Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

HHS Public Access

Author manuscript

J Adolesc Health. Author manuscript; available in PMC 2026 June 21.

Published in final edited form as:

J Adolesc Health. 2025 August ; 77(2): 316–323. doi:10.1016/j.jadohealth.2025.04.011.

Trends in sex of sex partners and sexual identity among US adolescents, 2015-2021

Kendall A. Lawley, MS, MPH[a], **Michael P. Barry, MPH**[a], **Linda J. Koenig, PhD**[b], **Nicolas A. Suarez, MPH**[c], **Austin M. Williams, PhD**[d], **Kevin P. Delaney, PhD**[b], **Karen W. Hoover, MD, MPH**[b], **Deven T. Hamilton, PhD**[a], **Steven M. Goodreau, PhD**[a]

[a]University of Washington, 1410 NE Campus Parkway, Seattle, WA, USA, 98195

[b]Centers for Disease Control and Prevention, Division of HIV Prevention, 1600 Clifton Road NE, Atlanta, GA, USA, 30329

[c]Centers for Disease Control and Prevention, Division of Adolescent and School Health, 1600 Clifton Road NE, Atlanta, GA, USA, 30329

[d]Centers for Disease Control and Prevention, Division of STD Prevention, 1600 Clifton Road NE, Atlanta, GA, USA, 30329

Abstract

Purpose: We sought to assess recent trends in both sex of sex partners and sexual identity among US adolescents. One motivation for this investigation is that incidence of sexually transmitted infections (STIs) is high among US adolescents, and varies along these dimensions; awareness of such trends may to shifts in needs for and care.

Methods: We analyzed four biennial Youth Risk Behavior Survey waves (2015-2021; total n=61,298). We used multinomial trend tests to assess changes in sex of sex partners among all respondents, and among those who had ever had sex. We then assessed trends in sexual identity, and in sex of sex partners disaggregated by sexual identity and by age.

Results: The proportion of female respondents reporting prior same-sex sexual contact increased significantly over time (7.4% to 12.2%, $p<0.001$), as it did for males (3.1% to 3.8%, $p<0.02$). Proportions with bisexual female, bisexual male, and lesbian identities also increased significantly, while gay male identity did not. There was no significant increase in the proportion of heterosexually-identified adolescents having same-sex contacts, but there was a significant decline in the proportion of gay male respondents having only female partners. Increases in female respondents with female partners occurred across individual ages from 14-17.

Corresponding author: Steven M. Goodreau, Campus Box 353100, University of Washington, Seattle WA 98195, goodreau@uw.edu, +1 (206) 543-3285 fax.

Conflicts of interest: The authors have no conflicts of interest to disclose.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Publisher's Disclaimer: This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Discussion: Sexual identity and sexual contact patterns are both shifting among US adolescents. These may yield upcoming shifts in the distributions of different STIs, including HIV. The early age for some of these shifts are especially important to consider for sexual health education.

Keywords

sex of sex partners; sexual networks; sexual orientation; sexual minorities; HIV; sexually transmitted infections; United States; Youth Risk Behavior Survey

Sexually transmitted infections (STIs) are a major source of morbidity and healthcare costs among US adolescents (1, 2). Virtually all STIs exhibit disparities in incidence and prevalence across the biological sex of individuals and their sex partners (SoSP), including among adolescents. These dimensions shape background prevalence for an individual's potential partners and the set of potential sex acts within those partnerings, which vary in transmission risk. For example, adult and adolescent males who have sex with males (MSM) have elevated HIV acquisition risk compared to males with female partners or to females (3), along with multiple other STIs including syphilis (4) and gonorrhea (5). Similarly, adult and adolescent females who have sex with females have the highest incidence of bacterial vaginosis (6). A Massachusetts study found that female adolescents who had sex with females (exclusively or also with males) had higher overall STI diagnosis rates than with male partners only (7).

SoSP relates to but is not always perfectly determined by sexual identity (SI). The relationship between SoSP and SI is complex; each is a distinct facet of sexual orientation, and use of either construct can lead to different interpretations of HIV/STI risk (8). Using SI as a proxy for SoSP is problematic when adolescents express seemingly incongruent constructs. For example, the HIV/STI risk of an adolescent male who identifies as heterosexual but has male sexual partners would be underestimated by SI alone. SI is not just relevant to HIV/STI epidemiology as a predictor of SoSP; it could impact an individuals' understanding of their risk, engagement with prevention and care, and membership in communities that may support or stigmatize sexual health navigation (7-9).

Given these considerations, Phillips and colleagues (10) used the nationally representative Youth Risk Behavior Survey (YRBS) to assess trends in SI and SoSP among US high school students from 2005-2015. The proportion of females and males with a sexual minority (SM) identity increased over time, with greater change among females. The proportion of females reporting any lifetime same-sex sexual contact also increased significantly; the increase for males was not significant.

More recent trends in the intersections of SoSP and SI among US adolescents have not been similarly assessed. These trends may differ from previous cohorts, as SM identities are increasing in the US, especially among youth (10-12). Many youth are "coming out" (i.e., sharing SM identity) at younger ages than previous generations (13, 14), whether due to greater acceptance (15) or increased access to relevant information (16). However, this does not necessarily translate into earlier ages at first same-sex sexual encounter (13), given the trend for contemporary adolescents overall to report less sex and later age at first sex than previous cohorts (17, 18). While adolescence has always been a period for exploring

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

identities and experimenting with behaviors, recent birth cohorts show particularly high rates of fluidity during this window (19), especially females (20, 21). Moreover, the ways adolescents conceptualize sexual identity continually evolve (19, 22).

