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Factors Associated With HIV Testing Among High-School Girls in the U.S., 2015–2017

Alissa C. Cyrus, MPH¹, Richard Dunville, MPH², Athena P. Kourtis, MD, PhD³, Karen W. Hoover, MD, MPH³, Pattie Tucker, MPH, DrPH¹

¹Office of Women's Health, Office of Minority Health and Health Equity, Centers for Disease Control and Prevention, Atlanta, Georgia

²Division of Adolescent and School Health, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia

³Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia

Abstract

Introduction: Few studies have examined the factors associated with HIV testing, specifically among U.S. high-school girls.

Methods: Investigators analyzed 2015 and 2017 Youth Risk Behavior Survey data to calculate the prevalence ratios and the corresponding 95% CIs for the association of HIV-related risk behaviors and other factors with HIV testing. Analyses were completed in March 2020.

Results: Approximately 1 in 10 high-school girls reported ever having had an HIV test. Ever having had an HIV test was most common among girls who had 4 lifetime sexual partners and those who had ever injected illegal drugs.

Conclusions: High-school girls who engage in behaviors or experience other factors that put them at higher risk for HIV are more likely to have ever gotten tested. However, the prevalence of having ever had an HIV test remains relatively low, indicating that continued efforts may be warranted to reduce risk behaviors and increase testing among high-school girls.

INTRODUCTION

The overall rate of HIV diagnoses in the U.S. decreased from 13.1 to 11.8 per 100,000 population from 2012 through 2017.¹ Adolescent girls are at increased risk of HIV owing to social and biological factors²; in 2016, nearly 270 girls aged 13–19 years in the U.S. received an HIV diagnosis.³ The Centers for Disease Control and Prevention (CDC) recommends that healthcare providers offer routine HIV screening for everyone aged 13–64 years and annually for high-risk individuals.⁴ Many young people are unaware of their HIV status; estimates indicate that more than half of individuals aged 13–24 years living with HIV in the U.S. are undiagnosed⁵ and that the lowest proportion of lifetime HIV testing is

Address correspondence to: Alissa C. Cyrus, MPH, Office of Women's Health, Office of Minority Health and Health Equity, Centers for Disease Control and Prevention, 2877 Brandywine Road, Mailstop TWU-3, Atlanta GA 30341. acyrus@cdc.gov.

among those aged 15–17 years.⁶ In 2017, only about 1 in 10 high-school students reported ever having an HIV test.⁷

Testing for HIV is more common among high-school students who are female, who are Black/African American, who are in higher grade levels (i.e., 11th or 12th grade), or who engage in behaviors that increase HIV risk.^{7–9} Risk behaviors include illegal drug use, having multiple sexual partners, not using a condom during sex, and using alcohol or drugs before sex.^{10–13} In 2017, <1% of high-school girls reported lifetime illegal injection drug use, nearly 15% reported lifetime prescription pain medicine misuse, and almost 8% reported having 4 lifetime sexual partners.⁷ Among sexually active girls, about half did not use a condom, and about 15% used alcohol or drugs the last time they had sex.⁷

Other factors potentially associated with HIV risk pertinent to high-school girls include sexual violence victimization (e.g., forced sexual intercourse, sexual dating violence) and mental health factors, including general psychological distress and suicidal thoughts or attempts.^{9,10,14} Although associations between sexual violence victimization and sexually transmitted disease (STD)/HIV risk behaviors^{15–17} among adolescent girls have been well established, the relationship between sexual violence victimization and HIV testing in the U.S. is less clear. Decker et al.¹⁴ found that adolescent girls who experienced dating violence were more likely to get tested for STDs/HIV; however, this study used data, which are now 20 years old, from 1 state. Mental health factors may lead to poor judgment and decision making or lack of agency in relationships, which in turn may lead to riskier behavior.¹⁸ Whether mental health factors are associated with HIV testing has not been as well studied. These factors are particularly important for high-school girls because of the large affected proportion: >40% report persistent feelings of sadness or hopelessness; approximately 10% have been forced to have sexual intercourse; and of those who dated someone in the past year, 1 in 10 experienced sexual dating violence.⁷

Previous studies of HIV-related risk behaviors and HIV testing have reported on adolescents and young adults overall^{8–10} or stratified by sex.^{11,12,19–21} The few studies focused on adolescent girls have used either clinic-based^{17,22} or state-based^{14,23} samples, results of which are not generalizable to all U.S. high-school girls. To the authors' knowledge, no studies have used nationally representative data to describe factors related to HIV testing concentrating on high-school girls. This study uses national Youth Risk Behavior Survey (YRBS) data to examine the factors associated with HIV testing among high-school girls in the U.S.

