HHS Public Access

Author manuscript

Prev Sci. Author manuscript; available in PMC 2021 October 01.

Published in final edited form as:

Prev Sci. 2020 October ; 21(7): 898–907. doi:10.1007/s11121-020-01153-z.

Association of HIV Education with HIV Testing and Sexual Risk Behaviors among U.S. Youth, 2009–2017: Disparities Between Sexual Minority and Sexual Majority Youth

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Abstract

HIV remains a serious concern among youth, particularly among sexual minority youth (SMY). Risk behaviors including low rates of HIV testing and inconsistent condom use as well as use of substances before sex contribute to these disparities. Therefore, HIV education in schools may be a valuable tool for reducing HIV-related risk behaviors. Using a large, pooled sample of youth (N=169468) from the 2009 –2017 Youth Risk Behavior Survey (YRBS), we conducted the first population-level assessment of associations between HIV education and risk behavior prevalence among high school aged youth by sexual behavior (i.e., sex of sexual partner[s]) in the US. Results demonstrated that racial/ethnic minority youth and SMY were less likely to have received HIV education than White or heterosexual peers. HIV education was associated with less substance use at last sex. Among males, HIV education was associated with increased condom use and HIV testing, emphasizing its promise as a potential intervention for risk behavior reduction. Results are discussed in light of current literature with future recommendations.

Keywords

sexual minority youth; HIV testing; HIV education; condom use; substance use

INTRODUCTION

The Centers for Disease Control and Prevention (CDC) estimates that 50,900 youth and emerging adults aged 13 to 24 years are living with HIV (Centers for Disease Control and Prevention 2018). Despite significant progress in HIV prevention and treatment, 8,164 youth and emerging adults received an HIV diagnosis in 2017, comprising 21% of diagnoses that year (Centers for Disease Control and Prevention 2018). Moreover, in the US, youth are less likely than any other age group to know their HIV status and therefore also the least likely to be connected to HIV services and to attain a suppressed viral load (Centers for Disease

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Conflicts of Interest: The authors declare they have no conflicts of interest.

Informed Consent: This study was based on secondary data analysis and as such informed consent was not required.

Control and Prevention 2019; Giordano et al. 2005; Hall et al. 2012). This disconnect highlights the need for informational mechanisms that enable youth to identify risk factors, make informed decisions regarding their health, and understand resources available to them for linkage to HIV services.

Low rates of HIV testing among youth are a key barrier to HIV prevention and treatment—only 9% of all high school students have ever been tested for HIV (Kann et al. 2018). Literature on HIV testing across sexually active and sexually inactive youth has been limited; however, Kann et al. indicate that adolescent females have higher rates of testing than adolescent males (2018). In the Youth Risk Behavior Survey (YRBS), self-reported HIV testing rates among females were 10.5% compared to 8.1% among males (Kann et al. 2018). Moreover, among populations at greatest risk for HIV infection, such as young men who have sex with men (YMSM), testing rates remain suboptimal (15–30%) (Phillips et al. 2015; Kann et al. 2018). Knowledge on where to get an HIV test is also limited; Phillips et al. found that of 152 sexually experienced adolescent gay and bisexual men, nearly half (42.9%) did not know where they could go to receive an HIV test (2015). Such low rates of testing and lack of knowledge of resources, particularly among populations at greatest risk for HIV infection, increase the likelihood that youth are unaware of their HIV infection and may, therefore, unknowingly transmit HIV to others (Kann et al. 2018).

Paired with low testing rates and lack of knowledge of resources, a number of other behaviors place youth at increased risk for HIV infection. Nearly half (46%) of sexually active high school students and 48% of YMSM did not use a condom during their most recent sexual experience (Kann et al. 2018). Further, as reported in one meta-analysis, nearly 1 in 5 high school students who had sex in the three months prior to being surveyed reported that they drank alcohol or used drugs before their most recent encounter. This is troubling as substance use prior to or during sexual intercourse can increase the likelihood of HIV transmission due to behaviors such as condomless sex (Rehm et al. 2012; Shuper et al. 2009; Kann et al. 2018). PrEP (pre-exposure prophylaxis), an HIV preventive biomedical intervention, is also infrequently used by youth. For instance, PrEP utilization rates among a sample of 759 YMSM PrEP was only 8.7% (Strauss et al. 2017). In sum, a concomitance of factors including unknown HIV status, substance use, and low rates of condom and PrEP usage may contribute to a higher risk for HIV infection in youth. Such factors necessitate support for interventions that empower youth, particularly YMSM and other sexual minority youth (SMY), to understand the risk factors that contribute to transmission and to take appropriate steps for prevention. In the context of this paper, we define SMY as adolescents who reported same-sex sexual contact, though SMY also include those who have romantic/emotional attractions to the same gender or claim an identity such as lesbian, gay, or bisexual.