In this paper, we assess recent trends in SoSP and SI among US adolescents, using YRBS data from 2015 to 2021. We first consider SoSP trends by sex overall, which helps assess potential HIV/STI exposure among adolescents. We then consider trends in SoSP proportions specifically among those who have ever had sex. This allows us to disentangle two drivers of HIV/STI risk: changes in overall proportions having had sex, and partner selection among those who have. We then separately consider trends in SI. Combining the two constructs, we disaggregate SoSP trends by respondents' self-reported SI. Finally, given the potential for continued flux in timing of SI formation and age at first sex, we examine trends in SoSP by age to identify how observed changes occur across the window of adolescent psychosocial development.

Methods

Data Source

The Youth Risk Behavior Survey (YRBS) is a nationally representative school-based survey of health behaviors conducted biennially by the Centers for Disease Control and Prevention (CDC) among US youth in grades 9-12 (23). Although some states and local jurisdictions additionally administer their own survey versions to larger samples, we used only the national dataset given its greater representativeness. The national YRBS began collecting SI data in 2015; we used four waves (2015-2021), with sample sizes >5,600 per sex per year (Figure 1). Combined student/school response rates ranged from 57.5%-60.3% across waves.

Variables

We considered survey year and respondents' self-reported age, sex, SI and lifetime SoSP. The survey was self-administered, so respondents could skip any question, or mark off an invalid response on the standardized form (e.g., filling in the "D" oval for a question with only options A-C); both are recorded as missing. Observations were excluded if respondents were missing responses for any key variable except for SI, where "declined to respond" was analyzed as a distinct category. We examined predictors of SoSP missingness to assess potential bias.

Sex constituted a single binary question ("What is your sex?", options: female/male). For SoSP, respondents were asked, "During your life, with whom have you had sexual contact?" with options: "females," "males," "females and males," and "I have never had sexual contact." Because "sexual contact" does not have one clear definition and it was left open for interpretation, respondents likely had a variety of different conceptualizations of what "counts" as contact. We refer to "sexual contact" as "sex" from here on for simplicity. Of note, other YRBS questions referenced "sexual intercourse" rather than "sexual contact."

For SI, respondents were asked "which of the following best describes you?" In 2015-2019, options were: "heterosexual (straight)," "gay or lesbian," "bisexual," and "not sure." In

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

2021, “not sure” was replaced with three options: “I describe my sexual identity some other way,” “I am not sure about my sexual identity (questioning),” and “I do not know what this question is asking.” Because these options were only present for one survey, we combined them into a single measure akin to the one it replaced for our main analysis; we also conducted a sensitivity analysis altering this assumption.

Age was coded in single years, with the exception of “18+”, the oldest option in YRBS. We excluded respondents under age 14 given small sample size (322/61,298 =0.5% across five years).

Analyses

SoSP and SI time trends were assessed using multinomial trend tests (24). This approach uses weighted sums of outcome-specific Cochran-Armitage trend tests to assess global trends; by default, it tests for linear trends on the log-odds scale. This method is analogous to logistic regression in certain respects (24, 25), but provides a global test and test for each value of each dependent variable (i.e., no reference categories). Survey year was treated as a numeric rather than categorical variable based on CDC recommendations and analyses from a similar study (10, 26). Analyses used YRBS weights throughout to account for the complex survey design, making it representative of the US high school population for sex, grade, and race/ethnicity.

We first assessed SoSP trends among all eligible respondents by self-reported sex (female/male), including those with no prior sexual experience (the “unconditional” numbers). This provides an estimate of the overall absolute proportion of adolescents with each form of sexual experience through time, which is relevant for any associated potential sexual and reproductive health needs. We then repeated the analysis, conditioning on having ever had sex, allowing us to isolate changes in SoSP among those with sexual experience. This conditioning means that trends could change magnitude and/or direction; e.g., a slight *decrease* in the unconditional proportion of males with male partners could reflect multiple combinations, including a sharp decline in overall proportions having any sex but slight *increase* in having male partners among those having sex. The full meaning of these conditional trends depends on the extent to which adolescents without sexual experience subsequently select partners similarly to their sexually experienced peers; we return this point in the Discussion.

We next assessed SI trends overall, without regard for SoSP. To consider SI and SoSP together, we disaggregated SoSP by self-reported SI, assessing proportions of the former for each value of the latter, thus conditioning out changes in SI response proportions. Finally, we disaggregated SoSP by age. For these last two analyses, we present overall proportions (including those who have never had sex) in the manuscript; we also conditioned on ever having had sex, which we briefly summarize in the manuscript but provide in full in the supplement.

All analyses were completed in R (version 4.1.0), with trends tests using the *multiCA* package (version 1.1). Instructions and code to replicate the analysis are available at https://github.com/UW-CAMP/SexOfSexPartners. Because the study comprised secondary analysis

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

of existing de-identified data, it is considered exempt from human subjects review by the University of Washington IRB.

Results

We first examined data completeness. Missingness comprised <1% for sex (460/61,298 observations) and age (317/61,298), and 13.4% for SoSP (8,204/61,298). Significant predictors of greater SoSP missingness (Table S1) included male sex, lesbian/gay identity, being “not sure” of SI, declining to provide SI, and each survey year after 2015. No ages were statistically significant.