METHODS

Study Sample

Data from the national YRBS were analyzed.²⁴ Conducted every 2 years, the YRBS collects self-reported data on health-related topics, including unintentional injuries, violence, tobacco use, alcohol and other drug use, sexual behaviors, dietary behaviors, physical activity, and overweight and obesity. The YRBS uses a 3-stage, cluster sample design to obtain a nationally representative sample of 9th–12th-grade students in public and private high schools in the 50 states and the District of Columbia. Data were weighted to adjust for

nonresponse and oversampling of Black and Hispanic students.²⁵ CDC's IRB approved the national YRBS. Weighted data from the 2015 and 2017 YRBS were combined to ensure adequate sample size for analyses, following CDC-recommended procedures.²⁶

Measures

Demographic characteristics included race/ethnicity (non-Hispanic White, non-Hispanic Black or African American, Hispanic or Latina; because sample sizes were too small for meaningful analysis, other racial/ethnic groups were collapsed into a non-Hispanic other or multiple-races category), high school grade level (9th, 10th, 11th, 12th), grades in school (mostly C's, D's, and F's; mostly A's and B's), sexual identity (heterosexual; gay, lesbian, or bisexual; not sure), and sex of sexual contacts (male contacts only, female contacts only or both male and female contacts, or no sexual contact).

Included HIV-related risk behaviors were the number of lifetime sexual partners (≥ 4 , <4 , never had sexual intercourse), condom use at last sexual intercourse (yes, no, never had sexual intercourse), alcohol or drug use before last sexual intercourse (yes, no, never had sexual intercourse), ever misused prescription drugs (yes, no),^a and ever injected illegal drugs (yes, no).

Other factors included were ever forced to have sexual intercourse (yes, no), experienced sexual dating violence in the past 12 months (i.e., someone they went out with or were dating forced them to do sexual things they did not want to do [yes, no, did not date anyone in past 12 months]), and persistent feelings of sadness or hopelessness (i.e., felt so sad or hopeless almost every day for ≥ 2 weeks in a row that they stopped performing some usual activities [yes, no]).

One HIV testing measure, ever having had an HIV test, was assessed. Respondents were considered to have ever had an HIV test if they responded yes to: Have you ever been tested for HIV, the virus that causes AIDS? (Do not count tests done if you donated blood).

Statistical Analysis

Prevalence estimates and corresponding 95% CIs of selected demographic characteristics, HIV-related risk behaviors, and other factors overall and stratified by ever or never having an HIV test were calculated. Nonoverlapping CIs were used to identify significant differences between those who ever and those who never had an HIV test. Logistic regression was performed to calculate the prevalence ratios (PRs) and the corresponding 95% CIs for the association of HIV-related risk behaviors and other factors with HIV testing, adjusted for high school grade level, race or ethnicity, grades in school, and sex of sexual contacts. Analyses were completed in March 2020 using SUDAAN, version 11.0.1.

A total of 30,389 high-school students participated in the combined 2015 and 2017 YRBS. The sample was limited to female students ($n=15,283$); further excluded were respondents

^aIn 2015, respondents were asked: *During your life, how many times have you taken a prescription drug (such as OxyContin, Percocet, Vicodin, codeine, Adderall, Ritalin, or Xanax) without a doctor's prescription?* In 2017, they were asked: *During your life, how many times have you taken prescription pain medicine without a doctor's prescription or differently than how a doctor told you to use it? (Count drugs such as codeine, Vicodin, OxyContin, Hydrocodone, and Percocet).*

missing on variables of interest ($n=4,667$): demographic characteristics ($n=3,408$), HIV-related risk behaviors ($n=639$), other factors ($n=588$), and HIV testing ($n=32$). The final analytic sample comprised 10,616 female high-school students with complete information, which scaled to 11,067 after weights were applied.

RESULTS

Overall, most high-school girls were non-Hispanic White (57.1%). Approximately one quarter were in each grade level (ranged from 23.9% [11th grade] to 26.1% [10th grade]), and >80% received mostly A's and B's. Most girls identified as heterosexual (83.1%), and nearly half had not had sexual contact with either males or females (49.3%). Slightly fewer than 1 in 10 girls reported having 4 lifetime sexual partners (8.3%), and 17.9% did not use a condom the last time they had sex. Approximately 6% reported using alcohol or drugs before they last had sex, nearly 15% ever misused prescription drugs, and only 0.5% ever injected illegal drugs. Almost 1 in 10 girls reported having been forced to have sexual intercourse and having experienced sexual dating violence (9.9% and 9.2%, respectively). In total, 40% of girls reported persistent feelings of sadness or hopelessness. Approximately 1 in 10 girls (10.3%) had ever had an HIV test (Table 1).