One key area of HIV intervention is to provide youth with comprehensive sex education that includes information on HIV transmission and prevention. The effects of sex and HIV education on risk behavior reduction in students are generally promising (Mueller et al. 2008; Vivancos et al. 2013; Kirby et al. 2007; Main et al. 1994; Kirby 2008). Still, the efficacy of school-based sex education is debated—effectiveness varies and is largely dependent on factors such as content, environment, and approach (Haberland and Rogow

2015). For example, one meta-analysis found that nearly two-thirds of comprehensive sex education interventions resulted in a reduction in adolescent sexual risk behaviors surrounding STIs/HIV following educational programming. Abstinence-based programming, however, was far less effective with less than a third of interventions having any effect whatsoever (Kirby 2008). Nevertheless, other studies have found limited impact of school-based sex education on outcomes including reported STI diagnoses, whether it was abstinence-based or comprehensive (Kohler et al. 2008; Sherr et al. 2013). These mixed results have driven calls for effective, empowerment-based, large-scale comprehensive sexual education programs in the HIV and STI prevention landscape (Koenig et al. 2016). Additional examination of the impact of sex education on risk-taking behavior at the population level is also justified, particularly with a focus on HIV-oriented programming.

Furthermore, there is limited literature on the association between HIV education and reduction in HIV risk behaviors in SMY as a whole, especially comparing these associations between SMY and sexual majority youth. Studies that do exist generally center solely on YMSM; for example, national-scale studies have shown that HIV education is associated with reduced HIV risk behavior in this population (Raifman et al. 2018). Other studies have reported that HIV education is associated with increased condom usage, fewer lifetime and current sexual partners, and reduction in substance use before sex (Blake et al. 2001). Despite the known impact of HIV education on risk behaviors in YMSM and the disproportionate impact of HIV in this population, YMSM are still less likely to receive HIV education compared to non-YMSM (Rasberry et al. 2018). Conflicting literature has debated whether HIV education differentially impacts condom use and overall risk behavior reduction in YMSM and non-YMSM populations (Raifman et al. 2018; Rasberry et al. 2018). In addition, other SMY populations are largely understudied, particularly sexual minority women (SMW). To our knowledge, there is only one study that focuses comprehensively on SMY in the context of HIV education, and no studies focusing specifically on young SMW (Blake et al. 2001).

In light of this literature, we hypothesize that HIV education will be associated with fewer risk behaviors across the general population, but that, perhaps due to the heteronormative focus of HIV and sex education in schools, these associations will be stronger in non-SMY populations. To investigate the impact of HIV education among male and female SMY and non-SMY, this study leverages a geographically diverse, multi-year sample of high school-aged youth (the YRBS) to examine the association of condom use, substance use during sex, and HIV testing outcomes with HIV education, with a novel and specific focus on differences between SMY and sexual majority youth. To our knowledge, this study is the first to provide such a comprehensive, population-level exploration of these topics.

METHODS

Participants

The YRBS is a biennial, national survey that has been conducted by the CDC since 1991 to collect health data on students in grades 9 to 12 (Centers for Disease Control and Prevention et al. 2013). The YRBS monitors health-related behaviors among youth, such as alcohol and drug use, experiences with violence, suicidal ideation, sexual behaviors, and eating habits

(Kann et al. 2016). We used data from local versions of the YRBS, which is administered on a state, territorial, tribal, and large urban school district level by departments of education or health—we pooled data across states and large urban school districts for this study. In their implementation, jurisdictions used a two-stage cluster sample design to identify a representative sample of students (Centers for Disease Control and Prevention et al. 2013). In the first stage, schools were selected with a probability proportional to their enrollment. In the second stage, classes of a required subject or during a required period were randomly selected and all students within these classes were eligible to participate. Participation was voluntary and anonymous, and students completed the self-administered surveys during the span of that single class period. A new sample was selected in this manner each survey year; the same students were not followed over time. For a complete description of the sampling procedure, see Kann et al. (2016).

