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Sociodemographic Correlates of Sexlessness Among American Adults and Associations with Self-Reported Happiness Levels: Evidence from the U.S. General Social Survey

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Abstract Although sexual activity is commonly believed to be a key component of emotional well-being, little is known about the factors associated with the absence of sexual activity or its associations with self-reported happiness. Using the U.S. General Social Survey–National Death Index 2008 dataset, a series of nationally representative surveys (1988–2002), this study analyzed the sociodemographic and lifestyle factors associated with past-year sexlessness and self-reported happiness among American adults ($n = 17,744$). After adjustment for marital status, there were no significant time trends evident in the proportion of American adults reporting past-year sexlessness. Among participants (age = 18–89 years), 15.2% of males and 26.7% of females reported past-year sexlessness while 8.7% of males and 17.5% of females reported no sex for 5 years or more. For both genders, past-year sexlessness was most strongly associated with older age and being currently non-married in the multivariable models. Among males, the multivariable analysis also showed that sexlessness was associated with providing less than 20% of the household income (OR 2.27). In female participants, sexlessness was associated with very low income, poor health, lower financial satisfaction, absence of children, and having conservative sexual attitudes (OR 1.46–3.60). For both genders, Black race was associated with a much lower likelihood of sexlessness among currently non-married adults. The purported detrimental impact of sexlessness

on self-reported happiness levels was not evident in this large, nationally representative study after adjusting for sociodemographic factors. Sexless Americans reported very similar happiness levels as their sexually active counterparts.

Keywords Sexual activity · Abstinence · Virginity · Asexuality · Celibacy · DSM-5

Introduction

Human sexuality research has spanned a wide spectrum of biomedical and sociomedical disciplines, but there have been surprisingly few large-scale studies exploring the factors associated with the absence of sexual activity and its effects on well-being. Although research in this area has been advanced in recent years by interest in the phenomenon of asexuality, or lack of sexual attraction to others (Bogaert, 2004, 2015; Hoglund, Jern, Sandnabba, & Santtila, 2014), previous population-based studies of sexual activity have primarily been conducted to provide prevalence estimates of sexual behaviors (e.g., age of first coitus, presence of multiple sex partners, and engagement in homosexual sex) (Centers for Disease Control, 2002; Finer, 2007; Herbenick et al., 2010; Sandfort, Orr, Hirsch, & Santelli, 2008; Smith, 1991, 2006; Turner, Danella, & Rogers, 1995) for the purposes of tracking behavioral risk factors and informing policy. The primary shortcoming of these larger national surveys is that sexual activity is typically only examined in association with basic demographic characteristics and health risk behaviors, such as condom use and alcohol consumption. Moreover, due to the lack of a scientific consensus on the definition of sexlessness, such studies have varied widely in the duration of sexual inactivity from as little as 1–3 months (Herbenick et al., 2010; Moriki, Hayashi, & Matsukura, 2015) to lifetime abstinence (Chou, Ng, & Yu, 2014; Eisenberg, Shindel, Smith, Lue, & Walsh, 2009; Haydon, Cheng, Herring, McRae, & Halpern, 2014). These larger,

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population-based studies also tend not to examine links between sexuality and mental health, and often neglect contextual factors, such as household composition and the presence of life stressors.

In recent years, there has been increased research interest in positive psychology and subjective well-being (Seligman & Csikszentmihalyi, 2000; Seligman, Steen, Park, & Peterson, 2005). Much research has focused upon the common aspects of subjective well-being or self-reported happiness such as personality traits, social class, environmental aspects. Relatedness, or feelings of closeness with others, has been shown to be an integral aspect of positive well-being according to social determination theory (Ryan & Deci, 2000). Conventional wisdom among health researchers has thereby been that safe, consensual sex is essential for positive mood and general psychological health (Heiman et al., 2011). Hence, low levels of sexual activity among physically healthy adults have often been viewed as a marker of poor emotional and sexual well-being (Blanchflower & Oswald, 2004; Shreiner-Engel & Schiavi, 1986). Moreover, there has been a long-standing belief in popular psychology that sexlessness is symptomatic of long-term relationship problems (Schnarch & Maddock, 2003; Weiner-Davis, 2003), which are, in turn, correlated with poorer mental health outcomes (Prigerson, Maciejewski, & Rosenheck, 1999).

Despite clear implications for well-being research, prior investigations of sexual activity levels and mental health, however, have mainly examined associations in the context of sexual dysfunctions (Laumann, Glasser, Neves, & Moreira, 2009; Laumann et al., 2005; Marsiglio & Donnelly, 1991; Nicolosi et al., 2005; Shifren et al., 2008), in the chronically ill (Marsiglio & Donnelly, 1991; Pangman & Seguire, 2000), younger people (Eisenberg, Shindler, Smith, Breyer, & Lipshultz, 2010; Rasberry & Goodson, 2009), in substance abusing populations (Nettleman, Ingersoll, & Ceperich, 2006), and in older adults (DeLamater & Moorman, 2007; Lindau & Gavrilova, 2010; Lindau et al., 2007; Matthias, Lubben, Atchison, & Schweitzer, 1997; Nicolosi et al., 2006; Palacios-Cena et al., 2012; Patel, Gillespie, & Foxman, 2003; Schick et al., 2010; Wong, Leung, & Woo, 2009).

Since sexual abstinence can be presumed to be largely involuntary in most of these studied populations, sexual inactivity has, not surprisingly, been correlated with poorer mental health (Dunn, Croft, & Hackett, 1999; Rosen et al., 2009; Shifren, Monz, Russo, Segreti, & Johannes, 2008). Studies that have investigated the importance of sexual well-being to general happiness have been limited to sexually active participants (Blanchflower & Oswald, 2004). Although contextual factors, clinical factors, and lifestyle variables were often included in smaller sexual behavior surveys, these smaller studies were often conducted on non-representative samples that limited the generalizability of the results. The ideal study would be nationally representative and contain a wide array of psychosocial variables.