Figure 1 and Table S2 show the proportion of respondents with a given reported SoSP lifetime history, by sex and year. The proportion of all female respondents reporting sex with only females increased significantly (1.7% to 3.0%, in 2015 and 2021, respectively; $p<0.001$ for the full temporal trend), and with both males and females (5.7% to 9.2%, $p<0.001$), and declined in those reporting sex with only males (33.7% to 32.2%, $p=0.023$) or no prior sex (58.9% to 55.6%, $p=0.002$). There was a significant increase in males with no prior sex (52.7% to 57.5%, $p<0$ .001) and decrease in males having only female partners (44.2% to 38.7%, $p<0$ .001). The point estimate for the proportion of males having only male partners also increased (1.3% to 1.7%), although not significantly ($p=0.053$). In *post-hoc* analyses, we considered the proportion of males having sex with males (whether also with females or not), which increased significantly (3.1% to 3.8%, $p<0.02$); similarly, the proportion of females having sex with females (whether also with males or not), increased significantly (7.4% to 12.2%, $p<0.001$).

Conditioning on having ever had sex, there were again significant increases in females having female (4.0% to 6.7%, $p<0.001$) and both female and male partners (13.9% to 20.8%, $p<0.001$), and a significant decrease in only male partners (82.1% to 72.5%, $p<0.001$). The proportion of males having only male partners increased significantly (2.8% to 4.0% $p=0.002$), while the point estimate for the proportion having both male and female partners also increased (3.8% to 4.9%), although not significantly ($p=0.052$). Thus, in 2021 more than one-quarter of sexually experienced female respondents (27.5%) reported a history of same-sex sexual contact, while a smaller but still substantial proportion of sexually experienced male respondents (8.9%) did.

We next considered trends in respondents’ self-reported SI (Figure 2, Table S3). Female respondents showed significant declines in reporting heterosexual identity over time (82.6% in 2015 to 62.2% in 2021, $p<0.001$ across the entire time trend). This change mostly reflected increases in reporting bisexual (9.9% to 18.6%, $p<0.001$) or unsure identity (4.0% to 14.3%, $p<0.001$), although lesbian identity also increased significantly (2.2% to 3.7%, $p<0.001$). Males reported a much smaller but also significant decline in straight identity (92.3% to 87.0%, $p<0.001$), similarly mimicked by increases in bisexual (2.2% to 4.2%, $p<0.001$) and “not sure” responses (2.4% to 5.9%, $p<0.001$). The increase for gay identity was not significant (1.9% to 2.1%, $p=0.21$). We repeated the trend tests, removing respondents who answered “I describe my sexual identity some other way” while retaining

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

the other two options in the “not sure” comparison (Table S4); the increase in “not sure” retained significance for both female and male respondents.

Figure 3 and Table S5 show the proportion of female respondents reporting each SoSP option for each SI response, including no sexual history. Female respondents identifying as straight or lesbian showed no significant shifts in SoSP. Bisexual females, in contrast, displayed a significant decrease in the proportion having both female and male partners (36.2% in 2015 to 30.6% in 2021, p=0.04), although these figures always reflected the majority of those with sexual history. The proportion of bisexual females with only male partners also increased significantly (17.4% to 22.9%, p=0.006). Females responding “not sure” and declining to respond were both more likely than their peers to have never had sex, although this declined significantly with time, while the proportion having sex with males only increased significantly.

Turning to male respondents (Figure 4, Table S5), straight-identified males showed a decline in the proportion having only female partners (46.5% to 41.8%, p<0.001), although this was due not to increases in male partners, but to those having no prior sex (52.7% to 57.5%, p<0.001). Gay males reported a significant decrease in the proportion with only female partners (9.8% to 2.0%, p=0.04), with a comparably sized, but not significant, change in those having no prior sex (37.6% to 47.3%, p=0.20).

When conditioning on having ever had sex, overall patterns of significant change in SoSP by SI remained largely similar for female respondents (Figure S1, Table S6); in contrast, the previously significant trends for straight and gay male respondents disappeared (Figure S2, Table S6). However, the point estimate for the proportion of gay males reporting only male partners increased by over 10 percentage points (66.3% in 2015 to 76.9% in 2021), and the proportion reporting only female partners decreased similarly (15.7% to 3.9%), despite neither achieving significance (p=0.10, and 0.08, respectively). We note that over 98% of sexually experienced straight males reported only female partners across all surveys, while >20% of gay males reported a prior female partner, either exclusively or along with male partners.