The distribution of demographic characteristics, HIV-related risk behaviors, and other factors differed between high-school girls who ever had an HIV test and those who never had. A higher proportion of girls who ever had an HIV test were non-Hispanic Black or African American (17.5% vs 10.9%); were in the 12th grade (36.1% vs 23.0%); got mostly C's, D's, and F's (29.8% vs 17.2%); identified as gay, lesbian, or bisexual (20.3% vs 12.2%); had ever misused prescription drugs (27.2% vs 13.3%); ever injected illegal drugs (2.0% vs 0.4%); had been forced to have sexual intercourse (24.0% vs 8.3%); and had persistent feelings of sadness or hopelessness (54.8% vs 38.6%) than the proportion of those who never had an HIV test. A higher proportion of those who never had an HIV test had not had sexual contact with males or females (53.0% vs 17.2%), had never had sexual intercourse (66.1% vs 22.0%), and had not dated anyone in the past 12 months (32.3% vs 12.9%) (Table 1).

The prevalence of lifetime HIV testing varied by risk behaviors and other factors. Only 14.1% of high-school girls who had persistent feelings of sadness or hopelessness, 17.2% who experienced sexual dating violence, and 19.1% who ever misused prescription drugs ever had an HIV test. By contrast, 36.2% of girls who had 4 lifetime sexual partners and 37.5% of those who ever injected illegal drugs ever had an HIV test. In unadjusted logistic regression models, each of the assessed factors was a significant predictor of ever having an HIV test (PRs ranged from 1.40 [experienced sexual dating violence] to 3.69 [ever injected illegal drugs]). After adjustment for demographic characteristics, PRs were attenuated; however, all but having experienced sexual dating violence remained significant (adjusted PRs ranged from 1.31 [used alcohol or drugs before last sex] to 2.15 [ever injected illegal drugs]) (Table 2).

DISCUSSION

Approximately 1 in 10 high-school girls reported ever having received an HIV test; it was most common among girls who had 4 lifetime sexual partners and those who had ever injected illegal drugs. Several factors associated with lifetime HIV testing were identified. It is encouraging that high-school girls who engage in behaviors or experience other factors that put them at higher risk for HIV are more likely to have been tested. However, the prevalence of ever having an HIV test is still relatively low, indicating that continued efforts may be warranted to reduce risk behaviors and increase testing among high-school girls.

Approximately 10% of high-school girls had ever received an HIV test, which was similar to a 2018 report.⁷ Other studies that included only sexually experienced adolescent girls found higher percentages, on the order of 20%.^{9,10,19} This study was not limited to sexually experienced high-school girls because some factors assessed may increase the risk for contracting HIV regardless of sexual experience (e.g., illegal injection drug use). In addition, girls who have been forced to have sexual intercourse may not consider themselves sexually experienced, and some girls may only consider vaginal intercourse when asked about sexual experience even if they have engaged in oral or anal sex; these girls would have been excluded were the study limited on the basis of sexual experience.

High-school girls who engaged in high-risk behaviors were more likely than those who did not to have ever received an HIV test, even after adjustment for demographic characteristics. Those who ever injected illegal drugs and those who had 4 lifetime sexual partners reported the highest prevalence of ever having an HIV test (37.5% and 36.2%, respectively) and were twice as likely to have had an HIV test as those who did not report these behaviors. Although smaller in magnitude, associations were also found between lack of condom use at last sex, use of alcohol or drugs before last sex, and ever having misused prescription drugs with HIV testing. With few exceptions, these results are similar to the findings of previous studies conducted among sexually experienced adolescents overall (i.e., boys and girls).⁸⁻¹⁰ Balaji and colleagues¹⁰ and Pampati et al.⁹ did not find an association between alcohol or drug use before last sex and prescription opioid misuse, respectively, and HIV testing. These differences may be due, in part, to the fact that these studies used a sample of only sexually experienced adolescents, who may be more similar in both risk behaviors and HIV testing than a sample of all adolescents. In addition, because adolescents may engage in multiple HIV-related risk behaviors, controlling for them as these studies did may attenuate some results.

