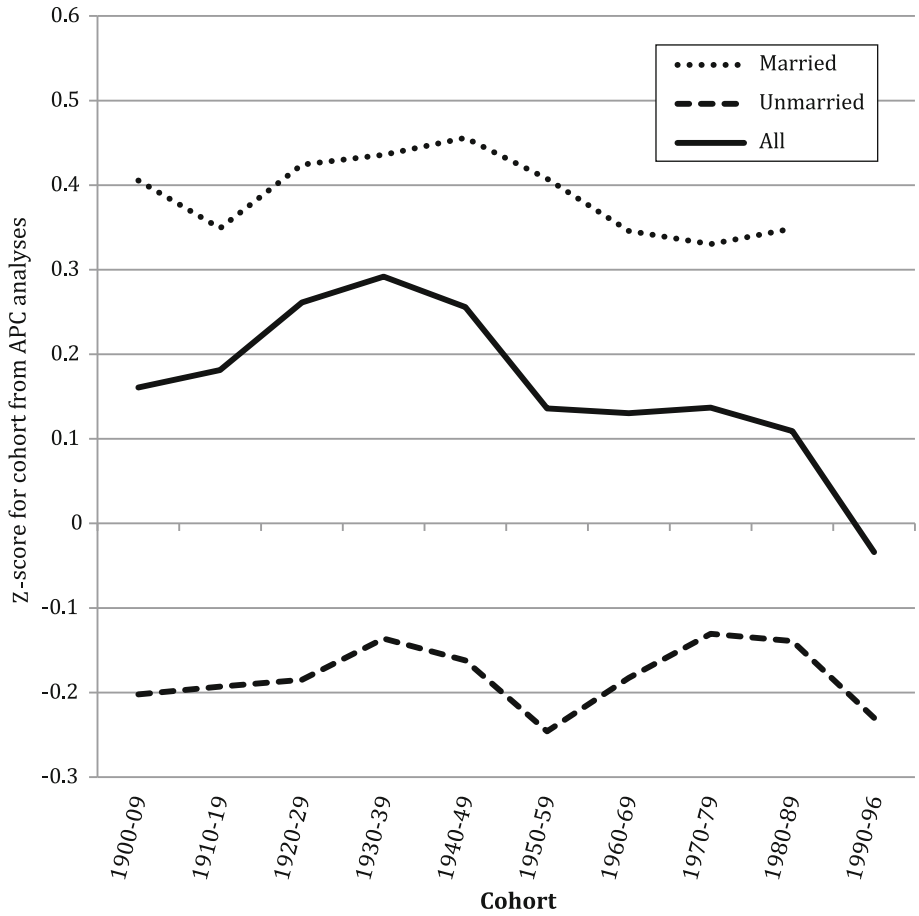

Fig. 5 Cohort differences in sexual frequency among married, unmarried, and all American adults, 0–6 scale standardized, in APC analyses controlling for age and time period

ples of having school-age children and being older, both of which seem to decrease sexual frequency. The decline in sexual frequency was larger among those with children aged 6–12, suggesting that couples with children this age are more likely than others to be having sex less often.

The marriage advantage for sexual frequency declined over time; while in previous decades married individuals had sex more often, by the mid-2000s never married individuals had sex more often. This is partially due to the later age at first marriage in the U.S.: More Americans are spending their 20s unmarried, while in past decades they spent these years of higher sexual frequency married. However, the decline in the marriage advantage for sexual frequency still held when age was controlled, suggesting that married individuals are having sex less frequently in recent years regardless of age effects, while never married individuals are having sex just as often as in past eras. The limited data on living situations showed a similar trend, with declines larger among those living with their (married or unmarried) partners and little change among those with no steady partner. With never married and unpartnered individuals having about the same amount of sex and married and partnered individuals having less, the partner advantage for sexual frequency has declined. This suggests that opportunities for sex for those without steady partners have stayed about the same, while sex within steady partnerships has become less frequent.