Finally, we disaggregated trends by respondent age (Figure 5; Table S7). For females, the proportion with no prior sex declined significantly over time for each age 14-17, with significant age-specific increases for having only female partners (ages 14, 15, 17), only male partners (ages 14, 15), and both (ages 14, 15, 16, 18). In contrast, males of specific ages showed almost no significant time trends, with one exception (increase in having both female and male partners for 16-year-old males). When conditioning on prior sex (Figure S3, Table S8), males showed the same paucity of significant effects as in unconditional tests. However, female respondents showed strong and significant shifts at even the youngest ages away from sex with males only and towards sex with either females only or both males and females. Indeed, the significant shift away from only male partners was replicated at every age, with effect sizes between 2015 and 2021 ranging from 5-10 percentage point reductions.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Discussion

We examined recent (2015-2021) trends in sex of sex partners (SoSP) and sexual identity (SI), alone and in combination, among US adolescents. The proportion of females and males reporting prior same-sex sexual activity increased. The increase was even larger for males when measured as the proportion of those with any sexual experience. Previous research using 2005-2015 YRBS data found an increase for females but not males (10); our work suggests that the increase among females has continued, with males increasing as well. We also saw a significant decline in the proportion of female respondents with no sexual experience, reversing the prior analysis's trends. These findings appear to contradict YRBS summary reports showing declines through 2021 in adolescents having sex (17); however, the summary report measure asks about sexual *intercourse*, whereas the one in our analyses asks about sexual *contact*. These constructs may not perfectly match, as intercourse does not encompass all forms of sexual contact and adolescents' interpretations of each concept may vary. Similarly, the decrease in female heterosexual identification may reflect differences in survey timing, as 2021 data were collected in fall due to COVID-19, unlike previous years' spring surveys. Data from the 2023 YRBS were not available when this research was conducted, but have recently become so; analyses of this and future waves will enable examination of continuation or change in the trends identified here.

SM identities increased over time, while straight identity decreased, matching findings from earlier YRBS waves (10) and other sources (12). Bisexual female identity saw the largest growth, followed by bisexual males and by lesbians, with no significant increase for gay males. This could portend a coming increase in STIs among young women, as multiple studies have found that bisexually identified women have the highest rates among women of both bacterial and viral STIs (27, 28). Young bisexual males similarly have higher rates of STIs than their heterosexual peers (28), and also exhibit unique risk profiles such as more cumulative and concurrent partners and younger sexual debut (8). The proportion responding some form of "not sure" also increased, although the exact effect is challenging to isolate given the expansion of relevant options in 2021. Reducing the comparison to two options that most clearly reflected being "not sure"—not understanding the question or questioning their sexual identity—still showed significant increases. Future studies would need to determine how young people who reported being unsure of their sexual identity vary from their peers in terms of STI burden.

Identity is of course only a proxy for STI risk, with the network of sexual relationships and behaviors in those relationships forming one determinant of the link between identity and risk. Our analysis of SoSP conditional on SI showed that same-sex sexual contact also increased, and was due primarily to the increase in youth with SM identities, i.e., heterosexual adolescents showed no significant increases in same-sex contact. However, as the proportion of the female population identifying as bisexual grew, the proportion of bisexual females reporting a history of sex with females and males declined. The former effect was larger than the latter, such that the proportion of all female respondents reporting bisexual identity and both male and female partners increased from 3.6% to 5.7%. Young women with both bisexual identity and behavior appear to have the highest rates of STIs among all young women (28), making this increase especially notable.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Both straight and gay males saw a decline in the proportion having sex with females only, although this was due solely to an increase in those having no prior sex. Nonetheless, the trend among gay males represents an absolute decline in those reporting a sexual history apparently incongruent with their stated identity. Although such a pattern may have many possible explanations—including sexual exploration or shifting identities—such incongruence has repeatedly been found to predict multiple forms of negative psychosocial health experiences (29-32). Thus, while increased male-male sex may have HIV/STI implications, the decrease in incongruence may portend a parallel increase in positive health outcomes. The magnitude of this effect will depend on the nature of the relevant causal web, however, which is only partly understood. Similarly, the decrease in incongruence may have beneficial implications for interpreting HIV/STI risk among adolescent males, as fewer would be misclassified by SI-based assessments.

Female increases in same-sex sex extended significantly across all observed ages from 14 to 17; the male pattern did not. Adolescent sexual health education may be more impactful if content delivery incorporates more information on female-female sexual contact, which appears to be increasing across the adolescent age range.

Our consideration of the absolute proportions of youth with each SoSP history was driven by an interest in the prevalence of partnerships associated with different HIV/STI risks. We also considered proportions after removing those who had never had sex, isolating the SoSP distribution among those with sexual experience. The two trends sometimes diverged in magnitude or significance, especially for males. For instance, while the proportion of all males having sex with males grew, its growth as a proportion of all those having had sex was even larger. If those who have not yet had sex end up shifting their SoSP distribution in the same direction as their peers, this pattern could portend even more rapid increases in male-male sex in the coming years, with implications for HIV/STI transmission, prevention, testing, and treatment. The accuracy of this assumption, for male-male sex or any other combination, is difficult to predict. If the shifts in SoSP occur in part from an overall change in cultural norms, we might expect to see similar patterns among those with both early and late sexual initiation. However, it is possible that known differences between those with early and late initiation (33), could lead to different magnitudes or even directions of behavioral shifts. The patterns here likely differ by sex. Examination of post-adolescent cohorts could test whether the relationship between early and late initiators for SoSP has changed over time.

Some measures exhibited large changes from 2015 to 2021, without significance. We see two key reasons for this. First, we conducted trend tests on the full set of surveys but only reported the 2015 and 2021 values in the text for simplicity; the figures and tables reveal cases in which the intervening years did not follow a consistent trend. Secondly, sample sizes varied considerably in the disaggregated analyses, being much smaller for SM groups than for heterosexual respondents (Tables S5-S6).