The finding that girls who had ever been forced to have sexual intercourse were more likely to have had an HIV test but that those who had experienced sexual dating violence in the past 12 months were not aligns with the findings of Pampati and colleagues.⁹ Other studies also found an association between forced sexual intercourse and HIV testing,⁸⁻¹⁰ possibly because girls who have been forced to have sex perceive themselves at higher risk of contracting HIV and request HIV testing directly or are referred for HIV testing after seeking out sexual assault services.^{14,27} The relationship between sexual dating violence and HIV testing is murkier. A study using Massachusetts YRBS data found that high-school girls who experienced both physical and sexual dating violence were more likely to be tested for

and diagnosed with STDs and HIV.¹⁴ However, a Boston area clinic-based study found that although 10% of adolescent girls sought care for testing or symptoms of HIV or STDs, there were no statistically significant associations with lifetime or current intimate partner violence.²⁸ The finding that high-school girls who experience sexual dating violence are not more likely to get tested for HIV is concerning. Male adolescents and young adults who perpetrate physical or sexual dating violence are more likely to engage in sexual risk behaviors and to be diagnosed with STDs, thereby increasing their partners' risk of contracting STDs or HIV.^{29–31} This is an important area that merits additional attention.

The 1 assessed mental health measure, persistent feelings of sadness or hopelessness, was associated with ever having an HIV test. Mental health factors have previously been associated with HIV-related risk behaviors such as injection drug use and sexual risk behaviors.^{32,33} The relationship between mental health and risk behaviors could partially explain this association; however, a recent study found that persistent feelings of sadness or hopelessness were associated with lifetime HIV testing even after adjustment for sexual risk behaviors.⁹ Psychological distress in female adolescents has been associated with real and perceived barriers to negotiating condom use with their sex partners.³³ Female adolescents who perceive barriers to condom use are more likely to worry about HIV infection³⁴ and thus may be more likely to seek testing for HIV. Further investigation is warranted to disentangle the relationship among high-school girls' mental health, risk behaviors, and receipt of HIV testing.

Barriers to HIV testing cited by adolescents (and young adults) include that they do not perceive themselves at risk, that a healthcare provider did not suggest it, that they feared getting tested, privacy concerns, and the stigma associated with getting an HIV test.^{35,36} A multifaceted approach is likely needed to address these barriers and increase HIV testing in this population. Possible strategies include providing HIV education in school, integrating HIV testing into routine and reproductive health services, and utilizing newer technologies such as mobile health (mHealth) interventions.^{2,37} Schools are invaluable for the dissemination of information; receipt of HIV/AIDS education in school has been linked to increased HIV testing and reduced drug use and sexual risk behaviors.^{2,21,23,38} Healthcare providers can incorporate HIV testing into routine and reproductive health visits; this can help normalize testing, and adolescents indicate that being offered HIV testing by their providers would help them remember to get tested.³⁶ These visits also represent an opportunity to conduct comprehensive screening of risk behaviors, violence victimization, and mental health and then for referral to additional services and HIV testing when appropriate. Interventions through mHealth, mostly using text messaging, have shown some promise in increasing HIV testing.³⁷ More research is needed to determine the effectiveness of large-scale adoption of mHealth interventions; however, they have the potential to deliver low-cost, confidential information and reminders about HIV testing.³⁷

Limitations

These data are subject to several limitations. First, YRBS data are self-reported and thus subject to recall and social desirability bias, which may result in under-reporting of HIV-related risk behaviors and other risk factors and under- or over-reporting of HIV testing.

Second, YRBS is conducted in public and private high schools in the U.S.; therefore, data are only representative of those who attend school. Out-of-school high school-aged adolescents are more likely to engage in risky behaviors than those in school³⁹; thus, estimates of risk behaviors presented in this study may be lower than estimates among all adolescent girls. Third, in 2015 and 2017, YRBS did not ask questions about all HIV-related risk behaviors (e.g., anal sex), testing for STDs, diagnosis of HIV or STDs, or access to health care, so this study was unable to account for those factors. Fourth, data on geographic location were not available in the national YRBS; therefore, the authors were unable to assess whether factors such as neighborhood stress or living in an area with high HIV prevalence were associated with HIV testing. In addition, they were unable to assess all racial and ethnic groups individually; because not all groups are equally likely to receive an HIV test,⁸ this is an area warranting further study. Finally, these data are cross-sectional, so causality cannot be determined. Despite these limitations, this study is unique because it assesses the relationship of HIV-related risk behaviors, sexual violence victimization, and mental health factors with HIV testing among high-school girls.

CONCLUSIONS

High-school girls who engage in HIV-related risk behaviors or experience other factors that put them at higher risk for HIV are more likely to get tested for HIV, which is encouraging. However, the prevalence of lifetime HIV testing among high-school girls remains relatively low, indicating opportunities for improvement in HIV testing in this group. A multifaceted approach, including HIV education in school, integration of HIV testing into routine and reproductive health services, and the use of newer mHealth technologies, aimed at reducing sexual risk behaviors and increasing HIV testing is warranted for all high-school girls but particularly for those who engage in high-risk behaviors.

