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Correlates of Sexual Activity and Sexually Transmitted Infections Among Human Immunodeficiency Virus-infected Youth in the LEGACY Cohort, United States, 2006

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Abstract

Background—To determine the prevalence and correlates of sexual activity and sexually transmitted infections (STIs) among human immunodeficiency virus (HIV)-infected youth.

Methods—The Longitudinal Epidemiologic Study to Gain Insight into HIV/AIDS in Children and Youth (LEGACY) is an observational medical record study of perinatally and behaviorally HIV-infected (PHIV and BHIV) youth followed at 22 US HIV clinics. PHIV youth were HIV infected at birth or by breast-feeding. BHIV youth were HIV infected sexually or by injection drug use. We determined the prevalence of sexual activity during 2006 and examined correlates of sexual activity among 13-to 24-year-old PHIV youth using multivariable generalized linear models. Among sexually active persons, we determined the association between mode of HIV acquisition and non-HIV STI diagnosis using multivariable generalized linear models.

Results—In all, 34% (195/571) of PHIV and 89% (162/181) of BHIV youth were sexually active. Eighty percent (155/195) of sexually active PHIV youth reported ever using condoms. Ninety-three percent discussed sex with a health care provider. Increasing age (adjusted prevalence ratio [APR]: 1.17 per year of age, 95% confidence interval [CI] = 1.12–1.23), having a boyfriend/girlfriend (APR: 2.74, 95% CI = 1.75–4.29), and injection drug use (APR: 1.38, 95% CI = 1.06–1.79) correlated with sexual activity after adjusting for socio-demographic and HIV-related clinical

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variables. Among sexually active youth, after adjusting for relevant confounders, PHIV youth were less likely than BHIV youth to have been diagnosed with an STI in 2006 (APR: 0.25, 95% CI = 0.13–0.46).

Conclusions—Sexual activity among HIV-infected adolescents is common. Factors associated with sexual activity in this study should be taken into account in developing behavioral risk reduction interventions targeting PHIV youth.

Keywords

HIV-infected adolescents; Perinatally infected; Behaviorally infected; Sexual activity; Sexually transmitted infections

Adolescence is often considered a critical period in the reproductive life cycle of an individual, characterized by sexual and lifestyle behavioral experimentation and risk taking. Not surprisingly, the burden of sexually transmitted infections (STIs) falls disproportionately on young adults. In 2000, approximately half of the estimated 18.9 million STIs reported in the United States (US) occurred among adolescents and young adults (15–24 years)¹; and from 2005 to 2008, the rate of human immunodeficiency virus (HIV) diagnosis increased among persons aged 15 to 24 years.² Although adolescents in the general US population have experienced recent improvements in indicators related to sexual behavior, high rates of unintended pregnancies and STIs, particularly among African Americans and Latinos, remain a public health concern.^{3,4}

With the advent of highly active antiretroviral therapy, many perinatally HIV-infected (PHIV) children are reaching adolescence and young adulthood^{5–9} and exploring their sexuality.¹⁰ Sexual risk behavior among youth living with HIV in the US, most of whom acquired HTV behaviorally (BHIV), is common.^{11–13} Data on the sexual behavior of PHIV adolescents are, however, limited. In 2000, a cross-sectional substudy of 131 adolescents who were infected with HIV as children and had a mean age 15.5 years, reported consensual sexual relations among 24 children (18%).⁹ This study was limited by the lack of data on sexual behavior for 53% of the study population. Another cross-sectional survey of PHIV adolescents and young adults at an urban tertiary care center in the US reported that 19 of 57 (33%) eligible youth aged between 13 and 24 years were sexually active. Twenty-six percent of those who were sexually active reported initiation of sexual activity before age 15 years, and half of sexually active female participants had ever been pregnant.¹⁴ However, this study used a small convenience sample from a single clinic site and did not include a comparison group to examine the role of perinatal HIV infection and other predictors of risk behavior. More recently, a longitudinal study (n = 40) conducted among 13- to 24-year-old adolescents with perinatally or transfusion-acquired HIV infection, reported increasing prevalence of sexual activity from 28% to 41% during a 21-month time span.¹⁵ On the contrary, other research suggests that some adolescents with PHIV avoid sexual relationships entirely, due to fear of disclosing their HIV status to a partner or as a harm reduction strategy.¹⁶ The American Academy of Pediatrics strongly encourages disclosure of HIV infection status to adolescent patients.¹⁷ However, disclosure of HIV infection status to children and age at disclosure remains one of the most sensitive issues in the management of children with