Aims

In order to address the dearth of scientific literature on the absence of sexual inactivity in the general population of healthy adults, the current study examined short-term and long-term sexual inactivity by estimating the prevalence of past-year and past 5-year sexlessness, defined as the absence of sexual partners, among a representative sample of adults in the U.S. This study also explored the sociodemographic, attitudinal, and lifestyle factors that were associated with past-year sexlessness. Finally, we investigated whether current happiness levels were associated with past-year sexlessness. Whether lack of sexual activity is, in fact, associated with lower subjective well-being in the general population bears importance for further research on human well-being and should be examined in order to inform clinical practice.

Method

Participants

The study population was drawn from the General Social Survey (GSS) linked to the National Death Index (the 2008 GSS-NDI) (Muennig, Johnson, Kim, Smith, & Rosen, 2011). The GSS is a serial cross-sectional survey conducted on a nationally representative sample of non-institutionalized U.S. adults over the age of 18 years. The study excludes those residing in long-term care facilities, school dormitories, religious institutes, military installations, and correctional facilities. Similar to other national surveys, the GSS only covers the non-institutionalized, civilian population due to the difficulty of obtaining special authorizations for conducting surveys within institutions such as the military or prison system.

Procedure

The face-to-face surveys have been conducted by the National Opinion Research Center almost every year since 1972. Between 1978 and 2002, the GSS has interviewed 55,087 participants with an overall response rate of over 80%, with extensive follow-up done to ensure non-responders are similar to responders. Questions related to sexual behaviors, however, have only been included since 1988 and this analysis thereby only examined participants interviewed in 1988–1991, 1993, 1994, 1996, 1998, 2000, and 2002 ($n = 17,728$).

Measures

The data analyzed in this survey include the following demographic items: gender, marital status (currently married, never been married, divorced/separated, widowed), age in years, educational

attainment (11 years or less, 12 years, 13–16 years, 17+ years), race (White, Black, other), presence of children (yes, no), household income group based upon inflation-adjusted income (adjusted for year 2000 dollar equivalents). The study recoded household into six levels based upon the distribution of the household income (<\$15 K to 75 K +/year) to allow sufficient sample sizes to conduct multivariate analysis. We recoded the participant's contribution to household income (<20, 20–39, 40–59, 60–79 and >80%) to investigate the relationship between household contributions and sexlessness. Additionally, this study instrument asked participants about their current self-rated physical health on a 4-point Likert scale (excellent, good, fair, and poor). The instruments asked participants about their current level of happiness (Taken all together, how would you say things are these days, would you say that you are very happy, pretty happy, or not too happy?).

Participants' job/work satisfaction and financial satisfaction were asked (satisfied, more or less satisfied, and dissatisfied). Sexual orientation was classified as heterosexual only or having some homosexual experience since age 18. We examined the levels of social engagement by classifying the number of times the participant socialized with friends and neighbors into three levels of socializing frequency (at least several times a month, once a month to several times per year, once a year or less). This study also examined conservative sexual beliefs measured as: attitudes toward homosexuality, teen sex, premarital sex, and extramarital sex (always wrong, almost always wrong, sometimes wrong, not wrong at all). The sexual attitudes variables were combined into an additive scale measuring sexual conservatism (scored 0–16) and trichotomized into three levels of increasing sexual conservatism. The scale had internal reliability (Cronbach's alpha = .65) above the minimally acceptable threshold (DeVellis, 1991).

The participant's sexual activity was examined by two open-ended items that asked how many sex partners the participant had in the preceding year and in the preceding five years. Participants who reported no sexual partners were recoded as past-year sexless (Yes/No) and past 5-year sexless (Yes/No), respectively. The item did not further inquire as to the type of sexual activity with the other person or whether the sexual activity was voluntary or not.

Data Analysis

Background characteristics of the study sample were summarized after stratification by sexual activity status (Table 1). Preliminary analyses noted no statistically significant period effects in the overall study sample after adjusting for marital status, so data across all surveys were aggregated for further analyses.

The study first examined the prevalence of sexlessness after stratification by gender, marital status, and race to examine sexless status in the US population by these broad sociodemographic classifications. The odds ratios for sexless status were calculated (White race as referent group) after adjusting for older age (65 + years) and household income level (Table 2) which were identified as the major confounding factors in the preliminary unadjusted analyses.

The study then examined the prevalence of sexlessness by demographic, health, lifestyle, and attitudinal factors (Tables 3, 4). The unadjusted odds ratios and 95% confidence intervals (CI) were estimated to identify factors that were associated with past-year sexlessness. All sociodemographic variables that were marginally significant in the unadjusted analyses ($p < .20$) were used as candidate variables for the sociodemographic multivariable stepwise logistic regression of sexless status. A second multivariable logistic regression model (full model) was estimated for past-year sexless status using sociodemographic, attitudinal, and lifestyle variables that were marginally significant in the unadjusted analyses ($p < .20$) as candidate variables. All multivariable models included significant interaction terms of main effect variables.

After stratifying by marital subgroup, multinomial logistic regression analyses were conducted to examine the association with past-year sexlessness and the following outcome categories (very happy = referent, pretty happy, and not too happy). In order to avoid confounding bias introduced by poor health status in the association between sexual activity and happiness (Lindau et al., 2007; Schick et al., 2010), we restricted the analysis to those with "excellent," "good," or "fair" health. The odds ratios and 95% CI were reported after adjusting for the following potential confounding factors: age, household income levels, educational attainment, race, and level of social engagement. Since participants were asked about their current happiness levels, only associations with past-year sexlessness were examined. Statistical significance was set at $p < .05$. SPSS version 16.0 was used for descriptive analyses. SAS version 9.2 was used for multivariable analysis.

Results

The background characteristics of the study sample are shown in Table 1. The study sample included adults 18–89 years of age ($M = 45$ years) at the time of the survey whose year 2000 inflation-adjusted annual household incomes ranged from \$486 to \$166,419 (median = \$36,883). Of the study sample, 21.5% reported not having sexual activity in the year preceding the survey and 13.6% of the sample did not have sex for five years or more. As compared with their sexually active counterparts, past-year sexlessness was more prevalent in females, Whites, the elderly, currently unmarried individuals, those who were religiously observant, and those with lower SES. Sexless adults were also more likely to have poorer health and more conservative sexual attitudes ($p < .05$). The majority of those who reported past-year sexlessness also reported past 5-year sexlessness, and the same significant trends were noted with background factors. There were no significant time trends in the proportion of sexless adults across the study period after adjusting for marital status.