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REFERENCES

1. Centers for Disease Control and Prevention. HIV surveillance report volume 29: diagnoses of HIV infection in the United States and dependent areas, 2017. Atlanta, GA: Centers for Disease Control and Prevention; 11 2018. <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2017-vol-29.pdf>. Published November 2018. Accessed April 28, 2020.
2. Abdool Karim Q, Baxter C, Bix D. Prevention of HIV in adolescent girls and young women: key to an AIDS-free generation. *J Acquir Immune Defic Syndr*. 2017;75(suppl 1):S17–S26. 10.1097/QAI.0000000000001316. [PubMed: 28398993]
3. Centers for Disease Control and Prevention. HIV surveillance report supplemental report volume 23, number 3: diagnoses of HIV infection among adolescents and young adults in the United States and 6 dependent areas 2011–2016. Atlanta, GA: Centers for Disease Control and Prevention; 5 2018. <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-supplemental-report-vol-23-3.pdf>. Published May 2018. Accessed April 28, 2020.

4. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR Recomm Rep*. 2006;55(RR-14):1–17. <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5514a1.htm>. Accessed May 14, 2019.
5. Centers for Disease Control and Prevention. HIV surveillance report supplemental report volume 23, number 1: estimated HIV incidence and prevalence in the United States 2010–2015. Atlanta, GA: Centers for Disease Control and Prevention; 3 2018. <https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-supplemental-report-vol-23-1.pdf>. Published March 2018. Accessed April 28, 2020.
6. Adolescents and adults tested for HIV in past 12 months (percent, 15–44 years) by age group. Healthy People 2020, HHS, Office of Disease Prevention and Health Promotion. <https://www.healthypeople.gov/2020/data/Chart/4613?category=4&by=Agegroup&fips=-1>. Updated October 8, 2020. Accessed September 24, 2019.
7. Kann L, McManus T, Harris WA, et al. Youth risk behavior surveillance - United States, 2017. *MMWR Surveill Summ*. 2018;67(8):1–114. 10.15585/mmwr.ss6708a1.
8. Coeytaux K, Kramer MR, Sullivan PS. HIV testing among United States high school students at the state and national level, Youth Risk Behavior Survey 2005–2011. *Springerplus*. 2014;3(1):202. 10.1186/2193-1801-3-202. [PubMed: 24855587]
9. Pampati S, Lowry R, Steiner RJ. Substance use, violence experiences, and mental health issues: are these health risks associated with HIV testing among sexually experienced U.S. high school students? *AIDS Care*. 2019;31(9):1106–1113. 10.1080/09540121.2019.1619666. [PubMed: 31129997]
10. Balaji AB, Eaton DK, Voetsch AC, Wiegand RE, Miller KS, Doshi SR. Association between HIV-related risk behaviors and HIV testing among high school students in the United States, 2009. *Arch Pediatr Adolesc Med*. 2012;166(4):331–336. 10.1001/archpediatrics.2011.1131. [PubMed: 22213606]
11. Eaton DK, Lowry R, Brener ND, Kann L, Romero L, Wechsler H. Trends in human immunodeficiency virus- and sexually transmitted disease-related risk behaviors among U.S. high school students, 1991–2009. *Am J Prev Med*. 2011;40(4):427–433. 10.1016/j.amepre.2010.12.010. [PubMed: 21406276]
12. Centers for Disease Control and Prevention (CDC). Trends in HIV-related risk behaviors among high school students—United States, 1991–2011. *MMWR Morb Mortal Wkly Rep*. 2012;61(29):556–560. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6129a4.htm>. Accessed October 23, 2018. [PubMed: 22832937]
13. Rasberry CN, Lowry R, Johns M, et al. Sexual risk behavior differences among sexual minority high school students - United States, 2015 and 2017. *MMWR Morb Mortal Wkly Rep*. 2018;67(36):1007–1011. 10.15585/mmwr.mm6736a3. [PubMed: 30212446]
14. Decker MR, Silverman JG, Raj A. Dating violence and sexually transmitted disease/HIV testing and diagnosis among adolescent females. *Pediatrics*. 2005;116(2):e272–e276. 10.1542/peds.2005-0194. [PubMed: 16061580]
15. Silverman JG, Raj A, Mucci LA, Hathaway JE. Dating violence against adolescent girls and associated substance use, unhealthy weight control, sexual risk behavior, pregnancy, and suicidality. *JAMA*. 2001;286(5):572–579. 10.1001/jama.286.5.572. [PubMed: 11476659]
16. Okumu M, Mengo C, Ombayo B, Small E. Bullying and HIV risk among high school teenagers: the mediating role of teen dating violence. *J Sch Health*. 2017;87(10):743–750. 10.1111/josh.12547. [PubMed: 28876474]
17. Decker MR, Miller E, McCauley HL, et al. Recent partner violence and sexual and drug-related STI/HIV risk among adolescent and young adult women attending family planning clinics. *Sex Transm Infect*. 2014;90(2):145–149. 10.1136/sextrans-2013-051288. [PubMed: 24234072]
18. Donenberg GR, Pao M. Youths and HIV/AIDS: psychiatry's role in a changing epidemic. *J Am Acad Child Adolesc Psychiatry*. 2005;44(8):728–747. 10.1097/01.chi.0000166381.68392.02. [PubMed: 16034275]
19. Van Handel M, Kann L, Olsen EO, Dietz P. HIV testing among U.S. high school students and young adults. *Pediatrics*. 2016;137(2): e20152700. 10.1542/peds.2015-2700. [PubMed: 26787047]