Analytic Sample

Local YRBS data were pooled across multiple jurisdictions (state and large, urban school districts) and years (biennially from 2009–2017). The entire dataset consists of 56 jurisdictions across 5 time points, and 523,829 youth. Only jurisdiction-years including both sexual behavior and HIV education assessments were utilized in the overall analytic sample for this manuscript, resulting in the inclusion of 70 jurisdiction-years representing 176,882 students. For the present analyses, students were excluded if they were missing any of the primary demographic variables of interest (sexual behavior: 4.7%; sex: 0.6%; race/ethnicity: 2.9%; grade: 1.1%, not mutually exclusive), resulting in a final analytic sample of 169,468 participants. Finally, to account for "mischievous" responders, incongruent responses were excluded from the analytic sample (those who indicated they had never had sex and *also* indicated they used drugs or alcohol at last sex [n = 63] and those who indicated they never had sex and also indicated not using a condom at last sex [n = 77]) (Cimpian et al. 2018).

Measures

All measures included in these analyses were identical across all jurisdiction-years unless otherwise noted.

Demographics

Grade.: Participants were asked, "*In what grade are you?*" Response options included: 9th grade, 10th grade, 11th grade, 12th grade, and ungraded or other grade. Students who selected "ungraded or other grade" (n = 255) were excluded from analyses.

Sex.: Sex was determined by asking participants "*What is your sex?*" with the choices: (1) male or (2) female. Until 2017, the YRBS did not ask about gender identity; therefore, we are unable to examine gender identity in most jurisdiction-years and will refer only to "male" or "female" participants in this study.

Race/ethnicity.: Race/ethnicity was assessed using two questions. First, participants were asked if they identified as Hispanic or Latino (yes or no). Second, participants were asked to select all of the races that applied from the following list: American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander; and White.

Using the CDC's classification, these variables were combined into 5 racial/ethnic groups: (1) Asian; (2) Black or African American; (3) Hispanic/Latino (regardless of reported race); (4) White; and (5) Other.

Sexual behavior.: Sexual behavior was assessed by asking, "*During your life, with whom have you had sexual contact?*" Response options included: (1) I have never had sexual contact; (2) females; (3) males; and (4) females and males. This variable was recoded based on the students' reported sex. The recoded variable included four categories: no sexual partners, only different-sex partners, only same-sex partners, and both same-and-different-sex partners.

Primary Exposure

HIV education.: To assess exposure to HIV education, participants were asked, "*Have you ever been taught about AIDS or HIV infection in school?*" Response options included: (1) Yes; (2) No; and (3) Not sure.

Outcomes of Interest

HIV testing.: To assess the prevalence of HIV testing, participants were asked, "*Have you ever been tested for HIV, the virus that causes AIDS (Do not count tests done if you donated blood)?*" Response options included: (1) Yes; (2) No; and (3) Not sure.

Condom use at last sex.: To assess condom use, participants were asked, "*The last time you had sexual intercourse, did you or your partner use a condom?*" Response options included: (1) I have never had sexual intercourse; (2) Yes; and (3) No.

Substance use at last sex.: Participants were asked, "*Did you drink alcohol or use drugs before you had sexual intercourse the last time?*" Responses included: (1) I have never had sexual intercourse; (2) Yes; and (3) No.

Statistical Analysis

All data cleaning and recoding was conducted in SAS Version 9.4 (SAS Institute, Cary, NC). Analyses were carried out using SAS-Callable SUDAAN Version 11.0.1 (RTI International, Research Triangle Park, NC) to appropriately weight estimates and to account for the complex sampling design of the YRBS. The YRBS data weights adjust for student non-response and distribution of students by grade, sex, and race/ethnicity in each jurisdiction (Centers for Disease Control and Prevention et al. 2013).

Descriptive analyses were conducted to determine prevalence of HIV education and HIV risk behaviors (HIV testing, condom use at last sex, and substance use at last sex) by sex. Bivariable analyses were then conducted to assess demographic and primary outcome associations with HIV education by sex, using χ^2 tests. Then, multinomial logistic regression models were developed to look at the association between HIV education and each of the three outcomes; these models were stratified by sex and included all demographic factors including sexual behavior.