The prevalence of past-year and past 5-year sexlessness stratified by sex, marital status, and race is shown in Table 2. Never-married, divorced/separated, and widowed Black males showed lower likelihood of sexlessness as compared to their White counterparts,

Table 1 Background characteristics of the General Social Survey Sample (1988–2002)

	Total sample (<i>n</i> = 17,744) (%)	Sex in past year (<i>n</i> = 13,928) (%)	Past-year sexless (<i>n</i> = 3816) (%)	Past 5-year sex (<i>n</i> = 11,711) (%)	Past 5-year sexless (<i>n</i> = 1851) (%)
<i>Gender</i> ^{a,b}					
Male	43.6	47.0	30.9	46.3	28.0
Female	56.4	53.0	69.1	53.7	72.0
<i>Age at time of survey</i> ^{a,b}					
<25	9.9	10.8	6.4	9.8	7.6
25–34 year	22.6	26.6	7.8	25.4	5.6
35–44 year	23.4	26.9	10.5	26.4	7.3
45–54 year	16.6	17.5	13.0	18.7	10.3
55–64 year	11.0	10.0	14.6	10.4	13.6
65–74 year	9.8	6.2	23.1	6.7	24.2
75 + year	6.8	2.0	24.6	2.6	31.4
<i>Race</i> ^{a,b}					
White	82.4	81.9	84.3	81.6	84.6
Black	12.6	12.8	11.8	13.0	11.3
Other race	5.1	5.4	3.9	5.5	4.1
<i>Years of education</i> ^{a,b}					
11 years or less	18.1	15.3	28.2	14.3	29.0
High school graduate	30.5	30.4	30.8	30.0	30.9
13–16 yrs (some college)	40.4	42.6	32.3	43.6	30.9
17+ years (post-college)	11.1	11.7	8.8	12.1	9.2
<i>Household income</i> ^{a,b,c}					
<\$20,000/year	26.2	21.0	46.5	21.7	49.5
20,000–44,999/year	33.1	33.1	33.2	34.0	31.9
45,000–69,999/year	21.3	23.6	12.7	22.6	12.0
70,000/year	19.3	22.4	7.6	21.7	6.6
<i>Marital status</i> ^{a,b}					
Married	50.2	59.6	15.6	54.9	13.5
Never married	22.2	21.5	25.1	22.4	26.4
Divorced/separated	18.2	16.6	24.0	18.6	20.2
Widowed	9.4	2.3	35.4	4.0	39.8
<i>Attend religious services?</i> ^{a,b}					
Never	18.8	18.7	19.4	19.5	18.8
Less than weekly	46.1	49.4	34.5	28.7	32.5
At least weekly	35.0	32.0	46.0	31.8	48.8
<i>Self-reported health status</i> ^{a,b}					
Excellent/good health	78.5	82.2	65.1	81.2	64.2
Fair/poor health	21.5	17.8	34.9	18.8	35.2
<i>Agree with the following</i> ^d					
Premarital sex is wrong ^{a,b}	35.1	30.0	54.0	30.4	61.6
Extramarital sex is wrong ^{a,b}	91.9	91.5	93.3	91.6	93.9
Teen sex is wrong ^{a,b}	86.7	85.2	92.1	85.7	92.7
Homosexual sex is wrong ^{a,b}	69.3	66.8	78.4	70.3	84.2

Table 1 continued

	Total sample (<i>n</i> = 17,744) (%)	Sex in past year (<i>n</i> = 13,928) (%)	Past-year sexless (<i>n</i> = 3816) (%)	Past 5-year sex (<i>n</i> = 11,711) (%)	Past 5-year sexless (<i>n</i> = 1851) (%)
<i>GSS Study Cohort</i> ^{e,f}					
1988–1994	48.3	48.1	48.9	34.1	34.5
1996–2002	51.7	51.9	51.1	65.9	65.5

^a *p* < .05 for past-year sexless

^b *p* < .05 for past 5-year sexless

^c Inflation adjusted to year 2000

^d Responded that that the action was “Always” or “Almost Always” wrong

^e Not significant at *p* < .05 for past-year sexless

^f Not significant at *p* < .05 for past 5-year sexless

Table 2 Prevalence of past-year and past 5-year sexlessness by gender, marital status, and race of American adults (18–89 years of age)

Current marital status	Males				Females			
	Males (<i>n</i>)	Past-year sexless/past 5-year sexless (%)	OR (95% CI) ^a past-year sexless	OR (95% CI) ^a past 5-year sexless	Females (<i>n</i>)	Past-year sexless/past 5-year sexless (%)	OR (95% CI) ^a past-year sexless	OR (95% CI) ^a past 5-year sexless
<i>Married</i>								
White	3673	6.8/3.7	1.00	1.00	4120	6.5/3/6	1.00	1.00
Other race	194	6.2/4.4	ns	ns	227	3.5/2.9	ns	ns
Black	334	9.0/4.8	1.66 (1.02–2.70)*	ns	351	8.5/4.8	ns	ns
<i>Never married</i>								
White	1625	25.4/16.2	1.00	1.00	1265	28.9/19.9	1.00	1.00
Other race	143	24.5/15.7	ns	ns	147	23.8/17.5	ns	ns
Black	247	8.5/5.7	0.31 (0.20–0.51)**	0.35 (0.18–0.67)*	518	16.8/8.6	0.58 (0.43–0.79)*	0.39 (0.24–0.62)**
<i>Divorced/separated</i>								
White	989	20.6/8.0	1.00	1.00	1556	35.8/20.3	1.00	1.00
Other race	47	17.0/2.6	ns	ns	96	26.0/15.7	ns	ns
Black	172	12.8/5.6	0.55 (0.33–0.92)*	ns	364	26.9/14.8	0.67 (0.50–0.89)**	0.60 (0.38–0.95)*
<i>Widowed</i>								
White	258	64.0/40.8	1.00	1.00	1131	88.2/69.1	1.00	1.00
Other race	9	33.3/20.0	ns	ns	33	72.7/47.6	ns	ns
Black	38	42.1/20.7	0.41 (0.18–0.98)*	ns	204	71.1/55.8	0.34 (0.21–0.53)**	0.52 (0.32–0.84)*

* *p* < .05; ** *p* < .001

^a Adjusted for income (0–19,999, 20 K–44,999, 50 K–69,999, 70 K) and age (elderly vs. not)

whereas married Black males had higher likelihood of sexlessness. Among females, Black race was significantly associated with lower likelihood of past-year and past 5-year sexlessness among never-married, divorced/separated, and widowed participants.