Our analysis has multiple limitations, many imposed by the available source data. Respondents were only given an “other” SI option in 2021, making direct comparison with earlier years difficult. The conceptualization of different identities might be shifting

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

among youth (34, 35) in ways that are only partially captured by comparing prevalence of identities over time; additional qualitative information about respondents' understanding of each choice would enhance interpretation of trends. The data preclude consideration of temporal changes in individuals' SI and the ordering of identity formation and sexual history. We cannot distinguish motivations for different sexual partnerings, e.g., identity exploration, peer pressure, or coercive or forced sex, nor can we determine sex frequency within partnerships, which is especially relevant for HIV/STI risk. We did not analyze trends by race or ethnicity, despite known differences in SI and SoSP metrics (36) and HIV/STI burden (3), as the analysis was already complex; future work may re-examine our most salient findings more deeply by disaggregating on this important dimension.

Finally, sexual contact is a general term, which is purposefully left undefined in YRBS. It may thus be interpreted differently by different respondents, making the direct links to HIV/STI risks difficult to know confidently. A recent study among Australian adolescents found that someone's definition of what constitutes the term "sex" is influenced by many factors, including sexual orientation, previous sexual experience, and cultural/religious context (37). "Sexual contact" is likely similar. It is thus possible that YRBS's unspecified definition of sexual contact could introduce bias based on participant identity. However, this approach has the strength of allowing participants to define their own sexual experiences in terms of what they consider most salient.

Notably, SoSP missingness was high. Male respondents and gay/bisexual respondents were more likely than others not to report their SoSP, likely underestimating the prevalence of male-male sex. As the under-reporting increased with time, the actual increase in male-male sex may be greater than observed in these data.

STIs prevalences vary by people's sex and that of their sex partners, including among adolescents (1-7). Meanwhile, sexual identity can shape one's perception of STI risk, exposure to prevention messaging, and engagement with testing and treatment (7-9). The nature of sexual identity and sexual partnerships among US adolescents is becoming more diverse. This work finds that earlier-identified shifts have continued, and in some cases expanded. Public health and education in the US may anticipate potential shifts in HIV/STI incidence, while also meeting adolescents where they are at in order to provide the quality education, prevention and treatment services needed to maximize adolescent sexual health.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements:

We thank the entire CAMP modeling team, especially Monica Trigg, as well as the YRBS staff and study participants.

Funding Sources:

This research was funded by the US Centers for Disease Control and Prevention National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (Epidemiologic and Economic Modeling Agreement number U38 PS004650), as well as by the National Institutes of Health (P2C HD042828).

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

List of abbreviations:

STIs	Sexually transmitted infections
SoSP	Sex of sex partners
SI	Sexual identity
YRBS	Youth Risk Behavior Survey
SM	Sexual minority
CDC	Centers for Disease Control and Prevention

References

[1]. Centers for Disease Control and Prevention. Sexually transmitted disease surveillance 2019, https://www.cdc.gov/std/statistics/2019/std-surveillance-2019.pdf. Accessed June 15, 2024. Atlanta; 2021.

[2]. Shannon CL, Klausner JD. The growing epidemic of sexually transmitted infections in adolescents: a neglected population. Curr Opin Pediatr 2018;30:137–143. [PubMed: 29315111]

[3]. Centers for Disease Control and Prevention. Diagnoses, deaths, and prevalence of HIV in the United States and 6 territories and freely associated states, 2022. HIV Surveillance Report, 2022; vol. 35. http://www.cdc.gov/hiv-data/nhss/hiv-diagnoses-deaths-prevalence.html. Accessed June 25, 2024; 2024.

[4]. Pathela P, Braunstein SL, Schillinger JA, et al. Men who have sex with men have a 140-fold higher risk for newly diagnosed HIV and syphilis compared with heterosexual men in New York City. J Acquir Immune Defic Syndr 2011;58:408–416. [PubMed: 21857351]

[5]. Fairley CK, Hocking JS, Zhang L, et al. Frequent Transmission of Gonorrhea in Men Who Have Sex with Men. Emerg Infect Dis 2017;23:102–104. [PubMed: 27983487]

[6]. Koumans EH, Sternberg M, Bruce C, et al. The prevalence of bacterial vaginosis in the United States, 2001-2004; associations with symptoms, sexual behaviors, and reproductive health. Sex Transm Dis 2007;34:864–869. [PubMed: 17621244]

[7]. Goodenow C, Szalacha LA, Robin LE, et al. Dimensions of sexual orientation and HIV-related risk among adolescent females: evidence from a statewide survey. Am J Public Health 2008;98:1051–1058. [PubMed: 18445809]

[8]. Everett BG, Schnarrs PW, Rosario M, et al. Sexual orientation disparities in sexually transmitted infection risk behaviors and risk determinants among sexually active adolescent males: results from a school-based sample. Am J Public Health 2014;104:1107–1112. [PubMed: 24825214]

[9]. Arbeit MR, Fisher CB, Macapagal K, et al. Bisexual Invisibility and the Sexual Health Needs of Adolescent Girls. LGBT Health 2016;3:342–349. [PubMed: 27604053]

[10]. Phillips G 2nd, Beach LB, Turner B, et al. Sexual Identity and Behavior Among U.S. High School Students, 2005-2015. Arch Sex Behav 2019;48:1463–1479. [PubMed: 31123950]

[11]. Moskowitz DA, Rendina HJ, Alvarado Avila A, et al. Demographic and social factors impacting coming out as a sexual minority among Generation-Z teenage boys. Psychology of Sexual Orientation and Gender Diversity 2022;9:179.