This decline in sexual frequency for married individuals has occurred at the same time that happiness for adults over 30 has declined (Twenge et al., 2016a). Though this corresponds with research indicating that low sexual frequency is one of the most common complaints among couples (Risch et al., 2003), other research indicates that external requests to increase sexual frequency (as advised by some self-help books or therapists) may actually be associated with decreased happiness and sexual enjoyment (Loewenstein, Krishnamurti, Kopsic, & McDonald, 2015). As such, understanding the root causes of decreased frequency and considering discrepancy between ideal and actual frequency would be more useful in designing therapeutic approaches around low sexual frequency (when that low sexual frequency is identified as a problem for the couple or individual).

We found that sexual frequency declined markedly with age, peaking at over 80 times a year in the mid- to late-20s and declining to about 30 times a year by the mid-60s. Men reported having sex more often than women; this could be due to a true difference (perhaps partially due to same-sex sexual experience) or to a greater bias toward reporting (vs. not reporting) sexual activity. We also found that those who work full time have children in the

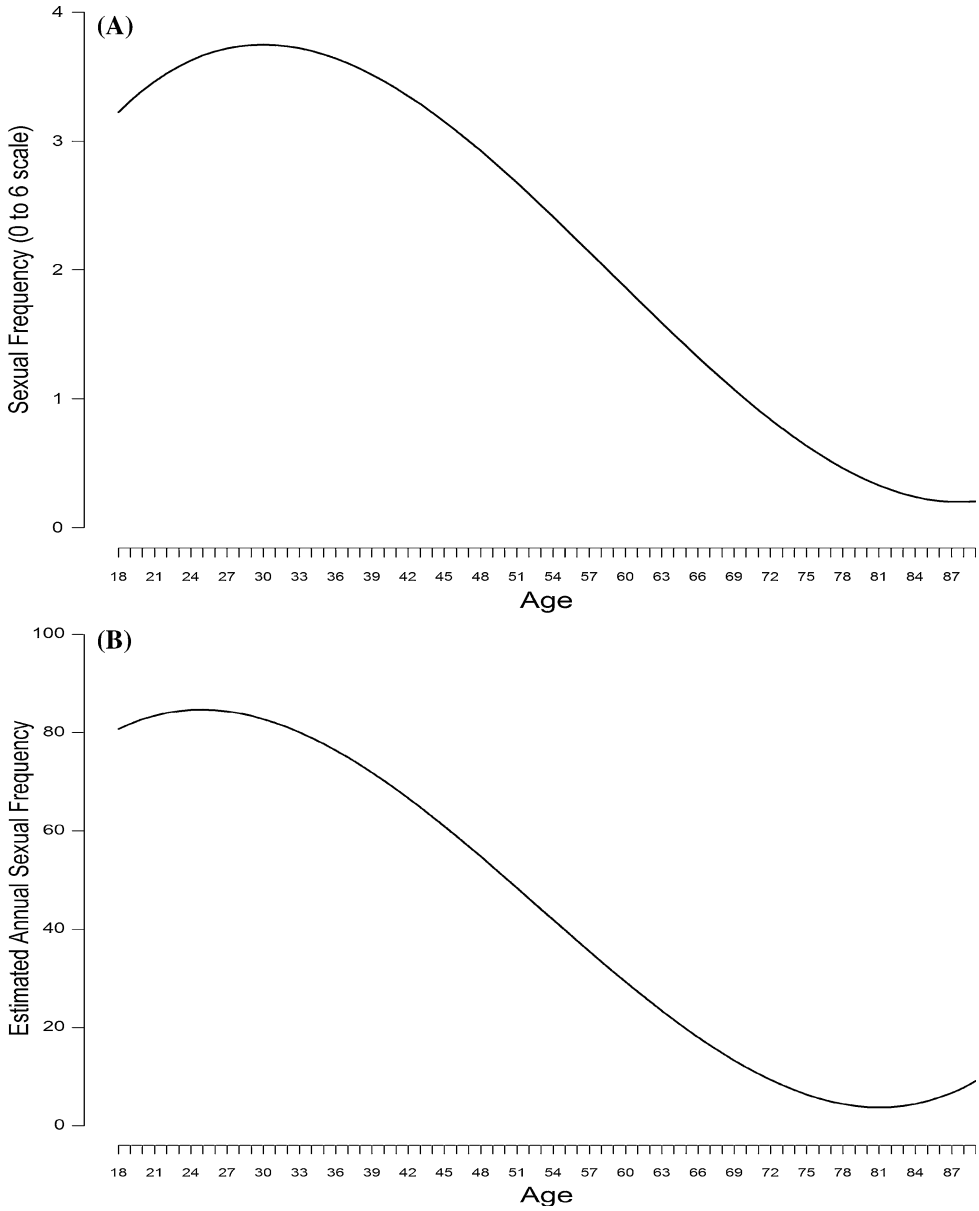

Fig. 6 Age differences in sexual frequency among American adults, in APC analyses controlling for time period and cohort, **a** 0–6 scale and **b** estimated times per year

household, and who watched a pornographic movie in the last year had sex more frequently.

Limitations

Participants may interpret the phrase "had sex" in a variety of ways that may influence their response (Bersamin, Fisher, Walker, Hill, & Grube, 2007). While some may use strict definitions of vaginal-penile intercourse to answer that question (and perhaps not endorse this item if they engaged in anal but not vaginal sex), others may interpret sex much more broadly and respond affirmatively even if they have engaged in oral sex only. Further, interpretations of this question may have changed over time. It is possible that earlier generations counted any sexual activity as sex, thus increasing their sexual frequency, whereas younger generations may hold more strict definitions of sex as including only vaginal-penile penetration. However, alternatives to vaginal intercourse such as oral sex were less common behaviors in previous eras (e.g., Grunseit, Richters, Crawford, Song, & Kippax, 2005), making this explanation less likely. If anything, younger generations may be more likely to count oral and anal sexual acts as having "had sex," suggesting that the effect may be larger than reported here. For example, Peck et al. (2016) found that more diverse samples (which younger generations are) are more likely to identify oral sex as sex.

