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# Is There Really a Sex Recession? Period and Cohort Effects on Sexual Inactivity Among American Men, 2006–2019

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**Abstract**

There has been a growing concern among researchers and media commentators that men in the United States may be increasingly less sexually active, creating a form of a "sex recession." Using 14 years of survey data from men in the National Survey of Family Growth (2006–2019), this study assesses whether such concerns are warranted. Cross-classified mixed-effects models are estimated to ascertain whether there is evidence of a population-wide sex recession among men due to secular conditions specific to different time periods, or if birth cohorts that comprise the male population at any given point in time are exhibiting distinct patterns of sexual behavior. The analysis finds no evidence of a population-wide sex recession among men. Rates of sexual inactivity among men have been constant across the time series, but those born between 2000 and 2004 had significantly higher rates of sexual inactivity than previous birth cohorts did at the same age. Additionally, men who are unemployed and/or living at home with their parents are more likely to refrain from sexual intercourse than their peers who are employed and/or living independently of their parents.

**Keywords**

Sexual health, sexuality, intimacy, sexuality

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On February 24, 2020, a 17-year-old man killed one and injured two with a machete at a spa in Toronto, Canada (BBC News, 2020). A few months later on May 20, a 20-year-old man shot and injured three with a gun at a shopping mall in Glendale, Arizona (Vigdor and Hauser, 2020). These seemingly random, violent attacks gained notoriety in large part because the perpetrators were purported to have been motivated by their affiliation with the involuntary celibate or "incel" community, which is a misogynistic online subculture consisting of men who are unable to develop romantic or sexual relationships with women (Glace et al., 2021; Preston et al., 2021). Consequently, incels became a topic of cultural intrigue as it brought the issue of male sexual inactivity into the media spotlight, with *Rolling Stone* magazine proclaiming: "They are unemployed. They're living at home in record numbers. They're not having sex" (Dickson, 2020).

The emergence of the incel subculture has been linked with growing gender equality in Western societies, which has been perceived by some men as devaluing their role in society (Glace et al., 2021; Preston et al., 2021). This status demotion has likely been aggravated by rising levels of social isolation in the United States (Klinenberg, 2016). If young men—unemployed and living at home with their parents—are less viable in dating markets and less equipped for emotional intimacy, the logic follows that they will be less able to acquire healthy romantic and sexual relationships with members of the opposite sex (Irfan et al., 2020; Ott, 2010). Indeed, the changing contours of young adulthood in the United States suggest the declining relative value of young men in the dating

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market. Between 2006 and 2019, the years examined in the present inquiry, the percentage of men between the ages of 25 and 35 in the labor force fell from 92% to 88%, while the percentage living at home with their parents rose from 14% to 19% (Coy, 2021).

These troubling trends in labor force participation and in living arrangements portend a decline in sexual activity for men, but has this in fact occurred? The empirical base to answer this question is thin, in part because few population surveys collect data on sexual behaviors systematically over time. One of the lone exceptions is the General Social Survey (GSS), which interviews a nationally representative cross-sectional sample of American adults every 2 years. Since 1989, the GSS has asked sample members to report their lifetime number of sexual partners as well as the frequency of sexual intercourse during the past year. Analyses of these data suggest that among men, rates of sexual inactivity have risen between 2000 and 2018 (Ueda et al., 2020) and are highest for those born in the late 1990s (Twenge et al., 2017). Similar findings were documented when comparing youth cohorts in 2007 to youth cohorts in 2017 using the Panel Study of Income Dynamics (Lei and South, 2021). These analyses spawned a series of news articles and social commentaries that proclaimed the United States was in the midst of a "sex recession" (Julian, 2018; Schpancer, 2020), with some even expressing concern that elevated rates of celibacy could potentially harm the economy (Novak, 2019). This all served to further buttress the narrative about the plight of disengaged young men and the subsequent rise of the incel subculture.

Declining rates of sexual activity are concerning in part because an active sex life is positively linked with mental and physical health (Brody, 2010). For example, frequent sexual activity is associated with fewer symptoms of depression and anxiety (Zhang and Liu, 2020), improved cognitive functioning (Smith et al., 2020), greater blood pressure regulation (Brody, 2006), a lower risk of a heart attack (Hall et al., 2010), and reductions in all-cause mortality (Cao, 2020). If sexual activity is in fact on the decline, it could have implications for long-term trends in population health.

As noted earlier, research that identifies a decline in sexual activity relies largely on time trends produced from successive waves of the GSS. The two major studies using the GSS to detect the emergence of a sex recession have small, but important limitations. Ueda et al.'s (2020) analysis of the GSS, which finds an increase in rates of male sexual inactivity between 2000 and 2018, does not sufficiently isolate period effects from cohort effects. In other words, it is not possible to assess whether the decline they observe is a population-wide temporal diminution reflecting the behaviors of all age groups (i.e., period effects), or if younger birth cohorts, which are entering their peak years for dating, cohabitation, and marriage, are distinctively responsible for the observed decline (i.e., cohort effects).

Twenge et al. (2017) overcome this limitation by using mixed-effects models, which allow for the disaggregation of period and cohort effects on sexual inactivity in the GSS. Their analysis suggests that cohort differences are driving the decline, with those born after 1979 notably less sexually active than their peers born between 1950 and 1979. In only having access to GSS data through 2014 at the time of analysis and publication, Twenge and colleagues lack data on 2015–2019 when the sex recession is believed to have been most pronounced.

