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Association between receipt of school-based HIV education and contraceptive use among sexually active high school students — United States, 2011–2013

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Abstract

Sexual health education, including HIV prevention information, can help prevent unintended pregnancy and sexually transmitted infections. National Youth Risk Behavior Survey data from 2011 and 2013 were used to determine HIV education prevalence among 9,825 currently sexually active students in grades 9–12. Associations between HIV education and contraceptive methods used at last sexual intercourse were examined for: (1) condom use; (2) any contraceptive method; (3) dual use of a condom and either birth control pills; IUD or implant; or shot, patch, or birth control ring; and (4) primary contraceptive method. Primary contraceptive method options were (1) no method; (2) birth control pills; (3) condoms; (4) IUD or implant; (5) shot, patch, or birth control ring; (6) withdrawal or some other method; and (7) not sure. Logistic regression (prevalence ratios [PRs] and 95% confidence intervals [CIs]) and Chi-squares were used for testing. Students who received HIV education were more likely than students who did not to use a condom (PR:1.09;CI:1.01,1.18) and any contraceptive method (PR:1.08;CI:1.04,1.12); there was no significant association with dual use. Primary contraceptive method varied significantly by receipt of HIV education ($p < .001$). School-based HIV education may be important for promotion of adolescent condom and contraceptive use.

Keywords

Adolescent health; HIV; contraceptive use; HIV education; school students; USA

Introduction

Young people and adolescents frequently engage in sexual behaviours that increase their risk for human immunodeficiency virus (HIV), other sexually transmitted infections (STIs), and unintended pregnancy (Centers for Disease Control and Prevention [CDC] 2014). Half of the new STI cases in the USA each year are among young people ages 15 to 24 years (CDC 2016b). Although teenage pregnancy rates in the USA have been declining (Martin et al. 2017), the teenage birth rate for the USA is still higher than in any other industrialised

country (Blum 2013). In 2015, among persons aged 15–19 years, 1,698 diagnoses of HIV (CDC 2016a); 464,545 cases of Chlamydia, gonorrhoea and syphilis (CDC 2016b); and 229,715 births (Martin et al. 2017) were reported. Related practices such as sexual risk behaviours are frequently established during childhood and adolescence (CDC 2014). Therefore, focusing prevention efforts during this time period is critical.

Risk for HIV, STIs and pregnancy differs based on which contraceptive method(s) an individual and their partner use (US Department of Veteran Affairs 2015; CDC n.d.; Guttmacher Institute 2016). For those who do not practise abstinence, consistent and correct use of condoms is the most effective method for protecting against HIV and other STIs (Office on Women’s Health 2015). While long-acting reversible contraceptive methods, such as an implant or IUD, are the most effective at preventing pregnancy, they do not protect against HIV and other STIs (CDC, n.d.). For this reason, the US CDC recommend that condoms always be used to reduce the risk of HIV and other STIs (CDC, n.d.).

Sexual health education, including HIV and other STI prevention information, aids in the prevention of negative outcomes associated with risky sexual behaviours (Breuner and Mattson 2016). Sexual health education can help modify young people’s sexual behaviours and address social and cultural issues that influence HIV infection risk (McKeon 2006; UNAIDS Inter-Agency Task Team on Education 2009). Well-planned and well-implemented sexual health education can result in increased knowledge about sex, the development of life skills related to sex (e.g., self-efficacy to refuse sex and obtain condoms), and positive attitudes required to change risk behaviours (e.g., changes in attitudes regarding pressuring someone to have sex) (UNAIDS Inter-Agency Task Team on Education 2009).