RESULTS

Demographics

The sample was nearly equally split between males (50.1%) and females (49.9%; Table 1). More than half of the sample identified as White (56.3%), with approximately one-fifth identifying as Black (18.0%) or Hispanic/Latino (18.2%). Nearly equal portions of the sample were from each grade, with a slight decrease in representation from 9th graders (26.6%) to 12th graders (23.5%). Of the sample, 2.2% reported sexual activity with the same sex only, 4.4% reported sexual activity with males and females, 49.1% reported sexual activity with a different sex only, and 44.3% reported no sexual activity.

More than two-thirds of participants reported receiving HIV education in school (83.7%). The remainder reported either receiving no HIV education (11.4%), or being unsure of receiving HIV education (4.9%). Males and females reported receiving HIV education at about equal rates (83.3% vs. 84.0%). Prevalence of HIV testing was fairly low (13.1%), and similar for both males and females. A small but substantial proportion indicated having used drugs or alcohol (7.6%) or not using condoms (14.7%) at last sex.

Bivariate Associations with HIV Education

Females—Among female students, receiving HIV education was associated with several demographic factors. Compared with White females, Black, Hispanic/Latina, and Asian females were all significantly less likely to report receiving HIV education (Table 2). Unsurprisingly, females in 9th grade were significantly less likely to report HIV education than 12th graders; no differences were seen for other grades. Females who reported sex with other females only were 29% less likely to have received HIV education (odds ratio [OR] = 0.71; 95% confidence interval [CI]: 0.59, 0.86) than females who never had sex. Females who used drugs or alcohol at last sex were significantly less likely to have received HIV education (OR = 0.81; 95% CI: 0.66, 0.97) than those who reported they did not use substances.

Males—Similar demographic associations with HIV education were seen among male students (Table 2). Compared with White males, all other race/ethnicity students were significantly less likely to have received HIV education. Additionally, male students who only had sex with other males, as well as males who had sex with both males and females, were significantly less likely to have received HIV education than their sexually inexperienced peers (OR = 0.60; 95% CI: 0.49, 0.72 and OR = 0.55; 95% CI: 0.45, 0.68, respectively). Although HIV testing among male students was not associated with HIV education, sexual risk behaviors were. Males who used drugs or alcohol at last sex were significantly less likely to have received HIV education than those who used no substances (OR = 0.65; 95% CI: 0.56, 0.74). Further, males who did not use condoms at last sex were significantly less likely to have received HIV education than those who used condoms (OR = 0.74; 95% CI: 0.65, 0.83).

Multinomial Logistic Regression Models

HIV Education and HIV Testing—In multinomial logistic regression models, HIV testing was not significantly associated with HIV education for females after controlling for sexual behavior, race/ethnicity, grade, and year of survey administration. However, many other factors were associated with HIV testing (Table 3). For example, females who were sexually active were significantly more likely to report HIV testing. Moreover, the odds of testing for HIV among those who had sex with both males and females was nearly twice that of those for other sexually active females.

After controlling for demographics, males who received HIV education were significantly more likely to have tested for HIV (AOR = 1.26; 95% CI: 1.03, 1.53; Table 4). Additionally, males who had sex with only males had 4.40 times the odds of testing for HIV and males who had sex with both males and females had 3.85 times the odds of testing for HIV compared to their sexually inexperienced peers (95% CI: 2.93, 6.59; 2.61, 5.68, respectively).

HIV Education and Substance Use at Last Sex—Among females, those who received HIV education (AOR = 1.38; 95% CI: 1.17, 1.62) were significantly more likely to abstain from drugs and alcohol at last sex (Table 3). Further, females who either had sex with only females (AOR = 0.69; 95% CI: 0.54, 0.87; Table 3) or both males and females (AOR = 0.43; 95% CI: 0.38, 0.49; Table 3) were less likely to abstain from substances at last sex than females who had sex with males only.

A similar pattern was seen for male students (Table 4). Those who received HIV education were 1.7 times as likely to abstain from drugs or alcohol at last sex (95% CI: 1.48, 1.95). Although there were no differences in substance use between males with only female partners and those with only male partners, male students with partners of both sexes were significantly less likely to abstain from substances at last sex (AOR = 0.52; 95% CI: 0.42, 0.64), after controlling for receipt of HIV education.