The present study builds on this nascent body of research to further explore the presence and etiology of a potential sex recession among men in the United States. This study uses data from the 2006–2019 waves of the National Survey of Family Growth (NSFG), a nationally representative survey that collects detailed sexual and reproductive histories from annual cross-sectional samples of adults between the ages of 15 and 50. While the GSS asks general questions about sexual behavior in the context of a broad array of unrelated topics, the NSFG's questions and collection protocols are designed entirely around eliciting high quality, detailed information on sexual behaviors. Additionally, in any given year, the NSFG sample is about 2.3 times the size of the GSS sample responding to sexual behavior items. As a result, the NSFG is less susceptible to both measurement and sampling error, which could be problematic when producing estimates of sensitive activities like sexual intercourse disaggregated across multiple birth cohorts. With the NSFG data, mixed-effects models predicting sexual inactivity for successive cohorts of American men are estimated.

The primary analytic goal of this study is to ascertain whether there is evidence of a population-wide sex recession among men due to secular conditions specific to different time *periods* or if birth *cohorts* that comprise the population at any given point in time are exhibiting distinct patterns of sexual behavior. Additionally, as a secondary analytic goal, this study explores whether the context of young adulthood as it relates to employment and living arrangements is associated with sexual inactivity. This study tests the hypothesis, prevalent in the sex recession media narratives regarding incels, that men who are unemployed and/or living at home with their parents are less likely to be sexually active than their peers who are working and living on their own.

## Methods and Materials

### *Data*

To identify period and cohort effects on male sexual inactivity, public-use data files from the 2006–2010,

2011–2013, 2013–2015, 2015–2017, and 2017–2019 waves of the National Survey of Survey of Family Growth's (NSFG) are pooled and analyzed. Sponsored by the U.S. Centers for Disease Control and Prevention, the NSFG is a repeated cross-sectional survey administered to samples of the civilian, non-institutionalized population of the United States aged 15–49 years. A representative sample of households and non-institutional quarters is selected via multi-stage probability sampling. Interviews are administered in-person by trained interviewers in English or in Spanish to one randomly selected resident from each household, with a portion of the more sensitive questions answered privately by self-administration.

A total of 29,470 male participants completed the interview across the 14 years of data. Because the goal of this analysis is to produce rates of sexual inactivity for birth cohorts grouped into 5-year intervals, 316 sample members born before 1965 were excluded due to cell size concerns for those comprising the 1960–1964 birth cohort. Of the remaining 29,154 sample members, an additional 46 were excluded because they did not provide answers to questions that identify sexual inactivity. The final analytic sample includes 29,108 men.

## Measures

This analysis focuses on two key outcome variables: lifetime sexual inactivity and recent sexual inactivity. Both measures are based on questions that ask sample members whether they have ever had vaginal intercourse and whether they had vaginal intercourse in the past 12 months.[1] Lifetime sexual inactivity is a binary variable coded "1" if the sample member is a virgin and "0" if they have ever had vaginal intercourse. Recent sexual inactivity is a binary variable coded "1" if the sample did not have vaginal intercourse within the past 12 months and "0" if they have. In the analytic sample, 13.7% of men were virgins and 21.8% did not have vaginal intercourse in the past year.

The primary analytic aim is to identify potential period and cohort effects on trends in sexual inactivity. Periods in this analysis are identified by the year in which the survey was administered, which ranges from 2006 to 2019. Cohorts in this analysis are identified by 5-year intervals within which the sample member was born. In the time series for the analytic sample, there are eight sets of birth cohorts spanning 1965–1969 through 2000–2004. To guide in the interpretation of the analysis, colloquial generational nicknames are used as short-hand labels for clusters of birth cohorts using the following conventions: Generation X includes the 1965–1969 through 1975–1979 birth cohorts, the Millennial generation includes the 1980–1984 through 1990–1994 birth cohorts, and Generation Z includes the 1995–1999 and 2000–2004 birth cohorts.

The secondary analytic aim of this study is to assess the association between employment and living arrangements with sexual inactivity. Employment is a binary variable coded "1" if the sample member was employed at the time of the survey, and "0" if they were unemployed. Living arrangements are measured via a binary variable coded "1" if the sample was living on their own without their parents at the time of the survey, and "0" if they were living at home with their parents.

All statistical models include controls for the following sociodemographic characteristics of the sample member: age, age$^2$, race/ethnicity, school enrollment status, marital status, marital status of the parents of the sample member when he was born, whether the sample member lived in an in-tact family from birth to age 18, and the education level of the sample member's mother. The education level of the sample member's mother is used instead of the education level of the sample member because the NSFG includes a sizeable number of adolescents and young men still enrolled in either high school or college, and thus have not attained their highest level of education. Descriptive statistics for all variables used in the analysis are presented in Table 1.