Subject matter experts have identified the characteristics of highly effective sex education and HIV/STI prevention education programmes. Two of these characteristics include (1) ‘provide medically accurate information about both abstinence and also contraception, including condoms’ and (2) ‘have clear goals for preventing HIV, other STIs, and/or teenage pregnancy’ (McKeon 2006). Studies show that good quality sexual health and HIV education programmes may help delay sexual debut, increase condom and other contraceptive use, reduce the number of sexual partners among those already sexually active, promote early treatment of STIs, facilitate access to confidential and voluntary STI counseling and testing, and reduce other behaviours that increase risk, such as injecting drug use (Kirby 2001; Mueller, Gavin, and Kulkarni 2008; UNAIDS Inter-Agency Task Team on Education 2009; Lindberg and Maddow-Zimet 2012; Fonner et al. 2014; Kirby, Laris, and Roller 2007; Ma, Fisher, and Kuller 2014; Breuner and Mattson 2016). Education about specific topics also plays a role in prevention of HIV, STIs and pregnancy. Knowledge about contraceptive methods is associated with contraceptive use among young women (Frost, Lindberg, and Finer 2012). Education about contraceptive methods is also associated with dual contraceptive use among young men aged 15–20 years (Jaramillo, Buhi, and Elder 2017). Greater knowledge about condoms and AIDS are known positive antecedents of condom use (Kirby 2001).

To date, little previous literature has examined the association between HIV education and specific contraceptive methods other than condoms. The objective of this study was

to assess if the receipt of HIV education is associated with contraceptive method among a nationally representative sample of US high school students. It addresses a gap in the literature by examining associations between HIV education and the reported use of specific contraceptive methods. Young people and adolescents have many contraceptive options with varying levels of protection against HIV, so it is valuable to assess how HIV education may influence the choice and use of these specific options, not just condom use.

Methods

Sample

A secondary analysis was conducted using data from the 2011 and 2013 cycles of the US National Youth Risk Behavior Survey (YRBS), a cross-sectional, school-based survey that monitors priority health-risk behaviours biennially among US high school students. A three-stage cluster sample design was used to obtain nationally representative samples of public and private school students in grades 9 to 12 [1] (n = 29,008 combined for 2011 and 2013). Student participation was anonymous and voluntary and local parent permission procedures were used.[2] The survey was self-administered using a computer-scannable questionnaire or answer sheet. The school-level response rates were 77%, the student-level response rates were 88%, and the overall response rates were 68% for 2011 and 2013, respectively. Additional details regarding YRBS sampling and psychometric properties, as well as demographic characteristics of the 2011 and 2013 YRBS samples are published elsewhere (CDC 2014; CDC 2012b; Brener et al. 2002; CDC 2013). The US CDC institutional review board system approved the national YRBS.

Measures

HIV education

The 2013 cycle of the YRBS was the last year in which the receipt of school-based HIV education was assessed. Students were asked ‘Have you ever been taught about AIDS or HIV infection in school?’ Hereinafter, this will be referred to as HIV education. Response options were ‘Yes,’ ‘No,’ and ‘Not sure.’

Contraceptive method

Students were asked two questions assessing contraceptive methods in the 2011 and 2013 YRBS questionnaires: (1) ‘The last time you had sexual intercourse, did you or your partner use a condom?’ Response options were: ‘I have never had sexual intercourse,’ ‘Yes,’ and ‘No’; (2) ‘The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy? (Select only one response.)’ In 2011, the response options were: ‘I have never had sexual intercourse,’ ‘No method was used to prevent pregnancy,’ ‘Birth control pills,’ ‘Condoms,’ ‘Depo-Provera (or any injectable birth control), Nuva

¹In the USA, students in grades 9 to 12 are typically aged 14–18 years.

²Schools may require active or passive permission procedures. Active parental permission involves collecting a signature from a parent for each student authorising that student’s participation. A student is not allowed to take part in the survey unless signed permission indicating this approval has been received. Passive permission means that students are excluded from survey participation only when a parent returns a signed form denying permission.

Ring (or any birth control ring), Implanon (or any implant), or any IUD,' 'Withdrawal,' 'Some other method,' and 'Not sure.' In 2013, the response options were: 'I have never had sexual intercourse,' 'No method was used to prevent pregnancy,' 'Birth control pills,' 'Condoms,' 'An IUD (such as Mirena or ParaGard) or implant (such as Implanon or Nexplanon),' 'A shot (such as Depo-Provera), patch (such as Ortho Evra), or birth control ring (such as NuvaRing),' 'Withdrawal or some other method,' and 'Not sure.' Throughout this manuscript, the response to this second question is referred to as the student's primary contraceptive method.

We examined four contraceptive methods at last sexual intercourse: condom use (yes, no), primary contraceptive method, any contraceptive method (defined as any method except 'no method was used to prevent pregnancy'), and dual use (defined as condom use and either birth control pills; IUD or implant; or shot, patch, or birth control ring as the primary contraceptive method).