Then there is the question of whether masturbation counts as sex. Unfortunately, research examining construals of sex examined only mutual masturbation with a partner and not solo masturbation. Given that only a small minority of people considered even partnered masturbation to be sex (Randall & Byers, 2003), it

seems unlikely that many would consider solo masturbation to be sex. As the GSS does not include any items explicitly about solo masturbation, it is possible that participants are having just as many orgasms, but more through masturbation to make up for the decline in sex with a partner.

As the sample was nationally representative, the conclusions are primarily applicable to heterosexuals, who made up 96% (by identity) and 91% (by behavior) of the GSS sample as of 2014 (Twenge, Sherman, & Wells, 2016b). As this study included data only from the USA, its conclusions are limited to trends in that country and cannot be generalized to other nations.

Conclusions

American adults in the early 2010s report having sex about nine fewer times a year than those in the late 1990s. Analyses separating the effects of age, time period, and cohort suggest that this trend is primarily due to cohort, with those born in the 1930s (the Silent generation) having sex about six more times a year on average than those born in the 1990s (Millennials and iGen). Much of this decline is due to the lower marriage rate in recent years, as married individuals have sex more consistently than unmarried individuals (a similar trend appears for living together). In addition, those with steady partners are having sex less frequently. The decline in sexual frequency thus appears to be rooted in twin trends: Americans with steady partners are both fewer in number and have sex less often.

Compliance with Ethical Standards

Conflict of interest Jean M. Twenge declares that she has no conflict of interest. Ryne A. Sherman declares that he has no conflict of interest. Brooke E. Wells declares that she has no conflict of interest.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

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