[12]. Rapoport E, Athanasian CE, Adesman A. Prevalence of Nonheterosexual Identity and Same-Sex Sexual Contact Among High School Students in the US From 2015 to 2019. JAMA Pediatr 2021;175:970–972. [PubMed: 34125134]

[13]. Drasin H, Beals KP, Elliott MN, et al. Age cohort differences in the developmental milestones of gay men. J Homosex 2008;54:381–399. [PubMed: 18826167]

[14]. Dunlap A. Changes in coming out milestones across five age cohorts. Journal of Gay & Lesbian Social Services 2016;28:20–38.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

[15]. Adamczyk A, Liao Y-C. Examining public opinion about LGBTQ-related issues in the United States and across multiple nations. Annual Review of Sociology 2019;45:401–423.

[16]. Miller B A computer-mediated escape from the closet: Exploring identity, community, and disinhibited discussion on an internet coming out advice forum. Sexuality & Culture 2016;20:602–625.

[17]. Centers for Disease Control and Prevention. Youth Risk Behavior Survey: data summary and trends report 2011-2021. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf. Accessed 26 Jun 2024. Atlanta; 2023.

[18]. Herbenick D, Rosenberg M, Golzarri-Arroyo L, et al. Changes in Penile-Vaginal Intercourse Frequency and Sexual Repertoire from 2009 to 2018: Findings from the National Survey of Sexual Health and Behavior. Arch Sex Behav 2022;51:1419–1433. [PubMed: 34799832]

[19]. Stewart JL, Spivey LA, Widman L, et al. Developmental patterns of sexual identity, romantic attraction, and sexual behavior among adolescents over three years. J Adolesc 2019;77:90–97. [PubMed: 31693971]

[20]. Srivastava A, Hall WJ, Krueger EA, et al. Sexual identity fluidity, identity management stress, and depression among sexual minority adolescents. Front Psychol 2022;13:1075815. [PubMed: 36710830]

[21]. Savin-Williams RC, Diamond LM. Sexual identity trajectories among sexual-minority youths: gender comparisons. Arch Sex Behav 2000;29:607–627. [PubMed: 11100265]

[22]. Srivastava A, Hall WJ, Krueger EA, et al. Sexual Identity Fluidity and Depressive Symptoms: Findings From a National Longitudinal Study of Sexual Minority Adolescents. J Adolesc Health 2023;73:873–879. [PubMed: 37530683]

[23]. Underwood JM, Brener N, Thornton J, et al. Overview and Methods for the Youth Risk Behavior Surveillance System - United States, 2019. MMWR Suppl 2020;69:1–10. [PubMed: 32817611]

[24]. Szabo A. Test for trend with a multinomial outcome. The American Statistician 2019;7:313–320.

[25]. Christensen R. Comment on “Test for Trend With a Multinomial Outcome” by Szabo (2019). The American Statistician 2020;74:313–314.

[26]. Brener ND, Mpofu JJ, Krause KH, et al. Overview and Methods for the Youth Risk Behavior Surveillance System - United States, 2023. MMWR Suppl 2024;73:1–12.

[27]. Tao G. Sexual orientation and related viral sexually transmitted disease rates among US women aged 15 to 44 years. Am J Public Health 2008;98:1007–1009. [PubMed: 18445803]

[28]. Everett BG. Sexual orientation disparities in sexually transmitted infections: examining the intersection between sexual identity and sexual behavior. Arch Sex Behav 2013;42:225–236. [PubMed: 22350122]

[29]. Annor FB, Clayton HB, Gilbert LK, et al. Sexual Orientation Discordance and Nonfatal Suicidal Behaviors in U.S. High School Students. Am J Prev Med 2018;54:530–538. [PubMed: 29449136]

[30]. Harper CR, Clayton HB, Andrzejewski J, et al. Health risks among discordant heterosexual high school students. J LGBT Youth 2018;15:149–161. [PubMed: 38464593]

[31]. Lourie MA, Needham BL. Sexual Orientation Discordance and Young Adult Mental Health. J Youth Adolesc 2017;46:943–954. [PubMed: 27480273]

[32]. Mendelsohn DM, Omoto AM, Tannenbaum K, et al. When Sexual Identity and Sexual Behaviors Do Not Align: The Prevalence of Discordance and its Physical and Psychological Health Correlates. Stigma Health 2022;7:70–79. [PubMed: 35369673]

[33]. Reese BM, Choukas-Bradley S, Herring AH, et al. Correlates of adolescent and young adult sexual initiation patterns. Perspect Sex Reprod Health 2014;46:211–221. [PubMed: 25130473]

[34]. Flanders CE, LeBreton ME, Robinson M, et al. Defining Bisexuality: Young Bisexual and Pansexual People's Voices. Journal of Bisexuality 2017;17:39–57.

[35]. Swan DJ, Habibi S, eds. Bisexuality : theories, research, and recommendations for the invisible sexuality. Cham, Switzerland: Springer, 2018.