HIV Education and Condom Use at Last Sex—In terms of sexual behavior, females who only had sex with other females (AOR = 0.41, 95% CI: 0.34, 0.50) or with both males and females (AOR = 0.59, 95% CI: 0.52, 0.66), were significantly less likely to have used a condom at last sex (Table 3). There were no associations between condom use and receiving HIV education.

For male students, the association between HIV education and condom use was more consistent: those who reported learning about HIV in school were significantly more likely to have used condoms at last sex (AOR = 1.37, 95% CI: 1.21, 1.56; Table 4). Finally, after controlling for receipt of HIV education, males who had sex with only males and those who had sex with both males and females were nearly 70% less likely to have used a condom at last sex when compared to males who only had sex with females (95% CI: 0.27, 0.42; 0.28, 0.42, respectively).

DISCUSSION

Within our study, we report novel findings on HIV education, its distribution across SMY and sexual majority youth, and its associations with HIV risk behaviors by sex and sexual behavior. Although most youth reported receiving HIV education in school, HIV prevention behaviors were low in practice. Few students reported HIV testing, and a notable portion of students engaged in condomless sex and/or used alcohol or other substances during sex. In tandem, nearly 5% of the population was unsure of whether they had received HIV education, perhaps suggesting that multiple time points and sessions of HIV education could be required to ensure retention of information. As nearly one half of our sample reported no sexual activity, this is of particular importance: HIV education may be more salient and impactful for youth as they are becoming sexually active and prevention behaviors become more pertinent to their current situation. Repeated HIV education may be beneficial, though this could not be tested within the current data.

We found that receiving HIV education was associated with increased odds of abstaining from substance use during last sex for both males and females. Further, for males, receiving HIV education was associated with increased condom use at last sex and testing for HIV. This evidence highlights HIV education as a promising intervention for risk behavior reduction, particularly among males. It also implies that lack of HIV education could be a potential risk factor in itself. This finding suggests the importance of discussion of the quality and distribution of HIV education at the population level.

Overall, all racial/ethnic minority groups were significantly less likely to report receiving HIV education than White students, with the exception of “other race” females. One possible explanation for this inequitable HIV education is the overall, systemic educational disparities between White students and racial/ethnic minority students, largely attributed to links between minority status and socioeconomic status (Garcia and Weiss 2015). These links can be traced back to a history of racially discriminatory policy in a number of social spheres. School funding and resources could potentially explain these patterns, as inequality in district funding is shown to have disparate impacts on urban settings, where racial/ethnic minorities are more highly concentrated, as well as on migrant children in schools (Orstander 2015). As HIV education is often seen as supplemental to other health topics, schools with high populations of racial/ethnic minorities could potentially have a difficulty implementing comprehensive HIV education as a result of resource constraints. In addition to funding constraints, discussion of sexuality in HIV and sexual education is often constrained by state legislative policy and ideology, functionally facilitating the spread of HIV (Adimora et al. 2015). Future research is needed into the role that specific curricula and larger policies have on receipt of HIV education, moving beyond just individual-level predictors.

As previously mentioned and consistent with current literature, differences in the distribution of HIV education within racial/ethnic minority populations were observed; these differences have the potential to exacerbate disparities in HIV, as Black and Latinx men and women are known to have higher rates of HIV incidence and prevalence, particularly prevalent in YMSM (Bradley et al. 2019; Tillerson 2008; Centers for Disease Control and

Prevention 2017b, 2017a, 2018). A lower distribution of HIV education in racial and ethnic minority populations in tandem with our observed associations of HIV education and risk behaviors suggests a need to further examine HIV education in racial and ethnic minority populations. Such disparities in HIV education distribution potentially demonstrate the need for culturally competent and community-specific sexual and HIV education (Whitten and Sethna 2014).

Within this sample, there were also notable disparities between sexual minority and sexual majority youth. Nearly all SMY (with the exception of females reporting sex with males and females) were less likely to report receiving HIV education compared to sexual majority youth. Studies have found that sexual minority identities and same-sex sexual behaviors are often excluded in sex education curricula, and students' understanding of this question may have been dependent on how tailored HIV education was to an individual's sexual experience (Pingel et al. 2013). This framework stands as one possible explanation for the marked lack of HIV education in SMY: sexual minority youth may have interpreted the question differently and believed that they had not received HIV education due to its irrelevance to their non-heterosexual experiences.