There are three important issues to highlight regarding the measurement of age. First, NSFG survey waves prior to 2015 were based on samples between the ages of 15 and 44. Beginning in September 2015, the NSFG age range expanded from 15–44 to 15–49. As a result, sexual inactivity for those aged 45–49 is not observed for the first 9 years of the time series. Second, in addition to age, age as a second-order polynomial (age$^2$) is included to accommodate the non-linear decline in sexual inactivity with age. Lastly, so that the intercept has a meaningful interpretation in the context of this analysis, age (and by extension age$^2$) is centered at age 25. The uncentered version of age is presented in Table 1.

## Analytic Strategy

To identify period and cohort effects under girding trends in sexual inactivity, cross-classified linear mixed-effects models with two levels are estimated. This model is a modified form of a traditional hierarchical linear model that was offered by Yang and Land (2006, 2008) to deal with the identification problem that is present when attempting to simultaneously estimate the effects of ages, periods, and cohorts for which there is an inherent linear dependency (i.e., cohort + age = period). In these cross-classified linear mixed-effects models, age is included in the first level of the model as a fixed characteristic of sample members for which a single additive slope parameter is estimated. Variation in rates of sexual inactivity

**Table 1.** Characteristics of Male Sample Members in the National Survey of Family Growth; 2006–2019.

| | % or Mean |
|---|---|
| Lifetime sexual inactivity (%) | |
| Inactive | 13.7 |
| Active | 86.3 |
| Recent sexual inactivity (%) | |
| Inactive | 21.8 |
| Active | 78.2 |
| Period (%) | |
| 2006 | 2.0 |
| 2007 | 4.5 |
| 2008 | 4.4 |
| 2009 | 4.8 |
| 2010 | 2.6 |
| 2011 | 2.6 |
| 2012 | 9.5 |
| 2013 | 9.3 |
| 2014 | 9.3 |
| 2015 | 10.1 |
| 2016 | 11.1 |
| 2017 | 10.4 |
| 2018 | 11.2 |
| 2019 | 8.2 |
| Cohort (%) | |
| 1965–1969 | 6.4 |
| 1970–1974 | 14.9 |
| 1975–1979 | 14.8 |
| 1980–1984 | 15.9 |
| 1985–1989 | 16.6 |
| 1990–1994 | 15.7 |
| 1995–1999 | 11.7 |
| 2000–2004 | 3.9 |
| Employment status (%) | |
| Employed | 88.2 |
| Not employed | 11.8 |
| Living arrangements (%) | |
| Live without parents | 85.2 |
| Live with parents | 14.8 |
| Age (mean) | 30.3 |
| Race/ethnicity (%) | |
| Black | 12.0 |
| Hispanic | 21.0 |
| Other | 9.9 |
| White | 57.1 |
| School enrollment status (%) | |
| Enrolled | 25.7 |
| Not enrolled | 74.3 |
| Marital status (%) | |
| Married | 37.5 |
| Divorced/widowed | 6.1 |
| Separated | 1.7 |
| Single, never married | 54.8 |
| Parents married when born (%) | |
| Yes | 82.3 |
| No | 17.7 |
| Intact family from birth to age 18 (%) | |
| Yes | 60.9 |
| No | 39.1 |
| Mother's level of education (%) | |
| Less than 12th grade | 19.0 |
| High school diploma | 32.9 |
| Some college | 23.4 |
| Bachelor's degree or higher | 24.7 |

*Note.* $N = 29{,}108$.

across periods and cohorts are identified via empirical Bayes estimates in which periods and cohorts are specified as random effects in the second level. This mixed-effects model is considered "cross-classified" because sample members (level 1) are nested within both periods (level 2) and within cohorts (level 2). The measures of employment status and living arrangements as well as all of the sociodemographic control variables are included as fixed effects in level 1 of the model. The model is estimated using restricted maximum-likelihood empirical Bayesian methods. Because it is a linear model, the parameter estimates have a linear probability interpretation.

## Findings

Table 2 presents parameter estimates from two cross-classified linear mixed-effects models predicting sexual inactivity, with standard errors in parentheses. The panels on the left show parameter estimates from a model predicting lifetime sexual inactivity, and the panels on the right show parameter estimates from a model predicting recent sexual inactivity. The top of the table shows the parameter estimates from level 1 of the model, including measures of employment and living arrangements as well as the sociodemographic controls. The bottom of the table shows the variance components for the level 2 random effects.

In the top half of the table, the level 1 coefficients for employment and living arrangements are both statistically significant at $p < .01$, indicating the strong association that these markers of socioeconomic attainment and maturity in adulthood have with sexual activity. Specifically, those who are unemployed and/or living at home with their parents are more likely to be sexually inactive, net of the year of the survey, the birth cohort to which they belong, and their sociodemographic background. Rates

**Table 2.** Parameter Estimates From Cross-Classified Linear Mixed-Effects Models Predicting the Probability of Sexual Inactivity.