The proportion of participants who reported past-year and past 5-year sexlessness is shown by sociodemographic, attitudinal,

and lifestyle factors among males (Table 3) and among females (Table 4). Among male participants, all sociodemographic factors except homosexual orientation were statistically significant with respect to associations with sexlessness in the unadjusted analyses. However, the full multivariable model of sociodemographic, lifestyle, and attitudinal factors showed that older age and not being

Table 3 Factors associated with sexlessness among all males participants from the General Social Survey

	% past-year sexless	% 5-year sexless	Unadjusted model for past-year sexlessness OR (95% CI)	Demographic and health factors model for past-year sexlessness OR (95% CI)	All factors model for past-year sexless OR (95% CI)
Total male study sample	15.2	8.7			
<i>Age at time of survey</i>					
<25	16.2	13.6	1.00	1.00	1.00
25–34 y	8.2	3.4	0.46 (0.36–0.59)[‡]	0.97 (0.66–1.43)	0.98 (0.52–1.87)
35–44 y	7.7	3.3	0.43 (0.34–0.56)[‡]	1.70 (1.12–2.56)*	1.78 (0.90–3.53) [§]
45–54 y	12.6	6.7	0.75 (0.58–0.96)*	3.86 (2.48–6.00)[‡]	5.01 (2.39–10.5)[‡]
55–64 y	15.0	6.8	0.91 (0.70–1.19)	3.23 (1.95–5.35)[‡]	2.64 (1.00–6.97)*
65 +	41.6	28.3	3.69 (2.95–4.60)[‡]	18.2 (10.6–31.3)[‡]	28.7 (11.4–72.3)[‡]
<i>Years of education</i>					
17+ years (post-college)	12.2	6.5	1.00	Non-significant ^a	Non-significant ^b
13–16 years (college)	12.9	7.1	1.06 (0.86–1.32)		
HS diploma (12 years)	15.1	8.6	1.28 (1.02–1.60)*		
11 years or less	23.2	15.3	2.17 (1.73–2.73)[‡]		
<i>Race</i>					
White	15.8	9.1	1.00	1.00	1.00
Black	11.2	6.0	0.68 (0.54–0.85)[†]	1.58 (0.73–3.43)	3.81 (1.29–11.3)*
Other race	14.7	8.5	0.92 (0.69–1.23)	2.29 (0.95–5.50)	4.29 (1.13–16.3)*
<i>Marital status</i>					
Married	6.9	3.8	1.00	1.00	1.00
Never married	23.3	14.9	4.08 (3.48–4.77)[‡]	12.3 (7.96–18.9)[‡]	35.5 (17.7–71.3)[‡]
Divorced/separated	19.4	7.4	3.23 (2.68–3.89)[‡]	6.06 (4.16–8.82)[‡]	11.8 (5.93–23.6)[‡]
Widowed	60.3	37.9	20.4 (15.8–26.5)[‡]	18.5 (10.3–33.2)[‡]	68.9 (23.9–198.6)[‡]
<i>Past-year household income**</i>					
\$75,000 +/year	7.2	4.1	1.00	1.00	Non-significant ^c
\$60 K–74,999/year	9.2	5.3	1.30 (0.94–1.79)	1.05 (0.66–1.68)	
\$45 K–59,999/year	11.4	5.9	1.65 (1.26–2.17)[‡]	1.53 (1.03–2.25)*	
\$30 K–44,999/year	13.2	7.3	1.95 (1.52–2.51)[‡]	1.47 (1.01–2.11)*	
\$15 K–29,999/year	20.4	11.0	3.29 (2.60–4.16)[‡]	1.60 (1.10–2.32)*	
<\$15 K/year	29.1	18.8	5.28 (4.14–6.74)[‡]	1.59 (1.03–2.45)*	
<i>Household income contribution</i>					
80–100%	11.3	5.1	1.00	1.00	1.00
60–79%	6.9	3.4	0.58 (0.43–0.78)[‡]	1.34 (0.93–1.95)	1.40 (0.75–2.58)
40–59%	7.2	3.3	0.61 (0.47–0.79)[‡]	1.10 (0.77–1.57)	1.03 (0.56–1.92)
20–39%	9.3	5.8	0.81 (0.58–1.14)	0.85 (0.54–1.33)	0.60 (0.26–1.39)
0–19%	21.6	18.2	2.16 (1.60–2.93)[‡]	2.10 (1.40–3.18)[‡]	2.27 (1.19–4.31)*
<i>Self-reported health</i>					
Excellent to fair health	14.6	8.0	1.00	1.00	Non-significant ^d
Poor health	38.4	26.6	3.65 (2.75–4.85)[‡]	1.90 (0.98–3.69) [§]	
<i>Participant has children</i>					
No children	20.7	12.8	1.00	1.00	Non-significant ^e
Has children	12.3	6.5	0.54 (0.48–0.61)[‡]	0.71 (0.52–0.98)*	
<i>Marital status × race</i>					
Never married—Black	8.4	5.7		0.20 (0.70–0.57)[†]	0.02 (0.002–0.23)[†]
Never married—Other race	28.1	15.7		0.53 (0.19–1.49)	0.24 (0.04–1.30) [§]
Divorced/Sep.—Black	10.7	5.6		0.59 (0.21–1.63)	0.19 (0.04–0.88)*
Divorced/Sep.—Other race	15.8	2.6		0.59 (0.16–2.16)	0.30 (0.03–2.68)
Widowed—Black	30.8	20.7		0.06 (0.01–0.65)*	NE