Nevertheless, the associations of HIV education and risk behaviors are especially important considering the aforementioned disparities of HIV incidence and prevalence in SMY, particularly among YMSM (Kann et al. 2018; Phillips et al. 2015). Alcohol and substance use at last sex and engaging in last sex without a condom were more prevalent across all SMY, with the exception of males who only reported sex with males – they were no more likely to have used alcohol/drugs at last sex than their sexual majority peers. Given HIV education's potential impact on risk factor reduction, a lack of HIV education could exacerbate disparities in SMY populations with heavy HIV burdens, particularly YMSM who are already at an elevated risk for HIV acquisition (Centers for Disease Control and Prevention 2017a, 2018). However, in some populations, such as females having sex with only females, factors such as not using condoms may not be considered high-risk behaviors for HIV transmission (Petersen et al. 1992).

It is also noteworthy that youth as a whole are a particularly high risk population for HIV. Despite a high prevalence of HIV education and a general inverse association between HIV education and risk behavior prevalence, the strikingly high prevalence of risk-taking behavior in students indicates that HIV education cannot stand alone as an intervention. Instead, HIV education must be supplemented with other evidence-based interventions, such as resource awareness initiatives, linkage to HIV services, condom distribution programs, and sexual communication training. This supplementation is especially pertinent as youth are the least likely to be connected to services in a timely manner, and therefore are at higher risk for comorbidities and transmission associated with non-suppressed viral loads (Giordano et al. 2005; Centers for Disease Control and Prevention 2019; Hall et al. 2012).

This study is not without limitations. The YRBS assesses receipt of HIV education through a single question, and does not provide any information on the content, timing, or frequency of the HIV education received. In this way, we could not control for quality or efficacy of their HIV education. It also does not account for any HIV education students may have

received outside of school or other educational programs about safer sex or STIs that may have similarly impacted students' behavior. Similarly, this study is also based on secondary data analysis; we did not have control over design of the questions. Some questions, due to a lack of clarity or definitions provided, may have been confusing to respondents and caused some amount of misclassification. The questions assessing sexual contact, for example, does not necessarily define sexual contact and it also does not allow us to account for cases of child sexual abuse. Still, we feel the robustness of our sample size limits the impact of this limitation. Additionally, the effectiveness of HIV education could potentially be moderated by things such as jurisdictional sexual education policies and the efficacy of their implementation, calling for further research on the association between jurisdictional HIV education policy and sexual risk behaviors. In addition, we were unable to assess social determinants of health such as rural/urban location or socioeconomic status which are known to impact HIV risk as well as school resource availability, as discussed above. Youth who were absent from school or dropped out, a high risk group for engaging in sexual risk behaviors, were also not able to be examined by nature of the YRBS. Finally, due to sampling design, our analyses were cross-sectional, preventing determination of directionality of effects.

In conclusion, this study leverages a large, nation-wide sample to examine the effects of HIV education not only across males and females, but sexual minority and sexual majority youth across race/ethnicity. Marking the potential role of HIV education in reducing HIV health disparities in sexual and racial/ethnic minorities, we call for future research into the effectiveness of HIV education in mitigating risk factors across sex and gender in youth, particularly accounting for differences in educational quality and access by racial/ethnic and socioeconomic disparities. Such results have the potential to inform public policy approaches to HIV education in schools and highlight the role of HIV education in preventing the acquisition of HIV in youth.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGMENTS

The authors wish to acknowledge the Centers for Disease Control and Prevention for their role in creating and administering the Youth Risk Behavior Survey.

The study was supported by a grant from the National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism (R01 AA024409; Principal Investigator: Phillips) as well as a grant from the National Heart, Lung, and Blood Institute (K12HL143959; Principal Investigator: Beach)

Ethics Approval:

This study was submitted to Northwestern University's IRB and received a designation of "exempt". It was conducted in accordance with the ethical standards of our institution and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Table 1.

Demographic Variables and HIV Prevention/Risk Behaviors among High School Aged Youth, YRBS, 2009–2017.