| | Lifetime Sexual Inactivity | | Recent Sexual Inactivity | |
|---|---|---|---|---|
| | *b* | (SE) | *b* | (SE) |
| Fixed effects | | | | |
| Constant | .352** | (.019) | .520** | (.017) |
| Employment status | | | | |
| Employed | −.134** | (.005) | −.187** | (.007) |
| Not employed (reference) | — | — | — | — |
| Living arrangements | | | | |
| Live without parents | −.105** | (.006) | −.108** | (.007) |
| Live with parents (reference) | — | — | — | — |
| Age | −.076** | (.002) | −.057** | (.003) |
| $Age^2$ | .001** | (.000) | .001** | (.000) |
| Race/ethnicity | | | | |
| Black | −.022** | (.006) | −.059** | (.007) |
| Hispanic (reference) | — | — | — | — |
| Other | .056** | (.007) | .062** | (.009) |
| White | .029** | (.005) | .037** | (.006) |
| School enrollment status | | | | |
| Enrolled | .073** | (.005) | .077** | (.007) |
| Not enrolled (reference) | — | — | — | — |
| Marital status | | | | |
| Married | −.063** | (.005) | −.234** | (.006) |
| Divorced/widowed | −.071** | (.008) | −.110** | (.010) |
| Separated | −.063** | (.012) | −.128** | (.015) |
| Single, never married (reference) | — | — | — | — |
| Parents married when born | | | | |
| Yes (reference) | — | — | — | — |
| No | −.026** | (.005) | −.034** | (.006) |
| Intact family from birth to age 18 | | | | |
| Yes (reference) | — | — | — | — |
| No | −.018** | (.004) | −.014** | (.005) |
| Mother's level of education | | | | |
| Less than 12th grade | 0.14** | (.005) | .025** | (.007) |
| High school diploma (reference) | — | — | — | — |
| Some college | .007 | (.005) | .014* | (.006) |
| Bachelor's degree or higher | .024** | (.005) | .022** | (.006) |
| Random effects variance components | | | | |
| Period | .000 | (.000) | .000 | (.000) |
| Cohort | .002 | (.001) | .001 | (.001) |
| Likelihood ratio $\chi^2$ | 324.06** | | 98.39** | |

*Note.* $N = 29{,}108$.
*$p < .05$; **$p < .01$.

of lifetime sexual inactivity are 13.4 percentage points lower for those who are employed compared with their unemployed peers, and 10.5 percentage points lower for those who live independently of their parents compared with their peers who are living at home with their parents. Similarly, rates of recent sexual inactivity are 18.7 percentage points lower for those who are employed compared with their unemployed peers, and 10.8 percentage points lower for those who live independently of their parents compared with their peers who are living at home with their parents. These differences in rates of sexual inactivity are sizable, and they comport with expectations regarding the sexual and romantic viability of young men who struggle to establish a foothold in the labor force and to establish autonomy from their family of origin.

Next, the variance components for the level 2 random effects at the bottom of Table 2 provide insight into the relative roles of periods and cohorts in shaping trends in

sexual inactivity, which is the primary analytic goal of this study. Both variance components are close to zero, indicating that the bulk of the variation in sexual inactivity is explained by individual-level factors and not by periods or by cohort membership. The small size of these variance components notwithstanding, the variation explained by cohorts is slightly higher than the variation explained by periods. This suggests that differences across cohorts are somewhat more salient than differences across time periods in explaining time trends in sexual inactivity.

To illustrate, estimated period effects for lifetime sexual inactivity are plotted in Figure 1a and estimated period effects for recent sexual inactivity are plotted in Figure 1b. Similar plots for cohort effects are presented in Figure 2a and b. These estimated period and cohort effects are derived from the models in Table 2 and reflect predicted probabilities of sexual inactivity for the population identified by the model intercept (i.e., when all covariates in the model are set to 0). For these figures, the model intercept corresponds to the probability that a 25-year-old unmarried Hispanic male, who grew up in an intact family, whose parents were married at the time of his birth, whose mom has a high school diploma, who is not enrolled in school, who lives with his parents, and who is unemployed is sexually inactive. Note that these estimated period and cohort effects are not affected by the choice of the population identified in the model intercept.

The trend lines in both Figure 1a and b are practically flat as there is negligible variation in rates of sexual inactivity from year to year. This indicates that when taking into account birth cohort and sociodemographic characteristics, the probability that men are sexually inactive has remained more or less constant from 2006 to 2019.[2] These estimated period effects dispute the contention that there has been a population-wide sex recession among men.

While period effects are largely null, Figure 2 reveals some distinct patterns with respect to the sexual profiles of the different cohorts. To illustrate these patterns, Figure 2a and b include 95% confidence intervals around the estimates, which can be used to identify significant deviations from the horizontal line which denotes the model intercept (which is .352 for lifetime sexual inactivity and .520 for recent sexual activity). First, members of Generation X evidenced probabilities of sexual inactivity that were by and large close to the mean. In contrast, members of the Millennial generation, particularly those born between 1985 and 1994 had significantly *lower* rates of sexual inactivity than the mean, while members of Generation Z born after 2000 had significantly *higher* rates of sexual inactivity than the mean. These cohort-specific patterns hold for lifetime sexual inactivity as well as for recent sexual inactivity.

To illustrate, consider our hypothetical young male who is parameterized by the model intercept (i.e., a 25-year-old unmarried Hispanic male, who grew up in an intact family, whose parents were married at the time of his birth, whose mom has a high school diploma, who is not enrolled in school, who lives with his parents, and who is unemployed). If this male were a Millennial born between 1985–1989, the probability that he did not engage in sexual intercourse in the past year is .48. If this same male were a member of Generation Z born between 2000 and 2004, the probability he did not engage in sexual intercourse in the past year is .57. Taken together, these findings suggest that while there is not a population-wide dip in the sexual activity of men, the youngest members of Generation Z are more likely to be sexually inactive than their Millennial counterparts were at the same ages just a few years prior. While there does not appear to be a secular decline in sexual activity for men, there does appear to be signs of one for the youngest birth cohorts who are starting to enter young adulthood at the time this article was written.