Table 3 continued

	% past-year sexless	% 5-year sexless	Unadjusted model for past-year sexlessness OR (95% CI)	Demographic and health factors model for past-year sexlessness OR (95% CI)	All factors model for past-year sexless OR (95% CI)
Widowed—Other race	0.0	20.0		NE	NE
Psychosocial/lifestyle factors					
<i>Homosexual experience</i>					
Never since age 18	7.1	NA	1.00		Non-significant ^f
Ever since age 18	8.7	NA	1.25 (0.79–1.98)		
Current job/work satisfaction					
Satisfied	10.2	5.2	1.00		Non-significant ^g
Neutral/not sure	13.0	2.2	1.32 (0.65–2.67)		
Dissatisfied	11.7	7.2	1.17 (0.94–1.46)		
<i>Current financial satisfaction</i>					
Satisfied	17.1	10.6	1.00		Non-significant ^h
More or less satisfied	13.8	7.7	0.77 (0.67–0.89) [†]		
Not at all satisfied	14.7	7.9	0.83 (0.70–0.99)*		
<i>Social engagement levels</i>					
At least several times/month	14.2	8.4	1.00		Non-significant ⁱ
Once/month-several times/yr	13.1	6.6	0.91 (0.76–1.09)		
Socialize once/year or less	26.1	18.3	2.12 (1.65–2.74)[‡]		
<i>Sexual attitudes</i>					
Liberal attitudes	11.7	5.8	1.00		1.00
Moderate attitudes	11.0	4.8	0.93 (0.54–1.61)		1.07 (0.52–2.18)
Conservative attitudes	17.2	11.5	1.56 (0.92–2.65) [§]		(0.93–3.85) [§]

All statistically significant associations are shown in bold

* $p < .05$; [†] $p < .01$; [‡] $p < .001$; [§] $p < .10$

** Adjusted for Year 2000 equivalent value. NE non-estimatable due to small sample size

The following variables were dropped from the stepwise regression model. The odds ratios and 95% CI prior to exclusion in the multivariable models are shown

^a Education: 13–16 years = 0.98 (0.69–1.39); high school diploma = 1.08 (0.74–1.58); 11 years or less = 1.01 (0.65–1.57)

^b Education: 13–16 years = 0.58 (0.21–1.62); high school diploma = 0.65 (0.21–2.02); 11 years or less = 0.35 (0.06–1.94)

^c Household income: \$60 K–74,999 = 1.45 (0.31–6.72); \$45 K–59,999 = 1.13 (0.24–0.54); \$30 K–44,999 = 1.90 (0.27–9.06); \$15 K–29,999 = 1.47 (0.21–10.1); <15 K = 2.58 (0.48–13.8)

^d Self-reported health: Poor health = 0.15 (0.001–18.5)

^e Presence of children: Having children = 1.01 (0.34–2.96)

^f Homosexual experience: Gay/bisexual orientation = 2.51 (0.73–8.66)

^g Job satisfaction: Neutral = 4.16 (0.81–21.3); Dissatisfied = 0.89 (0.51–1.55)

^h Financial satisfaction: More or less satisfied = 1.29 (0.49–3.36); Not at all satisfied = 1.54 (0.51–4.68)

ⁱ Social engagement levels: Socialized 1 × month-several times/year: 1.46 (0.64–3.32); Socialized 1 ×/year or less = 1.16 (0.18–7.35)

married remained the factors most strongly associated with past-year sexlessness. Lower contribution to household income (<20%) showed moderate associations with past-year sexlessness, and conservative sexual attitudes showed marginally significant associations with past-year sexlessness. Among married males, non-Whites were more likely to be sexless but among non-married males, Blacks were much less likely to be sexless. Among females, the multivariable model limited to demographic and health factors showed associations that were similar to males. However, poor health and having no children were significantly associated with sexlessness while lower contribution to household income was not. When psychoso-

cial factors were included as candidate variables, having a conservative sexual attitude and having low financial satisfaction were also significantly associated with past-year sexlessness ($p < .05$). Never-married, divorced/separated, and widowed Blacks were much less likely to be sexless than their White female counterparts.

Finally, we explored whether self-reported happiness levels were associated with sexual activity for males and females without poor health (Table 5). After stratification by marital status, the multinomial odds ratios with being “Very Happy” as the referent outcome showed that past-year sexlessness was not associated with self-reported past-year happiness levels after adjusting for the

Table 4 Factors associated with sexlessness among all females participants from the General Social Survey