	Total		Male		Female	
	#	%	#	%	#	%
Demographics	169,468		81,425	50.10	88,043	49.90
Sexual Behavior (n = 162,385)						
No Sex	74,186	44.26	33,414	42.29	40,772	46.23
Same Sex Only	4,231	2.20	1,888	1.96	2,343	2.44
Male and Female	7,394	4.42	1,692	2.11	5,702	6.72
Different Sex Only	76,574	49.12	40,581	53.65	35,993	44.61
Race/Ethnicity						
White	64,250	56.25	31,374	56.65	32,876	55.85
Black	27,229	18.04	12,545	17.56	14,684	18.52
Hispanic/Latino	43,763	18.19	20,826	18.20	22,937	18.17
Asian	15,346	3.27	7,628	3.31	7,718	3.23
Other	18,880	4.25	9,052	4.28	9,828	4.23
Grade						
9th	45,631	26.62	21,743	26.77	23,888	26.48
10th	44,152	25.69	21,168	25.84	22,984	25.54
11th	42,130	24.21	20,367	24.13	21,763	24.29
12th	37,555	23.48	18,147	23.27	19,408	23.69
Prevention and Risk Behavior						
Received HIV education (n=169,468)						
Yes	139,502	83.65	66,551	83.33	72,951	83.98
No	21,184	11.41	10,629	11.84	10,555	10.98
Not Sure	8,782	4.94	4,245	4.83	4,537	5.04
Tested for HIV (n = 74,268)						
Yes	10,954	13.08	5,183	12.79	5,771	13.37
No	55,105	76.54	26,201	76.18	28,904	76.90
Not Sure	8,209	10.38	4,173	11.03	4,036	9.73
Substance use at last sex (n = 144,203)						
Yes	11,130	8.95	6,209	12.79	4,921	6.25
No	47,120	33.35	22,684	34.18	24,436	32.54
Not Sure	85,953	59.08	38,554	56.87	47,399	61.21
Condom use at last sex (n = 150,585)						
Yes	37,354	25.76	20,219	29.32	17,135	22.34
No	22,373	14.69	9,346	13.24	13,027	16.09
Never had sex	90,858	59.55	40,700	57.44	50,158	61.57

Table 2.

Demographic and HIV Prevention/Risk Behavior Associations with HIV Education among High School Aged Youth, YRBS, 2009–2017.

	Received HIV Education			
	Female		Male	
	OR	95% CI	OR	95% CI
Demographics				
Sexual Behavior (n = 162,385)				
No Sex	1.00	--	1.00	--
Same Sex Only	**0.71**	**(0.59, 0.86)**	**0.60**	**(0.49, 0.72)**
Male and Female	1.04	(0.92, 1.19)	**0.55**	**(0.45, 0.68)**
Different Sex Only	**1.19**	**(1.10,1.28)**	1.01	(0.93, 1.09)
Race/Ethnicity				
White	1.00	--	1.00	--
Black	**0.77**	**(0.65,0.90)**	**0.53**	**(0.47, 0.60)**
Hispanic/Latino	**0.64**	**(0.56, 0.73)**	**0.57**	**(0.51, 0.65)**
Asian	**0.76**	**(0.64,0.91)**	**0.64**	**(0.55, 0.74)**
Other	0.85	(0.72, 1.02)	**0.69**	**(0.59, 0.81)**
Grade				
9th	**0.61**	**(0.52,0.71)**	**0.67**	**(0.59, 0.75)**
10th	0.93	(0.81, 1.09)	1.04	(0.92, 1.18)
11th	1.08	(0.93, 1.25)	1.08	(0.94, 1.22)
12th	1.00	--	1.00	--
Prevention and Risk Behavior				
Tested for HIV (n = 74,268)				
Yes	1.00	--	1.00	--
No	0.95	(0.76, 1.20)	0.93	(0.76, 1.12)
Not Sure	1.01	(0.76, 1.33)	1.18	(0.93, 1.47)
Substance use at last sex (n = 144,203)				
Yes	**0.81**	**(0.66, 0.97)**	**0.65**	**(0.56, 0.74)**
No	1.00	--	1.00	--
Never had sex	**0.85**	**(0.76,0.94)**	0.98	(0.87, 1.11)
Condom use at last sex (n = 150,585)				
Yes	1.00	--	1.00	--
No	0.98	(0.85, 1.15)	**0.74**	(0.65, 0.83)
Never had sex	**0.87**	**(0.76,0.98)**	0.99	(0.88, 1.11)

Table 3.