## Discussion

Driven in part by media interest in an emerging subculture of involuntary celibate men and in part by new research that uses the General Social Survey (Twenge et al., 2017; Ueda et al., 2020), there is a growing concern that men in the United States may be experiencing an era of arrested sexual development. Research finds that rates of sexual inactivity have risen between 2000 and 2018 (Ueda et al., 2020) and that those born in the late 1990s are particularly likely to abstain from sexual intercourse (Twenge et al., 2017). This study re-evaluates claims of this purported "sex recession" using nationally representative samples of men between the ages of 15 and 49 from the National Survey of Family Growth (NSFG). In analyzing rates of sexual inactivity between 2006 and 2019 with statistical methods that can effectively parse age-period-cohort effects, this study assessed whether there is a population-wide sex recession among men or if there are distinct patterns of sexual inactivity across birth cohorts.

The present study has three key findings of note. First, in assessing period effects on sexual inactivity among men in the NSFG, there is no evidence of either a positive or a negative trend in sexual inactivity. Between 2006 and 2019, rates of lifetime and recent sexual inactivity remained constant, casting doubt on claims of a population-wide sex recession. This diverges from the findings of Ueda et al. (2020) who detect an increase in sexual

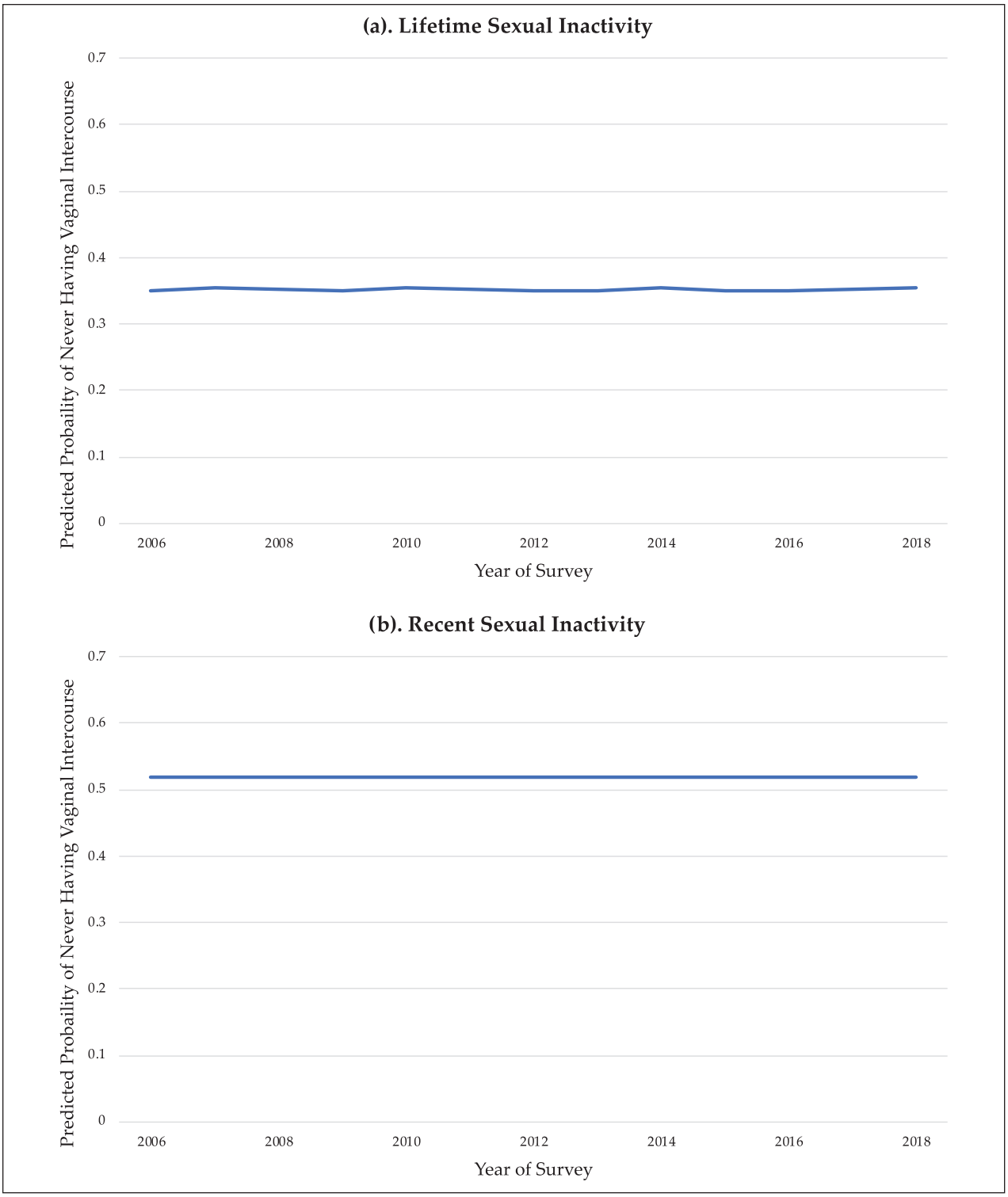


**Figure 1.** Estimated period effects for lifetime and recent sexual inactivity.

inactivity over the past few years among men in the GSS. It is worth noting that in addition to using different data, their analysis does not employ strategies to disentangle age, period, and cohort effects. While it is not possible to definitively identify why the present analysis of the NSFG and Ueda et al.'s (2020) analysis of the GSS yield