	% past-year sexless	% 5-year sexless	Unadjusted model for past-year sexlessness odds ratio (95% CI)	Demographic and health factors model for past-year sexlessness OR (95% CI)	All factors model for past-year sexless OR (95% CI)
Total female study sample	26.3	17.4			
<i>Age at time of survey</i>					
<25	11.8	8.6	1.00	1.00	1.00
25–34 year	6.8	3.3	0.54 (0.42–0.71)[‡]	0.97 (0.69–1.36)	0.78 (0.47–1.32)
35–44 year	11.2	4.9	0.95 (0.75–1.20)	2.99 (2.11–4.23)[‡]	1.74 (0.99–3.07) §
45–54 year	20.4	9.2	1.92 (1.52–2.42)[‡]	7.25 (5.04–10.4)[‡]	5.34 (2.99–9.54)[‡]
55–64 year	38.9	25.2	4.77 (3.78–6.01)[‡]	22.4 (15.1–33.1)[‡]	15.9 (8.48–29.6)[‡]
65 +	73.7	61.3	21.0 (16.8–26.3)[‡]	76.4 (51.1–114.2)[‡]	44.7 (23.1–86.4)[‡]
<i>Years of education</i>					
17 + years (post-college)	21.9	14.8	1.00	Non-significant ^a	Non-significant ^c
13–16 years (college)	20.6	12.4	0.93 (0.78–1.10)		
HS diploma (12 years)	26.2	17.8	1.27 (1.07–1.50)[†]		
11 years or less	41.0	31.1	2.48 (2.07–2.96)[‡]		
<i>Race</i>					
White	27.1	18.2	1.00	1.00	1.00
Black	25.1	15.4	0.90 (0.79–1.02)	1.50 (0.86–2.62)	2.13 (0.89–5.08)
Other race	18.3	12.4	0.60 (0.48–0.76)[‡]	1.32 (0.55–3.22)	1.57 (0.43–5.66)
<i>Marital status</i>					
Married	6.5	3.7	1.00	1.00	1.00
Never married	25.2	16.5	4.88 (4.18–5.70)[‡]	22.8 (16.1–32.3)[‡]	39.4 (21.5–72.3)[‡]
Divorced/separated	33.7	19.1	7.36 (6.34–8.53)[‡]	15.7 (12.0–20.5)[‡]	23.1 (14.6–36.5)[‡]
Widowed	85.2	66.6	83.4 (69.0–100.8)[‡]	31.7 (23.3–43.1)[‡]	49.5 (28.9–85.0)[‡]
<i>Past-year household income **</i>					
\$75,000 +/year	8.5	4.3	1.00	1.00	Non-significant ^d
\$60 K–74,999/year	11.5	6.7	1.40 (1.05–1.88)*	1.09 (0.72–1.67)	
\$45 K–59,999/year	14.8	9.2	1.88 (1.46–2.41)[‡]	1.25 (1.10–1.80)	
\$30 K–44,999/year	21.6	13.2	2.97 (2.37–3.72)[‡]	1.48 (1.06–2.06)*	
\$15 K–29,999/year	30.4	19.6	4.71 (3.81–5.81)[‡]	1.52 (1.11–2.08)*	
<\$15 K/year	44.4	31.0	8.61 (6.98–10.6)[‡]	1.77 (1.27–2.45)[†]	
<i>Household income contribution</i>					
80–100%	25.9	14.0	1.00	Non-significant ^b	Non-significant ^c
60–79%	15.6	8.7	0.53 (0.41–0.69)[‡]		
40–59%	8.6	4.6	0.27 (0.22–0.34)[‡]		
20–39%	9.1	3.7	0.29 (0.23–0.36)[‡]		
0–19%	10.7	7.4	0.34 (0.27–0.43)[‡]		
<i>Self-reported health</i>					
Excellent to fair health	24.7	16.1	1.00	1.00	1.00
Poor health	57.8	42.1	4.19 (3.40–5.15)[‡]	1.99 (1.44–2.76)[‡]	2.93 (1.65–5.20)[‡]
<i>Participant has children</i>					
No children	27.5	19.5	1.00	1.00	1.00
Has children	25.9	16.8	0.21 (0.83–1.02)	0.56 (0.45–0.81)[‡]	0.46 (0.31–0.69)[‡]
<i>Marital status × race</i>					
Never married—Black	14.3	8.6		0.37 (0.19–0.72)[†]	0.16 (0.05–0.46)[‡]
Never married—Other race	21.9	17.5		0.98 (0.35–2.72)	0.79 (0.17–3.74)
Divorced/Sep.—Black	24.2	14.8		0.42 (0.22–0.80)[†]	0.30 (0.11–0.87)*
Divorced/Sep.—Other race	15.9	15.7		0.65 (0.21–1.97)	0.15 (0.02–1.11)
Widowed—Black	65.6	55.8		0.29 (0.13–0.61)[†]	0.10 (0.03–0.37)[‡]

Table 4 continued

	% past-year sexless	% 5-year sexless	Unadjusted model for past-year sexlessness odds ratio (95% CI)	Demographic and health factors model for past-year sexlessness OR (95% CI)	All factors model for past-year sexless OR (95% CI)
Widowed—Other race	68.8	47.6		1.22 (0.29–5.10)	NE
Psychosocial/lifestyle factors					
<i>Homosexual experience</i>					
Never since age 18	10.1	NA	1.00		Non-significant ^f
Ever since age 18	4.4	NA	0.41 (0.22–0.78) †		
<i>Current job/work satisfaction</i>		Ns			
Satisfied	18.1	10.6	1.00		Non-significant ^g
Neutral/not sure	14.9	13.5	0.79 (0.35–1.77)		
Dissatisfied	18.5	8.8	1.03 (0.87–1.21)		
<i>Current financial satisfaction</i>					
Satisfied	29.2	21.2	1.00		1.00
More or less satisfied	25.7	17.4	0.83 (0.75–0.94) †		1.46 (1.03–2.06)*
Not at all satisfied	24.5	14.0	0.79 (0.70–0.89) ‡		1.43 (0.97–2.11) [§]
<i>Social engagement levels</i>					
At least several times/month	25.9	16.2	1.00		Non-significant ^g
Once/month-several times/yr	22.1	14.5	0.81 (0.72–0.93) †		
Socialize once/year or less	43.0	33.2	2.16 (1.81–2.57) ‡		
<i>Sexual attitudes</i>					
Liberal attitudes	13.9	5.3	1.00		1.00
Moderate attitudes	15.2	7.2	1.11 (0.64–1.94)		0.97 (0.68–1.26)
Conservative attitudes	34.3	24.8	3.23 (1.89–5.52) ‡		3.60 (1.86–6.96) ‡

All statistically significant associations are shown in bold

* $p < .05$; † $p < .01$; ‡ $p < .001$; § $p < .10$

** Adjusted for Year 2000 equivalent value. NE non-estimatable due to small sample size

The following variables were non-significant and dropped from the stepwise regression model for females

^a Education: 13–16 years = 0.95 (0.72–1.24); high school diploma = 0.87 (0.65–1.16); 11 years or less = 0.83 (0.60–1.16)

Contribution to household income: 60–79% = 0.97 (0.62–1.53); 40–59% = 1.07 (0.68–1.68); 20–39% = 0.82 (0.49–1.37); 0–19% = 0.78 (0.52–1.16)

^c Education: 13–16 years = 0.93 (0.41–2.12); high school diploma = 0.72 (0.28–1.81); 11 years or less = 0.84 (0.26–2.73)