perinatal HIV infection¹⁸; and limited data exist on the association between sexual activity and self-disclosure of HIV status in PHIV adolescents.

Because most PHIV youth have received regular medical care since birth and reach sexual debut after diagnosis of HIV infection, they represent a unique population for studying the prevalence and correlates of sexual activity. It is important to understand the sexual behavior of PHIV children as they reach adolescence to determine the best strategies for reducing the likelihood of acquisition of additional STIs and to prevent secondary transmission of HIV from this population. The goals of the present study were to (1) describe the sexual behavior of BHIV and PHIV adolescents (13–24 years) in 2006; (2) determine correlates of sexual activity in 2006 among PHIV adolescents; and (3) compare the risk of an STI diagnosis in 2006 among sexually active PHIV and BHIV adolescents in the United States. Because most BHIV youth were infected with HIV sexually and most were sexually active in 2006, we did not include them in our second goal of the study of correlates of sexual activity.

METHODS

The study population was drawn from the Longitudinal Epidemiologic Study to Gain Insight into HIV/AIDS in Children and Youth (LEGACY) study. LEGACY is a Centers for Disease Control and Prevention (CDC)-funded, observational, prospective cohort study of HIV-infected children and adolescents enrolled between birth and 24 years of age from 22 HIV specialty clinics across the US and Puerto Rico. This study population was selected using a 3-stage cluster probability proportional-to-size sampling method to encourage a broad selection of HIV-infected infants, children, and adolescents receiving care in 22 geographically diverse small, intermediate, and large-sized facilities. This study was approved by the institutional review board of the CDC and the institutional review boards of all local study sites. A consolidated 301(d) Certificate of Confidentiality was obtained for LEGACY to provide an added level of strict privacy protection for participants. Between November 2005 and June 2007, HIV-infected youth presenting for care at LEGACY clinic sites were offered enrollment. The participation was voluntary. Written informed assent and consent were obtained from minors and parents, as appropriate. The medical records of participants were reviewed and abstracted by a data abstractor. Data collected included demographics (age, race, ethnicity, gender, educational level); mode of HIV infection (perinatal, breast-feeding, heterosexual activity, homosexual activity, sexual abuse, blood transfusion, and injection drug use [IDU]); clinical diagnoses; antiretroviral (ARV) and non-ARV medications; vaccines; laboratory test results, including CD4⁺ T-lymphocyte (CD4) cell counts, plasma HIV-RNA determinations, HIV genotype and phenotype drug resistance test results, and reproductive history (age of menarche, sexual activity, contraceptive use, history of previous pregnancies, and diagnosed STIs).

All subjects who had their complete medical records for 2006 abstracted (referred to as the 2006 cohort) and who were at least 13 years or older by the end of January 2006 were eligible for this analysis. Participants were further categorized as PHIV or BHIV depending on their mode of HIV acquisition. PHIV participants were identified based on medical record documentation of maternal HIV infection during pregnancy, labor, delivery, or breast-feeding and diagnosis of HIV infection in the child during infancy or early childhood

without other known HIV risk factors. BHIV participants were infected with HIV through consensual sexual activity (opposite sex or same sex), IDU, or had multiple risks, but no perinatal or breast-feeding exposure. Participants who were infected by sexual abuse or blood transfusion and those who could not be classified as either PHIV or BHIV were excluded from this analysis.