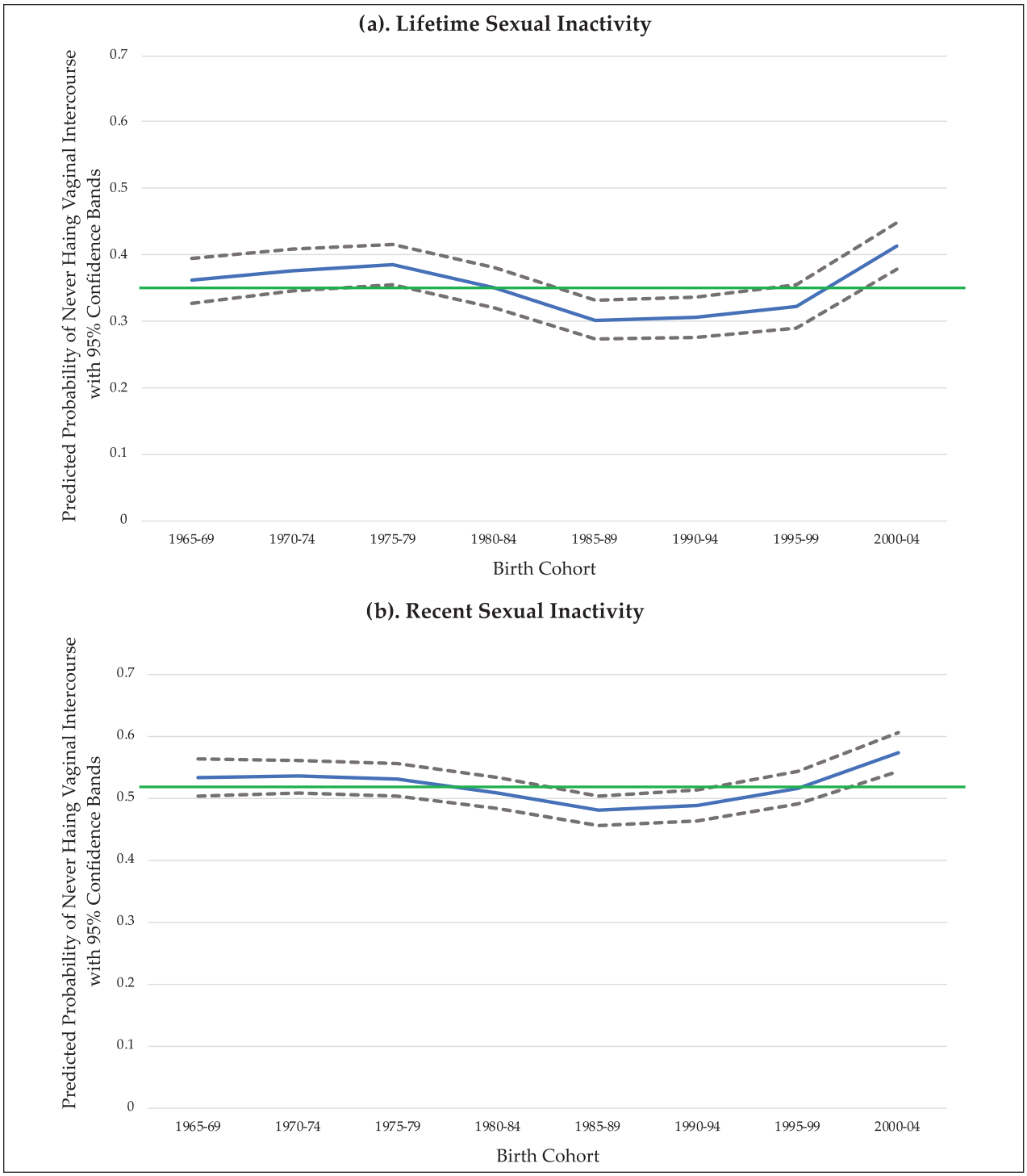


**Figure 2.** Estimated cohort effects for lifetime and recent sexual inactivity.

different findings, it is likely due to some combination of different data sources and the application of different statistical methods.

Second, in assessing cohort effects on sexual inactivity in the NSFG, the present study finds that the Millennial birth cohorts, particularly those born between 1985 and 1994, had the *lowest* rates of sexual inactivity while the Generation Z birth cohorts born after 2000 had the *highest* rates of sexual inactivity. This contradicts Twenge et al. (2017) who find that Millennials evidence

the highest rates of sexual inactivity. In only having access to data through 2014, Twenge et al. (2017) were not able to study those born after 1996. It is possible that with additional years of data and with more recent birth cohorts they would have found similar trends as those presented here. Regardless, the GSS data used by Ueda et al. (2020) and by Twenge et al. (2017) and the NSFG data used in the present analysis have different design features. While both data sets have their limitations, the NSFG is better suited to study trends in sexual inactivity because it is specifically designed to collect high quality, detailed information on sexual behaviors, and in any given year the NSFG sample is about 2.3 times the size of the GSS sample.