^d Household income: \$60 K–74,999 = 2.10 (0.62–7.20); \$45 K–59,999 = 0.99 (0.34–2.95); \$30 K–44,999 = 2.01 (0.75–5.38); \$15 K–29,999 = 1.33 (0.50–3.52); <15 K = 1.32 (0.48–3.68)

^e Contribution to household income: 60–79% = 0.84 (0.33–2.15); 40–59% = 1.75 (0.75–4.08); 20–39% = 0.90 (0.33–2.46); 0–19% = 0.69 (0.20–2.39)

^f Job satisfaction: neutral = 0.00 (0-inf); dissatisfied = 1.32 (0.71–2.44)

^g Social engagement levels: socialized 1 × month-several times/year = 1.02 (0.65–1.59); socialized 1 × /year or less = 0.64 (0.29–1.42)

potential confounding effects of age, socioeconomic status, race, and social engagement levels. In particular, never-married adults showed virtually identical levels of happiness between sexually active and sexless participants.

Discussion

We found that nearly one in six men and over one in four women in the USA did not have sex for at least one year; moreover, the majority of the sexually inactive were sexless for five years or more. Sexual inactivity is thereby not necessarily a short-term interruption

of sex, but often represents a long-lasting lifestyle in a non-negligible percentage of American adults. The proportion of individuals who reported past-year sexlessness was roughly similar to those estimated by other large-scale, cross-sectional US studies (Laumann et al., 2009; Smith, 1991) and corroborated the generally higher prevalence among females (Waite, Laumann, Das, & Schumm, 2009). Due to the lack of reliable population-based data from the international literature, however, it could not be ascertained whether American adults as a whole are more or less sexless than their counterparts in other countries. However, remarkably similar percentage of past-year sexlessness was noted between a Swedish study of 70-year-old adults (34% of males and 66% of females)

Table 5 Self-reported past-year happiness levels versus past-year sexlessness status with multinomial odds ratios of happiness levels among healthy adults ^a

Happiness levels outcomes	Males			Females		
	Had sex	Sexless	OR _{adj} (95% CI) ^b	Had sex	Sexless	OR _{adj} (95% CI) ^b
<i>Married participants</i>	<i>n</i> = 2739	<i>n</i> = 190		<i>n</i> = 2959	<i>n</i> = 183	
Very happy	40.5%	42.6%	Referent outcome	43.0%	30.6%	Referent outcome
Pretty happy	54.1%	51.1%	1.02 (0.61, 1.71)	51.5%	59.0%	0.68 (0.40, 1.16)
Not too happy	5.4%	6.3%	1.13 (0.41, 3.14)	5.5%	10.4%	0.67 (0.23, 2.00)
<i>Never-married participants</i>	<i>n</i> = 1094	<i>n</i> = 317		<i>n</i> = 1007	<i>n</i> = 324	
Very happy	20.8%	18.9%	Referent outcome	23.2%	23.8%	Referent outcome
Pretty happy	65.5%	65.9%	1.08 (0.66, 1.78)	62.7%	63.3%	0.73 (0.44, 1.20)
Not too happy	13.6%	15.1%	0.93 (0.45, 1.89)	14.1%	13.0%	0.61 (0.28, 1.30)
<i>Divorced/separated participants</i>	<i>n</i> = 681	<i>n</i> = 145		<i>n</i> = 895	<i>n</i> = 435	
Very happy	17.0%	20.7%	Referent outcome	18.7%	20.9%	Referent outcome
Pretty happy	66.8%	61.4%	1.08 (0.53, 2.19)	64.4%	62.1%	1.56 (0.97, 2.50)
Not too happy	16.2%	17.9%	0.65 (0.26, 1.64)	17.0%	17.0%	1.36 (0.69, 2.68)
<i>Widowed participants</i>	<i>n</i> = 79	<i>n</i> = 117		<i>n</i> = 142	<i>n</i> = 771	
Very happy	30.4%	19.7%	Referent outcome	26.8%	25.3%	Referent outcome
Pretty happy	58.2%	56.4%	0.39 (0.09, 1.64)	48.6%	60.6%	0.66 (0.28, 1.53)
Not too happy	11.4%	23.9%	0.52 (0.06, 4.79)	24.6%	14.1%	1.54 (0.53, 4.45)

^a Participants with baseline health reported as “poor” were excluded from analysis

^b Adjusted for age (18–34, 35–49, 50–64, 65+), household income, education, race, and social engagement levels (see Table 3 for categories)

(Beckman, Waern, Gustafson, & Skoog, 2008) with our own study population (41.6% and 64.8%, respectively). Middle-aged, married Americans, however, were notably much less likely to be sexless than their counterparts in East Asia. A study of married Hong Kong Chinese between 45 to 59 years of age revealed that one-third of women and 17% of the males were sexually abstinent (Kim, Lau, & Cheuk, 2009) (versus 5.7% and 4.5%, respectively, in our sample). A Japanese study of married couples up (20–59 years of age) also reported that 24% of the sample did not have sex in the past year (Moriki et al., 2015). The similar percentages of marital sexlessness between genders in our study suggest that extra-marital sexual relationships are not strongly skewed toward one sex. The much lower prevalence of marital sexlessness in Americans is likely to be partially attributable to the relatively higher prevalence of divorce in Western countries (18.2% of this study sample versus <5% in the Chinese population) (Hong Kong Government, 2007), suggesting that couples in poor marital relationships in Western countries are less likely to remain together than in countries with lower cultural acceptance of divorce.

Examination of past 5-year sexlessness prevalence among never-married Americans in our study showed high levels of sexual inactivity across all age groups, lending credence to speculations that asexual individuals comprise a non-trivial percentage of the population. Recent research on asexuality has estimated that 1.5% of males and 3.3% of females in Finland reported no sexual attraction to others in the past year (Hoglund et al., 2014) and that about 1% of British adults have never experienced sexual attrac-

tion to anyone at all (Bogaert, 2004). The proportion of past 5-year sexlessness among those who have never been married in the 25–45 age group in our study was much higher (8.7% for males, 11.3% for females) that the above-cited prevalence estimates for asexuality but not vastly different from a 2002 study of lifetime virgins of the same age group (Eisenberg et al., 2009), suggesting that a large proportion of these individuals with long-term sexual inactivity are likely to have had lifetime abstention from sex. The much higher prevalence of past 5-year sexlessness reported in our study as compared with asexuality estimates, however, suggests that the absence of sexual activity has strong sociological dimensions beyond lack of sexual attraction toward others. The implications of our findings on the phenomenon of asexuality should be interpreted with caution since the absence of sexual activity is not equivalent to asexuality.