The primary outcome of interest was sexual activity in 2006 defined as medical record documentation of sexual activity, any STI ICD-9 diagnosis (*Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Trichomonas vaginalis*, herpes simplex virus type 2, syphilis, human papillomavirus (HPV) infection, and genital warts) in 2006 or pregnancy, termination of pregnancy, or prenatal care in females. Independent variables of interest were gender, age, self-reported race/ethnicity, highest level of education attained, and geographical site. We also studied documentation of the following variables in 2006: having a boyfriend or girlfriend (BF/GF), discussion of sex with the medical provider, disclosure of HIV status to the patient, ever or never being pregnant, illicit drug use, CD4 nadir, and log peak HIV-1 quantitative RNA PCR (viral load).

Statistical Analyses

We examined the general characteristics of the entire study population of PHIV and BHIV youth. We determined the prevalence of sexual activity among PHIV participants and compared differences in descriptive characteristics between sexually active versus nonsexually active participants using χ^2 tests for categorical variables, *t* tests for normally distributed variables, and the Mann-Whitney *U* test for skewed variables. Collinearity among variables was evaluated using Pearson correlation coefficients. Tests of significance were 2-tailed and significance was set at 5%.

Among PHIV participants, generalized linear models (Poisson regressions with robust variance estimates) were used in bivariate and multivariable analyses to examine the association between sexual activity and independent variables of interest including gender, age, race/ethnicity, highest level of education, log peak viral load, CD4 nadir, having a BF/GF, documented disclosure of HIV status, illicit drug use, and geographical site of care. The final model included variables found to be significant with *P* value <0.05 using backward stepwise model selection. Confidence intervals (95%) were constructed around all prevalence ratios and adjusted prevalence ratios. Among all sexually active participants in 2006, we determined the prevalence of selected markers of sexual risk behavior, including STI diagnosis, condom use, and discussion of sex with medical provider. We examined the association between mode of HIV transmission (perinatal vs. behavioral) and STI diagnosis using bivariate and multivariable generalized linear models (Poisson regressions with robust variance estimates). Independent variables of interest were age, gender, peak HIV viral load, CD4 nadir, use of contraceptives, having a BF/GF, and illicit drug use. The final model included variables found to be significant with *P* <0.05 in bivariate analysis (gender, peak HIV viral load, and contraception use) and those identified as important a priori (age and illicit drug use).

RESULTS

A total of 2169 HIV-infected children and adolescents/youth were approached to participate in the LEGACY study. Six percent ($n = 130$) refused. In all, 1478 enrolled participants had all their 2006 medical records abstracted (ie, 2006 cohort). Of these, 891 (60.3%) were at least 13 years of age by the end of January 2006. In all, 139 participants could not be clearly classified as PHIV or BHIV and were excluded from the analysis. Five hundred and seventy-one (76%) were PHIV and 181 (24%) were BHIV, resulting in a sample of 752 participants from 22 clinical sites. More than half of participants were females (56.1%), 64.1% were non-Hispanic black, 27% were Hispanic, 5.3% were non-Hispanic white, and 1.7% were other non-Hispanic race/ethnicities (Table, Supplemental Digital Content 1, <http://links.lww.com/INF/A946>). The median log peak HIV viral load for the total study population in 2006 was 3.98 (9538 copies/mL). Twenty-one percent of the study population had a CD4 nadir of <200 cells/mm³ in 2006. Approximately 17% of female participants were pregnant in 2006. PHIV participants were significantly younger (Table, Supplemental Digital Content 1, <http://links.lww.com/INF/A946>; $P < 0.001$) than BHIV participants. PHIV and BHIV participants also differed significantly with respect to race/ethnicity, gender, educational level, peak HIV viral load, CD4 nadir, sexual activity, history of pregnancy in females, and illicit drug use (Table, Supplemental Digital Content 1, <http://links.lww.com/INF/A946>). However, of these differences, several (other than differences in sexual activity and CD4 counts) were explained by differences in age between PHIV and BHIV participants and disappeared when stratified by age groups (results not shown).