Third, the present study finds evidence that men who are unemployed and/or living at home with their parents are more likely to be sexually inactive than their peers who are employed and/or living independently of their parents. With observational data, it is not possible to unequivocally establish whether these relationships are causal. Regardless, the evidence here lends support to claims that unemployed men who have yet to establish residential independence from their parents have less currency in the heterosexual dating market. While population surveys like the NSFG are not well-equipped to identify and study fringe subcultures, the general narrative regarding socially disengaged men emerging from the nascent body of media coverage (Dickson, 2020) and research (Glace et al., 2021; Preston et al., 2021) on incels is generally supported here.

Taken together, the findings from this analysis qualify and update research that explores time trends in levels of sexual activity. Based on the NSFG, there does not appear to be a widespread sex recession among men between 2006 and 2019, as overall rates of sexual inactivity have more of less held steady since 2006. However, men born after 2000 exhibit higher-than-average rates of sexual inactivity. As these members of Generation Z embark on the transition from adolescence to adulthood, they are doing so with less sexual experience than their Millennial and Generation X counterparts who came before them. Consequently, any discussion of a sex recession should be centered around these particular birth cohorts, not on Millennial men nor the adult male population writ large.

While it is too early to assess whether Generation Z's coming of age represents the start of a long-term decline in sexual activity, it is worth highlighting that the patterns observed here were done with data collected prior to the COVID-19 pandemic. The pandemic drastically limited geographic mobility and employment opportunities—potentially further cementing isolation-linked behavioral patterns. Future research in coming years will be needed to assess whether this is a transitory downswing or a sustained generational shift in men's sexual behavior. Additionally, public health interventions aimed at improving healthy development among young men in Generation Z may want to consider outreach strategies to those who are unemployed and/or living at home with their parents. While the present study was not designed to determine how to directly improve sexual health, it does suggest that interventions and programs intended to increase employment and residential independence could also have sexual health benefits for young men.

Despite the many strengths of this study, there are two key limitations. First, as a population-based study, the NSFG is largely composed of heterosexual men. As a result, it has limited ability to undertake age-period-cohort analyses of sexual behaviors among gay men and/or men who have sex with men. The present study only measures sexual activity in terms of vaginal intercourse, and so the findings may not convey directly to sexual minorities. Second, in the absence of an experiment (natural or otherwise), employment and living arrangements are non-random conditions which may be confounded with other factors. While the analysis controls for some sociodemographic characteristics, there might be other unmeasured factors that differentiate those who work/live on their own and those who do not work/live on their own as well as contribute to sexual behaviors (e.g., physiological characteristics, neighborhood characteristics, etc.).

In closing, the present analysis of the NSFG casts doubt on a population-wide sex recession among men but does reveal notable generational differences that could portend longer-term trends in sexual behavior in the years to come. Given that this analysis was conducted using data collected prior to the onset of the COVID-19 pandemic, it is unclear if a turnaround in sexual behavior is on the horizon for those born after 2000. As the pandemic set in, stay-at-home orders forced families to consolidate living spaces, journalistic accounts reported that large swaths of residential college students were forced to move home, and the unemployment rate skyrocketed. In other words, those just beginning the transition to adulthood now face immediate barriers to employment and residential independence. This array of factors suggests that there is likely to be at least a short-term, period-specific spike in rates of sexual inactivity. However, lockdown measures intended to slow the spread of COVID-19 created an economic recession that may permanently alter the life course of the Generation Z cohorts who are experiencing these simultaneous health and economic crises as they progress toward their prime years of dating, cohabitation, and marriage. As the aftermath of the pandemic and the recession progresses, analyses that distinguish period and cohort effects will be needed to assess

whether patterns of sexual behavior are affected for the entire male population in the short-term and/or if it will further hinder the long-term experiences of the youngest generations.

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## Ethics approval

Rice University's Office of Research Compliance determined that this analysis does not constitute research with human subjects (as defined under 45CFR46:102) as it does not involve access to identifiable private information about people.

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## Notes

1. This analysis focuses solely on heterosexual activity as questions detailing same-sex experiences are not available for all years on the NSFG public-use data files. Further, concerns about male sexual inactivity are largely motivated by the perceived diminished value of men in the heterosexual dating market (as expressed in the media coverage of the incel subculture). It is not clear whether similar dynamics operate for men who have sex with men. Throughout this paper, any reference to sexual inactivity or behavior is only with regard to vaginal intercourse.
2. Figures 1 and 2 are derived from the models in Table 1, which include controls for sociodemographic characteristics. In analyses not presented, period and cohort effects from versions of the models in Table 1 in which the sociodemographic characteristics are excluded are also estimated. The patterns are identical if the sociodemographic controls are included in or excluded from the models, indicating that the patterns presented in Figures 1 and 2 are not dependent upon the presence of control variables.