20. Decker MR, Rodney R, Chung SE, Jennings JM, Ellen JM, Sherman SG. HIV testing among youth in a high-risk city: prevalence, predictors, and gender differences. *AIDS Care*. 2015;27(5):555–560. 10.1080/09540121.2014.986048. [PubMed: 25495522]
21. Centers for Disease Control and Prevention (CDC). HIV testing among high school students—United States, 2007. *MMWR Morb Mortal Wkly Rep*. 2009;58(24):665–668. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5824a3.htm>. Accessed April 30, 2021. [PubMed: 19553902]
22. Danielson CK, Walsh K, McCauley J, et al. HIV-related sexual risk behavior among African American adolescent girls. *J Womens Health (Larchmt)*. 2014;23(5):413–419. 10.1089/jwh.2013.4599. [PubMed: 24749895]
23. Goodenow C, Szalacha LA, Robin LE, Westheimer K. Dimensions of sexual orientation and HIV-related risk among adolescent females: evidence from a statewide survey. *Am J Public Health*. 2008;98(6):1051–1058. 10.2105/AJPH.2005.080531. [PubMed: 18445809]
24. Youth risk behavior survey, 2015 and 2017 [survey data and codebook]. Centers for Disease Control and Prevention. <https://www.cdc.gov/healthyyouth/data/yrbs/data.htm>. Updated June 2016 and June 2018. Accessed February 16, 2021.
25. Brener ND, Kann L, Shanklin S, et al. Methodology of the Youth Risk Behavior Surveillance System—2013. *MMWR Recomm Rep*. 2013;62 (RR-1):1–20. <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6201a1.htm>. Accessed June 10, 2019.
26. Centers for Disease Control and Prevention. Combining YRBS data across years and sites. Atlanta, GA: Centers for Disease Control and Prevention; 8 2020. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/2019/2019_YRBS_combining_data.pdf. Published August 2020. Accessed October 30, 2020.
27. Brown MJ, Weitzen S, Lapane KL. Association between intimate partner violence and preventive screening among women. *J Womens Health (Larchmt)*. 2013;22(11):947–952. 10.1089/jwh.2012.4222. [PubMed: 23808669]
28. Miller E, Decker MR, Raj A, Reed E, Marable D, Silverman JG. Intimate partner violence and health care-seeking patterns among female users of urban adolescent clinics. *Matern Child Health J*. 2010;14(6):910–917. 10.1007/s10995-009-0520-z. [PubMed: 19760162]
29. Reed E, Miller E, Raj A, Decker MR, Silverman JG. Teen dating violence perpetration and relation to STI and sexual risk behaviours among adolescent males. *Sex Transm Infect*. 2014;90(4):322–324. 10.1136/sextrans-2013-051023. [PubMed: 24578579]
30. Vagi KJ, O'Malley EO, Basile KC, Vivolo-Kantor AM. Teen dating violence (physical and sexual) among U.S. high school students: findings from the 2013 National Youth Risk Behavior Survey. *JAMA Pediatr*. 2015;169(5):474–482. 10.1001/jamapediatrics.2014.3577. [PubMed: 25730143]
31. Casey EA, Querna K, Masters NT, et al. Patterns of intimate partner violence and sexual risk behavior among young heterosexually active men. *J Sex Res*. 2016;53(2):239–250. 10.1080/00224499.2014.1002125. [PubMed: 26158212]
32. Lowry R, Crosby AE, Brener ND, Kann L. Suicidal thoughts and attempts among U.S. high school students: trends and associated health-risk behaviors, 1991–2011. *J Adolesc Health*. 2014;54(1):100–108. 10.1016/j.jadohealth.2013.07.024. [PubMed: 24035267]
33. DiClemente RJ, Wingood GM, Crosby RA, et al. A prospective study of psychological distress and sexual risk behavior among black adolescent females. *Pediatrics*. 2001;108(5):E85. 10.1542/peds.108.5.e85. [PubMed: 11694669]
34. Crosby R, DiClemente RJ, Wingood GM, et al. Psychosocial correlates of adolescents' worry about STD versus HIV infection: similarities and differences. *Sex Transm Dis*. 2001;28(4):208–213. 10.1097/00007435-200104000-00004. [PubMed: 11318251]
35. The Henry J Kaiser Family Foundation. National survey of young adults on HIV/AIDS. San Francisco, CA: The Henry J. Kaiser Family Foundation; 11 2017. <http://files.kff.org/attachment/Report-National-Survey-of-Young-Adults-on-HIV/AIDS>. Published November 2017. Accessed April 28, 2020.
36. Schnall R, Rojas M, Travers J. Understanding HIV testing behaviors of minority adolescents: a health behavior model analysis. *J Assoc Nurses AIDS Care*. 2015;26(3):246–258. 10.1016/j.jana.2014.08.005. [PubMed: 25283353]