Based on medical record review, 34.1% ($n = 195$) of PHIV participants and 89.5% ($n = 162$) of BHIV participants were sexually active during 2006 (Table, Supplemental Digital Content 1, <http://links.lww.com/INF/A946>; $P < 0.001$). Among sexually active participants, there were no significant differences between PHIV and BHIV participants with respect to condom use and discussion of sex with medical providers ($P = 0.58$ and $P = 0.24$, respectively). At least one STI was diagnosed in 2006 in 10.3% (20/195) of sexually active PHIV participants versus 32.1% (62/162) of sexually active BHIV participants ($P < 0.01$). HPV (high-risk types or type 6 or 11) infection or condyloma acuminata/genital warts were the most common STIs among PHIV youth with STIs (prevalence, 46.4%); followed by *Chlamydia trachomatis* and other nongonococcal urethritis (17.9%), *Trichomonas vaginalis* (14.3%), genital herpes (10.7%), and *Neisseria gonorrhoeae* infection (7.1%). The most common STIs among BHIV youth were HPV (high-risk types or type 6 or 11) or condyloma acuminata/genital warts (44.7%), *T. vaginalis* (13.2%), and genital herpes (11.8%). Others were syphilis (10.5%), *Neisseria gonorrhoeae* infection (9.2%), *Chlamydia trachomatis*, and other nongonococcal urethritis (7.9%).

Twenty-one percent ($n = 120$) of PHIV participants were unaware of their HIV diagnosis due to a variety of reasons, including young age, developmental delay, or parental choice. HTV disclosure status was unknown/missing in 10.8% ($n = 62$) of PHIV participants (Table 1). Nineteen percent ($n = 34$) of PHIV participants who had not had their HIV status disclosed to them were sexually active. Among participants whose HTV status had been disclosed to them, the median age of disclosure was 11 years. Age of disclosure was unknown in 44.7% ($n = 174$) of participants. The absence of information on age of

disclosure did not differ significantly among participants with respect to sexual activity ($P=0.66$, results not shown).

Among PHIV participants, sexual activity generally increased with age (Fig., Supplemental Digital Content 2, <http://links.lww.com/INF/A947>). In bivariate analysis (Table 1), significant associations with the likelihood of sexual activity included; female versus male gender (ages 16–18, 19–21, and 22–25 years vs. age <16 years), non-Hispanic other versus non-Hispanic white race/ethnicity, educational level (high school and high school graduates vs. elementary/middle school), CD4 nadir of <200 cells/mm³ versus CD4 nadir of ≥200 cells/mm³, median log peak viral load, illicit drug use, disclosure of HIV status to the participant, and having a BF/GF. In multivariable analysis (Table 1), age, median log peak HIV viral load, illicit drug use, and having had a BF/GF remained independently associated with an increased likelihood of sexual activity. Participants from clinics in the Southeast and South Central US were significantly less likely to be sexually active compared with participants from clinics in the Northeast.

Among all sexually active participants ($n = 357$), variables significantly associated with STI diagnosis in bivariate analysis were mode of HIV acquisition, gender, median log peak HIV viral load in 2006, and contraceptive use (Table 2). In multivariable analysis, PHIV versus BHIV mode of HIV infection, female versus male gender, and median log peak viral load remained significantly associated with having an STI diagnosis.

DISCUSSION

In our multistage population of HIV-infected participants in the US, we found evidence of sexual activity in a majority (89.5%) of BHIV participants and more than a third (34.1%) of PHIV participants in 2006. This is consistent with previous reports of high rates of sexual activity among HIV-infected youth (mostly BHIV)^{11–13}; and much lower rates of sexual activity among youth infected with HIV perinatally.^{14,15,19,20} PHIV adolescents are often developmentally delayed and may reach sexual puberty later than their chronologic peers.²¹ Consistent with previous reports,^{20,22,23} the prevalence of sexual activity among PHIV participants in our population increased with age and were higher among participants who reported having a BF/GF. We did not find significant racial/ethnic differences in sexual activity in our population. However, we found considerable variation in sexual activity by geographical location—youth receiving care at clinics in the Southeast and South Central parts of the US were significantly less likely to be sexually active compared with participants from clinics in the Northeast in our population. It is not clear what factors account for these geographical differences.