[36]. Mustanski B, Birkett M, Greene GJ, et al. The association between sexual orientation identity and behavior across race/ethnicity, sex, and age in a probability sample of high school students. Am J Public Health 2014;104:237–244. [PubMed: 24328662]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

[37]. Kauer S, Power J, Bourne A, et al. The diverse but common definitions of sex for young people in Australia. Sex Education 2024:1–17.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Implications and Contributions:

Both same-sex sexual contact and sexual minority identity increased among US adolescents over the period 2015-2021. These shifts are important for anticipating future HIV/STI risk and framing of sexual health promotion and education. Such efforts may benefit from an awareness that these shifts are occurring across the adolescent age range.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

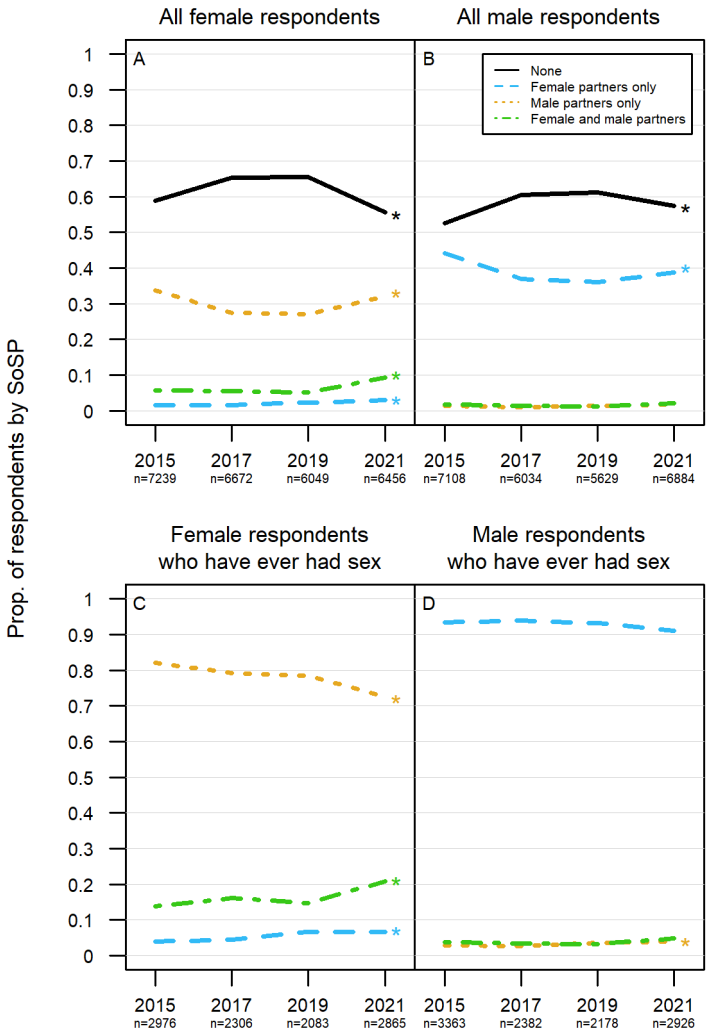


Figure 1:

Proportion of respondents by sex of sex partners (SoSP) over the lifetime, Youth Risk Behavior Survey (YRBS), 2015-2021

SoSP = sex of sex partners over the lifetime. Asterisks indicate significant trends. Associated numerical values are in Table S2.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

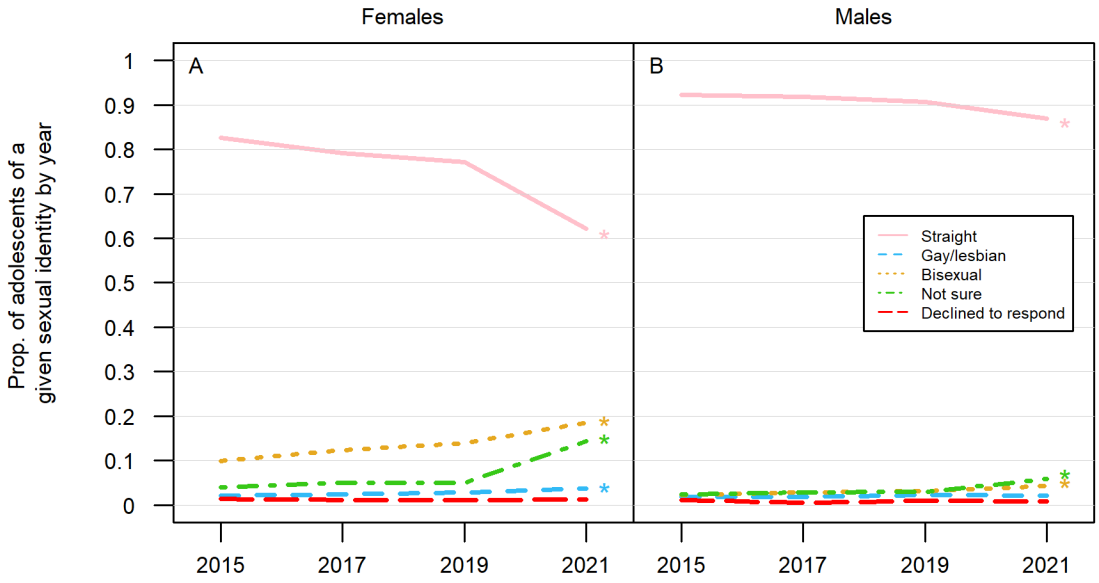


Figure 2:

Proportion of respondents by sexual identity, Youth Risk Behavior Survey (YRBS), 2015-2021

Asterisks indicate significant trends. Associated numerical values are in Table S3.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