37. Conserve DF, Jennings L, Aguiar C, Shin G, Handler L, Maman S. Systematic review of mobile health behavioural interventions to improve uptake of HIV testing for vulnerable and key populations. *J Telemed Telecare*. 2017;23(2):347–359. 10.1177/1357633X16639186. [PubMed: 27056905]
38. Raj A, Decker MR, Murray JE, Silverman JG. Gender differences in associations between exposure to school HIV education and protective sexual behaviors and sexually transmitted disease/HIV diagnosis among high school students. *Sex Educ*. 2007;7(2):191–199. 10.1080/14681810701264599.
39. Centers for Disease Control and Prevention (CDC). Health risk behaviors among adolescents who do and do not attend school—United States, 1992. *MMWR Morb Mortal Wkly Rep*. 1994;43(8):129–132. <https://www.cdc.gov/mmwr/preview/mmwrhtml/00025174.htm>. Accessed June 22, 2020. [PubMed: 8309460]

Table 1. Prevalence of Selected Characteristics Among High-School Girls by HIV Testing Status—Youth Risk Behavior Survey, 2015–2017

Characteristics	Overall (N=11,067) % (95% CI)	Ever had an HIV test (n=1,142) % (95% CI)	Never had an HIV test (n=9,925) % (95% CI)
Overall	N/A	10.3 (9.2, 11.5)	89.7 (88.5, 90.8)
Race or ethnicity			
White, non-Hispanic	57.1 (52.8, 61.3)	49.1 (43.0, 55.2)	58.1 (53.8, 62.2)
Black or African American, non-Hispanic	11.6 (10.1, 13.3)	17.5 (13.6, 22.1)	10.9 (9.5, 12.5)
Hispanic or Latina	21.4 (18.6, 24.6)	22.3 (18.5, 26.7)	21.3 (18.5, 24.5)
Other or multiple, non-Hispanic	9.8 (8.2, 11.6)	11.1 (8.5, 14.4)	9.7 (8.1, 11.5)
Grade level			
9th grade	25.6 (23.9, 27.3)	16.6 (13.7, 19.9)	26.6 (24.8, 28.5)
10th grade	26.1 (24.7, 27.6)	22.6 (19.6, 25.8)	26.5 (25.0, 28.1)
11th grade	23.9 (22.9, 25.0)	24.8 (21.4, 28.5)	23.8 (22.7, 25.0)
12th grade	24.4 (23.3, 25.5)	36.1 (32.8, 39.5)	23.0 (22.0, 24.2)
Grades in school			
Mostly C's, D's, and F's	18.5 (16.4, 20.8)	29.8 (25.8, 34.1)	17.2 (15.2, 19.4)
Mostly A's and B's	81.5 (79.2, 83.6)	70.2 (65.9, 74.2)	82.8 (80.6, 84.8)
Sexual identity			
Heterosexual	83.1 (81.3, 84.9)	77.1 (73.8, 80.0)	83.8 (81.8, 85.7)
Gay/lesbian/bisexual	13.0 (11.6, 14.6)	20.3 (17.4, 23.5)	12.2 (10.7, 13.9)
Not sure	3.8 (3.3, 4.5)	2.7 (1.9, 3.7)	4.0 (3.4, 4.7)
Sex of sexual contacts			
Males only	41.6 (39.5, 43.7)	62.8 (59.1, 66.4)	39.1 (37.1, 41.2)
Females only or both males and females	9.1 (8.0, 10.3)	20.0 (17.0, 23.3)	7.8 (6.8, 9.0)
No sexual contact	49.3 (46.9, 51.7)	17.2 (14.1, 20.9)	53.0 (50.7, 55.4)
Number of lifetime sexual partners			
4	8.3 (7.3, 9.5)	29.2 (26.2, 32.4)	5.9 (5.0, 7.0)
<4	30.2 (28.3, 32.2)	48.8 (45.5, 52.2)	28.0 (26.0, 30.1)
Never had sexual intercourse	61.5 (58.6, 64.3)	22.0 (18.6, 25.9)	66.1 (63.3, 68.7)
Used a condom at the last sexual intercourse			
No	17.9 (16.1, 19.7)	45.3 (41.8, 48.9)	14.7 (13.1, 16.5)