Statistical analysis

The analytic sample was restricted to the 9,825 (33.9%) currently sexually active students, defined as having had sexual intercourse with at least one person during the 3 months before the survey. The statistical software SUDAAN was used to account for the complex sampling design. The data were weighted to adjust for student non-response and the oversampling of non-Hispanic Black and Hispanic students.

Prevalence estimates for HIV education and contraceptive methods among currently sexually active students were calculated. Chi-square analyses were used to test for differences in primary contraceptive method prevalence by receipt of HIV education. In addition, pairwise comparisons were performed to identify specific differences in primary contraceptive method by receipt of HIV education. This method allows for the one-to-one comparison for each contraceptive method rather than providing an overall measure of the difference. A t-statistic p-value of < 0.05 indicated a significant difference. Due to the change in response options to this question, only data from 2013 are presented.

Multivariable logistic regression models were used to estimate adjusted prevalence ratios (PRs) and 95% confidence intervals (CIs) for the associations between receipt of HIV education and the other contraceptive use questions (condom use, any contraceptive method, and dual use). These logistic regression models were run using data from both 2011 and 2013. Models were adjusted for sex (male, female), race/ethnicity (non-Hispanic white; non-Hispanic Black; Hispanic; other or multiple race), and grade (9th, 10th, 11th, or 12th). In addition, we assessed for interactions in the association of receipt of HIV education with contraceptive use by sex and race/ethnicity. This was done using interaction terms in the logistic regression models. Interactions were considered significant when the Wald F p-values were < 0.05 .

Results

Table 1 presents the prevalence of receipt of HIV education and contraceptive use reported by high school students in the USA. Among currently sexually active students, 86.0%

reported having ever received HIV education. At last sexual intercourse, 59.7% of students reported using a condom, 86.7% reported using any contraceptive method, and 9.2% were dual users. In 2013, the most common primary contraceptive method was condoms (47.3%); the least common method was an IUD or implant (1.6%).

Table 2 presents the prevalence of primary contraceptive method by receipt of HIV education. Overall, Chi-Square analysis indicated that there was a significant difference in primary contraceptive method by receipt of HIV education ($X^2 = 7.67$, p -value < 0.0001). Results from pairwise testing found that students who received HIV education were less likely than students who did not receive HIV education to use no contraceptive method (12.6% vs. 20.3%) and were more likely to use birth control pills (19.8% vs. 14.8%) or the shot, patch, or ring (5.1% vs. 2.9%). No significant differences were observed for the other primary contraceptive methods.

Table 3 shows both the (1) crude prevalence of contraceptive use by receipt of HIV education and (2) adjusted PRs and 95% CIs estimating the association between receipt of HIV education and contraceptive use. Students who received HIV education were more likely than students who did not to use a condom (PR: 1.09; CI: 1.01, 1.18) and any contraceptive method (PR: 1.08; CI: 1.04, 1.12). Students who received HIV education had an almost two percentage point higher prevalence of dual contraceptive use (9.4%) as compared to students who did not receive such education (7.7%), but the difference was not significant.

Tests for interaction by sex and race/ethnicity produced results that were not consistent across contraceptive use measure. There were no significant interactions by sex and race/ethnicity for condom use and dual use. However, for any contraceptive method, significant interactions were found for both sex ($p = 0.0283$) and race/ethnicity ($p = 0.0467$).

Discussion

This study found that the self-reported receipt of school-based HIV education was prevalent among high school students. This high prevalence is encouraging, given that as of December 2017, only 24 states and the District of Columbia have a mandatory requirement for sex education and only 34 states and the District of Columbia mandate HIV education (Guttmacher Institute 2017). In this study, receipt of HIV education was associated with condom use and any contraceptive use. Furthermore, the receipt of HIV education increased the likelihood of students using only some primary contraceptive methods: no contraceptive method; birth control pills; and the shot, patch or birth control ring.