## References

BBC News (20, May 2020). Teenage boy charged in Canada's first incel terror case. *BBC News*. https://www.bbc.com/news/world-us-canada-52733060

Brody, S. (2006). Blood pressure reactivity to stress is better for people who recently had penile-vaginal intercourse than for people who had other or no sexual activity. *Biological Psychology*, 71(2), 214–222. doi:10.1016/j.biopsycho.2005.03.005

Brody, S. (2010). The relative health benefits of different sexual activities. *Journal of Sexual Medicine*, *7*(4), 1336–1361. doi:10.1111/j.1743-6109.2009.01677.x

Cao, C., Yang, L., Xu, T., et al. (2020). Trends in sexual activity and associations with all-cause and cause-specific mortality among US adults. *Journal of Sexual Medicine*, *17*(10), 1903–1913. doi:10.1016/j.jsxm.2020.05.028

Coy, P. (11, June 2021). Fewer young men are in the labor force: More are living at home. *Bloomberg Businessweek*. https://www.bloomberg.com/news/articles/2021-06-11/fewer-young-men-are-in-the-labor-force-more-are-living-at-home

Dickson, EJ. (4, May 2020). 'TFW No GF' Is a deeply uncomfortable portrayal of incel culture. *Rolling Stone*. https://www.rollingstone.com/culture/culture-features/tfw-no-gf-incel-culture-sxsw-992943/

Glace, A. M., Dover, T. L., & Zatkin, J. G. (2021). Taking the black pill: An empirical analysis of the "Incel". *Psychology of Men and Masculinity*, *22*(2), 288–297. doi:10.1037/men0000328

Hall, S. A., Shackelton, R., Rosen, R. C., & Araujo, A. B. (2010). Sexual activity, erectile dysfunction, and incident cardiovascular events. *American Journal of Cardiology*, *105*(2), 192–197. doi:10.1016/j.amjcard.2009.08.671

Irfan, M., Hussain, N. H. N., Noor, N. M., Mohamed, M., & Ismail, S. B. (2020). Sexual abstinence and associated factors among young and middle-aged men: A systematic review. *Journal of Sexual Medicine*, *17*(3), 412–430. doi:10.1016/j.jsxm.2019.12.003

Julian, K. (December 2018). Why are young people having so little sex? *The Atlantic*. https://www.theatlantic.com/magazine/archive/2018/12/the-sex-recession/573949/

Klinenberg, E. (2016). Social isolation, loneliness, and living alone: Identifying the risks for public health. *American Journal of Public Health*, *106*(5), 786–787. doi: 10.2105/AJPH.2016.303166

Lei, L., & South, S. J. (2021). Explaining the decline in young adult sexual activity in the united states. *Journal of Marriage and Family*, *83*(1), 280–295. doi:10.1111/jomf.12723

Novak, J. (25, October 2019). America's sex recession could lead to an economic depression. *CNBC*. https://www.cnbc.com/2019/10/25/americas-sex-recession-could-lead-to-an-economic-depression.html

Ott, M. A. (2010). Examining the development and sexual behavior of adolescent males. *Journal of Adolescent Health*, *46* (4 suppl.), S3–S11. doi:10.1016/j.jadohealth.2010.01.017

Preston, K., Halpin, M., & Maguire, F. (2021). The black pill: new technology and the male supremacy of involuntary celibate men. *Men and Masculinities*, Forthcoming.

Shpancer, N. (21, June 2020). Why so many young people are having no sex. *Psychology Today*. https://www.psychologytoday.com/us/blog/insight-therapy/202006/why-so-many-young-people-are-having-no-sex

Smith, L., Grabovac, I., Yang, L., et al. (2020). Sexual activity and cognitive decline in older age: A prospective cohort study. *Aging Clinical and Experimental Research*, *32*(1), 85–91. doi:10.1007/s40520-019-01334-z

Twenge, J. M., Sherman, R. A., & Wells, B. E. (2017). Sexual inactivity during young adulthood is more common among U.S. millennials and iGen: Age, period, and cohort effects on having no sexual partners after age 18. *Archives of Sexual Behavior*, *46*(2), 433–440. doi:10.1007/s10508-016-0798-z

Ueda, P., Mercer, C. H., Ghaznavi, C., & Herbenick, D. (2020). Trends in frequency of sexual activity and number of sexual partners among adults aged 18 to 44 years in the US, 2000-2018. *JAMA Network Open*, *3*(6). doi:10.1001/jamanetworkopen.2020.3833

Vigdor, N., & Hauser, C. (21, May 2020). Three injured in mall shooting in Arizona, officials say. *New York Times*. https://www.nytimes.com/2020/05/21/us/westgate-mall-shooting-arizona.html

Yang, Y., & Land, K. C. (2006). A mixed models approach to the age-period-cohort analysis of repeated cross-section surveys, with an application to data on trends in verbal test scores. *Sociological Methodology*, *36*(1), 75–97. doi:10.1111/j.1467-9531.2006.00175.x

Yang, Y., & Land, K. C. (2008). Age-period-cohort analysis of repeated cross-section surveys: Fixed or random effects? *Sociological Methods and Research*, *36*(3), 297–326. doi:10.1177/0049124106292360

Zhang, Y., & Liu, H. (2020). A national longitudinal study of partnered sex, relationship quality, and mental health among older adults. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, *75*(8), 1772–1782. doi:10.1093/geronb/gbz074