Characteristics	Overall (N=11,067) % (95% CI)	Ever had an HIV test (n=1,142) % (95% CI)	Never had an HIV test (n=9,925) % (95% CI)
Yes	20.6 (19.2, 22.1)	32.6 (29.7, 35.8)	19.2 (17.8, 20.8)
Never had sexual intercourse	61.5 (58.6, 64.3)	22.0 (18.6, 25.9)	66.1 (63.3, 68.7)
Used alcohol or drugs before last sexual intercourse			
Yes	6.1 (5.3, 6.9)	16.5 (14.0, 19.3)	4.9 (4.2, 5.6)
No	32.4 (30.1, 34.9)	61.5 (57.7, 65.2)	29.1 (26.7, 31.6)
Never had sexual intercourse	61.5 (58.6, 64.3)	22.0 (18.6, 25.9)	66.1 (63.3, 68.7)
Ever misused prescription drugs			
Yes	14.7 (13.6, 16.0)	27.2 (23.6, 31.1)	13.3 (12.1, 14.5)
No	85.3 (84.0, 86.4)	72.8 (68.9, 76.4)	86.7 (85.5, 87.9)
Ever injected illegal drugs			
Yes	0.5 (0.4, 0.8)	2.0 (1.2, 3.3)	0.4 (0.2, 0.6)
No	99.5 (99.2, 99.6)	98.0 (96.7, 98.8)	99.6 (99.4, 99.8)
Ever forced to have sexual intercourse			
Yes	9.9 (8.7, 11.3)	24.0 (20.5, 27.8)	8.3 (7.3, 9.5)
No	90.1 (88.7, 91.3)	76.0 (72.2, 79.5)	91.7 (90.5, 92.7)
Experienced sexual dating violence in the past 12 months			
Yes	9.2 (8.3, 10.1)	15.3 (12.5, 18.5)	8.5 (7.6, 9.4)
No	60.5 (58.6, 62.5)	71.8 (67.9, 75.5)	59.2 (57.1, 61.3)
Did not date anyone in the past 12 months	30.3 (28.1, 32.6)	12.9 (10.7, 15.5)	32.3 (30.0, 34.7)
Persistent feelings of sadness or hopelessness			
Yes	40.2 (37.9, 42.6)	54.8 (51.3, 58.3)	38.6 (36.2, 40.9)
No	59.8 (57.4, 62.1)	45.2 (41.7, 48.7)	61.4 (59.1, 63.8)

N/A, not applicable.

Prevalence and APRs for the Association of HIV-Related Risk Behaviors and Other Factors With HIV Testing—Youth Risk Behavior Survey, 2015–2017

Table 2.

Variables	Prevalence of HIV testing % (95% CI)	Unadjusted PR (95% CI)	Adjusted ^a APR (95% CI)
Had 4 lifetime sexual partners	36.2 (31.4, 41.3)	2.16 (1.85, 2.54)	1.99 (1.70, 2.32)
Did not use a condom at the last sexual intercourse	26.2 (23.5, 29.1)	1.60 (1.39, 1.84)	1.48 (1.30, 1.69)
Used alcohol or drugs before last sexual intercourse	28.1 (23.8, 32.9)	1.44 (1.21, 1.71)	1.34 (1.12, 1.60)
Ever misused prescription drugs	19.1 (16.1, 22.4)	2.16 (1.81, 2.58)	1.43 (1.20, 1.69)
Ever injected illegal drugs	37.5 ^b (22.1, 55.9)	3.69 (2.31, 5.87)	2.15 (1.21, 3.82)
Ever forced to have sexual intercourse	24.9 (22.0, 28.0)	2.86 (2.43, 3.35)	1.71 (1.48, 1.98)
Experienced sexual dating violence in the past 12 months	17.2 (14.0, 20.9)	1.40 (1.12, 1.76)	1.23 (0.97, 1.54)
Persistent feelings of sadness or hopelessness	14.1 (12.5, 15.8)	1.80 (1.60, 2.03)	1.31 (1.16, 1.48)

^a Adjusted for high school grade level, race or ethnicity, grades in school, and sex of sexual contacts.

^b Estimate has a relative SE between 20 and 30 and should be interpreted with caution.
APR, adjusted prevalence ratio; PR, prevalence ratio.