In another study using YRBS data, Ma, Fisher, and Kuller (2014) also found receipt of HIV education to be significantly associated with condom use. Our findings related to use of any contraceptive method cannot be directly compared to those of Ma, Fisher, and Kuller (2014), however, as their study used a question with response options that did not include birth control rings, patches, implants or any IUD. Furthermore, Ma, Fisher, and Kuller (2014) reported differences by race/ethnicity. As a part of this analysis, we examined interactions by sex and race/ethnicity for the associations between the receipt

of HIV education and condom use, any contraceptive method and dual use. Significant interactions were only observed for any contraceptive method. It is unclear why interactions were significant for only this variable and the reasons behind these differences.

Health education is critical for helping students become successful learners and healthy, productive adults (Division of Adolescent and School Health 2012). Good quality sexual health education implies the use of a systematic approach to sexual health education that includes grade-specific, evidence-based interventions (Lohrmann and Wooley 1998; Kirby et al. 2011; CDC 2012a). Sexual health education typically refers to programmes that cover topics related to pregnancy, STIs, and possibly other sexual health topics (Kirby 2001). HIV education refers to programmes that focus primarily on HIV and usually other STIs (Kirby 2001). HIV education topics are frequently included as part of a larger sexual health education programme, and more literature is available about the content of these larger programmes. Although the content of sexual health education varies, data from the 2014 US School Health Policies and Practices Study (SHPPS) indicated that approximately three-quarters of high schools had a teacher who taught about how HIV is transmitted and how to prevent HIV infection (CDC 2015). The 2011–2013 US National Survey of Family Growth indicated that STIs and HIV/AIDS were the most commonly reported topics received in sexual health education amongst heterosexually active, young men, 15–20 years of age (Jaramillo, Buhi, and Elder 2017). As part of required instruction, more than 60% of U.S. high schools had a teacher who taught about methods of contraception and condom and contraception efficacy and more than 70% had a teacher who taught about how to prevent pregnancy (Centers for Disease Control and Prevention 2015).

Good quality sexual health education can be accomplished through support for such education from school and district administration, and with teachers who are knowledgeable about the relevant topics. Policies on sexual health education can detail whether such education is required, how it is provided, who is providing it, course content, and the role of parents (Sorace 2013). An analysis of 2014 SHPPS [3] data has shown that teachers who receive professional development on sexual health content are more likely to teach human sexuality, pregnancy prevention, HIV prevention, and STD prevention in a required health education course than teachers without such professional development (Clayton et al. 2017). However, in 2014, professional development on sexual health topics was not prevalent among teachers in US secondary schools (Centers for Disease Control and Prevention 2015). Sexual health education is especially important considering that provision of HIV, STD, and pregnancy prevention services in middle and high schools decreased between 2000 and 2014, according to SHPPS data (Centers for Disease Control and Prevention 2015).

Limitations

The findings of this study should be interpreted with the following limitations in mind. First, YRBS data are cross-sectional; therefore, causality and directionality cannot be inferred. Second, HIV education is not randomly assigned, it is based on the school the student attends. Although our analysis does take into account the cluster sampling design of the

³The 2014 SHPPS health education questionnaire uses the term STD rather than STI.

YRBS, there could be factors that influence who does and does not receive HIV education that are not accounted for in the analysis. Third, the data are self-reported and as a result behaviours may be under- or over-reported. Further, HIV education may be better recalled by students for whom the education made a bigger impression. However, a psychometric study has shown that the national YRBS questions have good test-retest reliability (Brener et al. 2002). Fourth, since the question on HIV education focuses on receipt of HIV education in schools, it is not known if students have been taught about HIV or AIDS outside of school. Lastly, we do not have any data about the content or quality of the HIV education provided. Students may have received HIV education, but it may not have covered topics related to contraception, it may not have conveyed accurate information, or it may have been of such short duration that the likelihood of subsequent behaviour change was minimal at best. Furthermore, any HIV education might have been presented in the context of broader sex education that included contraceptive use and methods rather than these topics being specific to an HIV-specific curriculum. Therefore, it is not certain that the variation in contraceptive use is directly associated with HIV education components. However, as mentioned earlier in this paper, many schools have teachers who cover HIV education topics (Centers for Disease Control and Prevention 2015). Different associations may have been observed if there was an assessment of education specific to contraceptive methods or broader sex education.