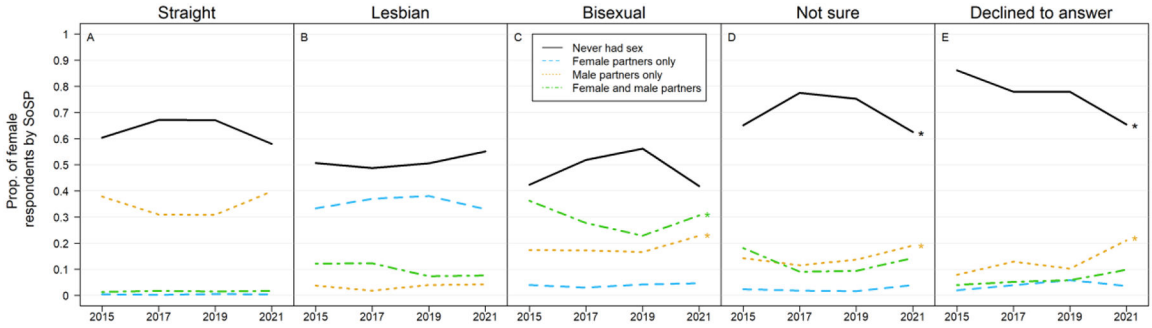


Figure 3:

Proportion of female respondents by sex of sex partners (SoSP) over the lifetime, including those with no prior sexual contact, broken out by reported sexual identity (SI), Youth Risk Behavior Survey (YRBS), 2015-2021

SoSP = sex of sex partners over the lifetime. Asterisks indicate significant trends. Associated numerical values are in Table S5.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

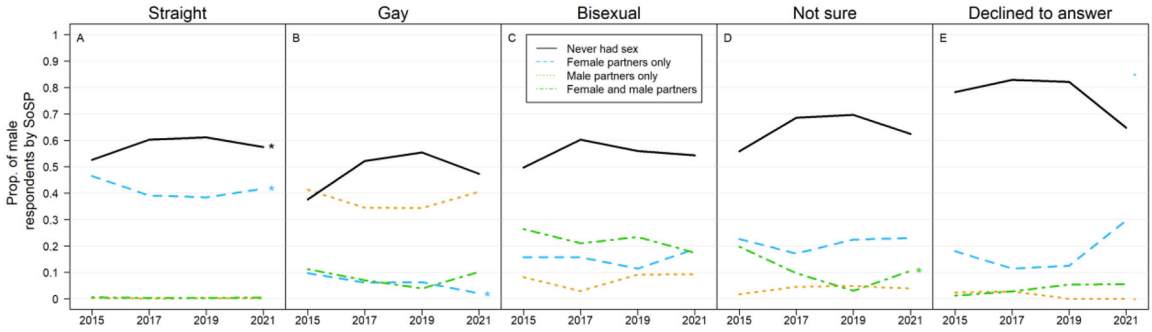


Figure 4:

Proportion of male respondents by sex of sex partners (SoSP) over the lifetime, including those with no prior sexual contact, broken out by reported sexual identity (SI), Youth Risk Behavior Survey (YRBS), 2015-2021

SoSP = sex of sex partners over the lifetime. Asterisks indicate significant trends. Associated numerical values are in Table S5.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

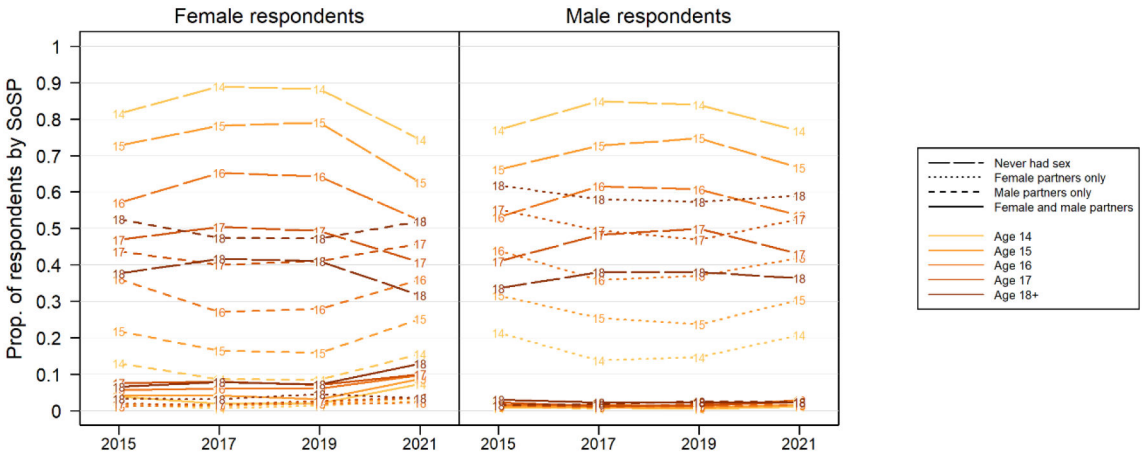


Figure 5:

Proportion of respondents by sex of sex partners (SoSP) over the lifetime, including those with no prior sexual contact, broken out by age, Youth Risk Behavior Survey (YRBS), 2015-2021

SoSP = sex of sex partners over the lifetime. Asterisks indicating significant trends are not included, given the large number of densely packed lines. Out of 20 trends per panel, 13 are significant for females and 1 for males; these are listed in Table S7 and described in the text.