Although older age and not being married were by far the strongest factors associated with past-year sexlessness, there were statistically significant psychosocial, economic, and attitudinal factors associated with sexlessness for both genders. For instance, contributing less than 20% of the household income was a significant correlate of short-term sexlessness for males only, while lower satisfaction with one's financial situation was associated with short-term sexlessness among females only. This may be indicative of gender power dynamics or psychosocial stressors that may strongly influence sexual opportunities or libido. Similar to studies that found strong associations between lifetime abstinence and religiosity (Eisenberg et al., 2009; Haydon et al., 2014; Matthias et al., 1997), conservative sexual attitudes were associated with past-year sex-

lessness among females and marginally significant ($p < .10$) associations among males. Although we did not report the associations of past 5-year sexlessness with the various background factors, due to the temporal instability of many of these variables (e.g., income, self-reported health, and even marital status), the factors associated with past 5-year sexlessness were largely similar to those that were associated with past-year sexlessness. In both sexes, long-term sexlessness was thereby most strongly associated with older age and marital status, whereas socioeconomic factors (e.g., income-related variables), cultural attitudes (conservatism), and fulfillment in other life domains (financial satisfaction) showed less robust associations.

Perhaps most surprising was that sexually inactive people were no less happy than their sexually active counterparts. Most noteworthy, never-married participants showed virtually identical levels of happiness levels regardless of their sexual activity status. Although sexual inactivity among physically healthy adults has often been seen as an indicator of poor emotional well-being in popular psychology (Schnarch & Maddock, 2003; Shreiner-Engel & Schiavi, 1986; Weiner-Davis, 2003), a study conducted on a nationally representative sample of American women revealed that the majority of women with low sexual desire (72.5%) did not report distress over their lack of interest in sex (Rosen et al., 2009). Our results also strongly suggest that sexual activity per se is not a requisite component of emotional well-being. Previous research in the area of psychological well-being and subjective well-being supports the correlation of positive, close relations with others (relatedness) as one of the most important components of human well-being (Argyle, 1987; Myers, 1992). Sexual activity does not capture all romantic feelings, nor does it capture the quality of intimate relationships with others. Based on our study results, there may be other dimensions of close human relationships that are much more integral aspects of well-being and that sexual activity may either be replaced by these other dimensions, or is peripheral to the core areas of emotional well-being. The other domains that are common to well-being theories include having control over the course of one's life (autonomy), feeling in control of one's situation (competency/mastery) (Ryan & Deci, 2001) as well such domains as self-acceptance, life purpose, and personal growth (Ryff & Keyes, 1995; Ryff & Singer, 1998), none of which explicitly include sexual activity.

A potential limitation of this study was that it was based upon self-report data and large differences in reporting biases between groups may compromise the validity of the findings. However, validation studies of sexual behaviors have noted high level of accuracy for recalling past-year abstinence (Jaccard et al., 2004). Another limitation of this study is that the GSS–National Death Index 2008 dataset only includes sexual activity data until 2002 and sexual behaviors in the population may have changed since then. However, when we examined the prevalence of sexlessness between 1988 and 2002, there were no significant differences in the prevalence of sexlessness in the population after adjusting for marital status, so any changes since then are likely to be moderate. The GSS-NDI dataset nonetheless contains a large body of information including extensive information about the participants' ideas,

beliefs, feelings, and general attitudes, so a broad array of potential confounders were available. Nevertheless, it is possible that unknown confounding variables could have rendered a positive association non-significant. Moreover, the survey determined the sexless status of participants by inquiring about the number of sexual partners and did not ask details about the nature of those sexual partnerships and whether those interactions were voluntary or not. Without detailed information about sexual behaviors, the measure of sexual activity remains quite non-specific. Asking about the number of sexual partners is also open to interpretation and may not include coitus. A study conducted in 1999 in a U.S. student-aged population revealed that there exist multiple interpretations of having “had sex.” While nearly all respondents considered coitus as sex and would include these encounters as sexual partnerships, approximately 40% considered oral sex alone and 2% considered “deep kissing” alone as having “had sex” (Sanders & Reinisch 1999). Nonetheless, using the absence of sexual partners as a definition of sexual inactivity allows for easier cross-cultural comparisons rather than asking about specific sexual behaviors such as oral sex which may not be culturally acceptable for population-based surveys in many parts of the world. Lastly, a limitation of this study was the scale for measuring happiness. Although this construct was measured with a single question and broadly classified people into three happiness levels, we noted that this variable correlated significantly in a small subset of individuals ($n = 1170$) who were asked about their emotional well-being in past month. Happiness showed strong inverse relationships with feelings of cheerlessness, nervousness, hopelessness, and worthlessness ($p < .001$). When we looked at the correlations between self-reported happiness with job satisfaction, financial satisfaction, and satisfaction with non-work activities, the data also indicated a strong positive association ($p < .001$), suggesting that a single-item happiness scale adequately captures this very abstract construct.

Our findings contradict the perception promulgated by popular media that the absence of partnered sexual activity commonly results in poorer happiness levels. The lack of difference in happiness levels between sexless and sexually active respondents, particularly among never-married individuals, indicates the need to re-examine the relative importance of sexual activity to overall well-being over an individual's life course. This study's findings also support the DSM-5 revisions for the diagnosis of sexual dysfunctions that now require significant emotional distress as a diagnostic criterion. Given the surprisingly high proportion of Americans that report both short-term and long-term sexlessness, future research should investigate the self-reported reasons for the absence of sexual activity among these adults.

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Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest to declare.

Ethical Approval The General Social Survey–National Death Index was approved by the Columbia University Medical Center Institutional Review Board.

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