Conclusions

A large majority of high school students in the USA report receiving school-based HIV education. Different contraceptive methods have varying abilities to mitigate the risks of HIV/STIs and unintended pregnancy. For those who do not practise abstinence, condom use is the most effective method for protecting against HIV/STIs (Office on Women's Health, US Department of Health and Human Services 2015). We were interested in whether HIV education may be associated with not only condom use, but other contraceptive methods used by young people. Based on the study findings, HIV education may be important for the promotion of condom use and other contraceptive methods, contributing to a higher prevalence of students using any method. Based on existing data (Centers for Disease Control and Prevention 2015), future studies could benefit from understanding the relationship between the content of the HIV education students receive, the professional development that teachers of HIV education receive, and their relation to adolescents' and young people's behaviour. It is important to note that in addition to sexual health education provided by schools, such education can be provided by health care providers such as doctors, other health professionals and parents (Breuner and Mattson 2016).

Disclosure statement

The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the U.S. Public Health Service.

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Table 1.

Prevalence of receipt of HIV education and self-reported contraceptive use among currently sexually active US high school students — national Youth Risk Behavior Survey, 2011 and 2013.

	Prevalence (95% CI)
Ever been taught about AIDS or HIV infection in school	86.0 (84.8, 87.2)
Used a condom during last sexual intercourse	59.7 (57.8, 61.6)
Primary contraceptive method used at last sexual intercourse (2013 only)	
No method	13.7 (12.2, 15.4)
Birth control pills	19.0 (16.6, 21.7)
Condoms	47.3 (44.4, 50.1)
IUD or implant	1.6 (1.1, 2.1)
Shot, patch, or ring	4.7 (3.8, 5.8)
Withdrawal or some other method	10.8 (9.4, 12.4)
Not sure	2.9 (2.3, 3.7)
Used any contraceptive method at last sexual intercourse ^a	86.7 (85.7, 87.7)
Dual use ^b	9.2 (8.3, 10.1)

CI: Confidence interval.

^aAny method except “no method was used to prevent pregnancy.”

^bCondom use and use of birth control pills; an IUD or implant; or shot, patch, or birth control ring at last sexual intercourse.

Table 2.

The prevalence of primary contraceptive method by receipt of HIV education among currently sexually active U.S. high school students — national Youth Risk Behavior Survey, 2013

Primary contraceptive method at last sexual intercourse	HIV education		p-value ^a
	% (95% CI) Yes	% (95% CI) No	
No method	12.6 (11.1, 14.2)	20.3 (16.4, 24.9)	0.0007
Birth control pills	19.8 (17.4, 22.6)	14.8 (11.4, 18.9)	0.0043
Condoms	47.5 (44.7, 50.3)	45.1 (37.7, 52.7)	0.5120
IUD or implant	1.6 (1.1, 2.6)	1.6 (0.8, 3.2)	0.9715
Shot, patch, or ring	5.1 (4.1, 6.3)	2.9 (1.7, 5.0)	0.0222
Withdrawal or some other method	10.7 (9.4, 12.1)	11.1 (7.3, 16.7)	0.8349
Not sure	2.7 (2.1, 3.5)	4.2 (2.8, 6.4)	0.1223

CI: Confidence interval.

^aP-values for each pairwise comparison.

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Table 3.

Prevalence and prevalence ratios for contraceptive use by receipt of HIV education among currently sexually active US high school students — national Youth Risk Behavior Survey, 2011 and 2013.

Outcome variables	%	Prevalence ratio (95% CI)
Condom use during last sexual intercourse		
Yes – HIV education	60.5	1.09 (1.01, 1.18)
No – HIV education	55.8	Referent
Used any contraceptive method at last sexual intercourse ^b		
Yes – HIV education	87.9	1.08 (1.04, 1.12)
No – HIV education	80.5	Referent
Dual use ^c		
Yes – HIV education	9.4	1.10 (0.80, 1.52)
No – HIV education	7.7	Referent

PR: Prevalence ratio; CI: Confidence interval.

Bold text indicates significant PRs. PRs are considered significant if the confidence intervals exclude 1.0.

^aLogistic regression models adjusted for sex, race/ethnicity, and grade.

^bAny method except “no method was used to prevent pregnancy.”

^cCondom use and use of birth control pills; an IUD or implant; or shot, patch, or birth control ring at last sexual intercourse.