Multinomial Logistic Regression of Association between HIV Prevention/Risk Behavior Associations with HIV Education among Female High School Aged Youth, YRBS, 2009–2017.

	Received HIV Testing N = 35312		**No Substance Use, Last Sex N = 32361**		**Condom Use, Last Sex N = 33528**	
	AOR	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**
Sexual Behavior						
No Sex	1.00	--	--	--	--	--
Same Sex Only	**3.40**	**(2.44, 4.73)**	**0.69**	**(0.54, 0.87)**	**0.41**	**(0.34, 0.50)**
Male and Female	**5.90**	**(4.61, 7.54)**	**0.43**	**(0.38, 0.49)**	**0.59**	**(0.52, 0.66)**
Different Sex Only	**3.88**	**(3.31, 4.56)**	1.00	--	1.00	--
Race/Ethnicity						
White	1.00	--	1.0.0		1.00	--
Black	**2.90**	**(2.32,3.61)**	**1.56**	**(1.34,1.83)**	1.10	(0.98,1.24)
Hispanic/Latino	**2.01**	**(1.69, 2.40)**	**1.32**	**(1.17,1.48)**	**0.89**	**(0.81,0.98)**
Asian	**1.64**	**(1.30,2.07)**	**1.39**	**(1.01,1.92)**	0.82	(0.67,1.00)
Other	**1.74**	**(1.40, 2.15)**	1.05	(0.85, 1.28)	0.94	(0.81,1.08)
Grade						
9th	**0.64**	**(0.50, 0.81)**	0.87	(0.74, 1.02)	**1.30**	**(1.16,1.47)**
10^{th}	**0.72**	**(0.57, 0.90)**	**1.19**	**(1.03,1.38)**	**1.45**	**(1.30,1.62)**
11th	0.88	(0.72, 1.09)	1.04	(0.92, 1.17)	**1.22**	**(1.12,1.33)**
12^{th}	1.00	--	1.00	--	1.00	--
HIV Education						
Yes	0.97	(0.77, 1.22)	**1.38**	**(1.17,1.62)**	1.11	(0.98,1.26)
No	1.00	--	1.00	--	1.00	--

Table 4.

Multinomial Logistic Regression of Association between HIV Prevention/Risk Behavior Associations with HIV Education among Male High School Aged Youth, YRBS, 2009–2017.

	Received HIV Testing N = 32177		**No Substance Use, Last Sex N = 31134**		**Condom Use, Last Sex N = 32147**	
	AOR	**95% CI**	**AOR**	**95% CI**	**AOR**	**95%CI**
Sexual Behavior						
No Sex	1.00	--	--	--	--	--
Same Sex Only	**4.40**	**(2.93, 6.59)**	0.88	**(0.68, 1.13)**	**0.34**	**(0.27, 0.42)**
Male and Female	**3.85**	**(2.61, 5.68)**	**0.52**	**(0.42, 0.64)**	**0.34**	**(0.28, 0.42)**
Different Sex Only	**1.97**	**(1.65, 2.37)**	1.00	--	1.00	--
Race/Ethnicity						
White	1.00	--	1.00	--	1.00	--
Black	**2.57**	**(2.11,3.13)**	**1.41**	**(1.23,1.63)**	**1.22**	**(1.09,1.38)**
Hispanic/Latino	**1.91**	**(1.62, 2.25)**	1.04	(0.92, 1.16)	**0.87**	**(0.79,0.95)**
Asian	1.27	(0.94, 1.70)	1.25	(0.97, 1.61)	0.92	(0.76,**1.13)**
Other	**1.81**	**(1.40, 2.35)**	0.97	(0.82, 1.15)	0.91	(0.78,**1.08)**
Grade						
9th	0.91	(0.71, 1.16)	**1.19**	**(1.02,1.38)**	**1.26**	**(1.11,1.42)**
10th	**0.81**	**(0.67,0.99)**	**1.23**	**(1.08,1.41)**	**1.26**	**(1.13, 1.41)**
11th	**0.82**	**(0.68,0.99)**	1.11	(0.98, 1.26)	**1.10**	**(1.00, 1.21)**
12th	1.00	--	1.00	--	1.00	--
HIV Education						
Yes	**1.26**	**(1.03,1.53)**	**1.70**	**(1.48,1.95)**	**1.37**	**(1.21,1.56)**
No	1.00	--	1.00	--	1.00	--