The prevalence of STIs (10%) among sexually active PHIV youth in our study population in 2006 is lower than the reported prevalence of similar STIs (infection with *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Trichomonas vaginalis*, herpes simplex virus type 2, and HPV) of 24.1% among sexually active healthy adolescent girls 14 to 19 years of age participating in the nationally representative National Health and Nutrition Examination Survey in 2003 to 2004.²⁴ To our knowledge, our study is the first to compare STI rates in PHIV versus BHIV youth receiving care in the US. Sexually active PHIV participants in our

study population were significantly less likely to have had an STI diagnosis in 2006 compared with sexually active BHIV participants. This may reflect better opportunities for preventive health risk behavior messages to PHIV youth who are diagnosed with HIV prior to sexual debut and have more routine access to medical care. However, clinicians may have been less likely to screen PHIV youth for STIs if they are not perceived to be sexually active. PHIV youth who have been managed by a single pediatrician for several years may be more reluctant to let their provider know they are sexually active and may be receiving reproductive care elsewhere. In contrast, many BHIV youth are identified as sexually active at the time care is initiated with their care provider and are more likely to get screened for STIs. We also found that, among sexually active HIV-infected youth, females were less likely to have an STI diagnosis compared with males. This may be explained by the earlier onset of sexual activity among males and more risk taking behavior by males.²⁵ Others have reported adolescent males generally take less responsibility for STI prevention than females²⁶

Similar to findings from another pediatric HIV cohort study (CDC's Pediatric Spectrum of HIV Disease [PSD] study) in 2000,⁹ condom use (ever) was documented in 80% of sexually active HIV-infected adolescents within our study population. Considering we only measured "any condom use," our finding is most likely an overestimate of consistent condom use in this population. Moreover, the documented presence of STI's and pregnancies among sexually active in our study population provides evidence of suboptimal condom use. Unprotected sexual activity among HIV-infected youth raises the risk of HIV transmission to sexual partners. Fortunately, medical care providers had discussed sex with 93% of HIV-infected youth in our study.

Recent studies have shown that injecting drug use is escalating globally and is an important cause of HIV transmission worldwide.²⁷ Five percent of our PHIV population had evidence of illicit drug use and had a 40% greater prevalence of sexual activity in 2006 as compared with those who did not use illicit drugs. This is consistent with a recent study showing a significant association between sexual risk behaviors and illicit drug use among perinatally HIV-exposed and HIV-infected youth in New York City.¹⁹ IDU has also been associated with high-risk sexual behavior and STIs among high-risk groups and otherwise healthy youth.²⁸⁻³² Because of the added concern of secondary transmission of HIV to their peers and poor health outcomes,³³ evidence of illicit drug use in youth with HIV infection cannot be ignored.

Consistent with previous reports,²⁰ we found a significant, albeit marginal, independent association between increasing peak viral load in 2006 and sexual activity in PHIV youth. Among sexually active participants, increasing HIV viral load was also associated with an increased likelihood of having an STI diagnosis. This, we believe, may be a reflection of a greater likelihood of sexual activity and overall high-risk behavior among youth who also have poor adherence to antiretroviral therapy, resulting in high HIV viral loads. Considering that the efficiency of HIV transmission is directly proportional to the viral load in the transmitting individual,^{34,35} this finding is of concern and may have serious implications for preventing HIV transmission among sexually active youth.

Disclosure of HIV Status to PHIV Adolescents

PHIV youth often learn about their HIV status during early adolescence or preadolescence,¹⁴ a time when they are often beginning to consider initiating sexual relationships. The median age of disclosure of HIV status to LEGACY participants was 11 years. Studies of disclosure of HIV status to children indicate that disclosure increases as a function of age, with 10 years being the usual age for disclosure.³⁶⁻³⁹ Although children with other chronic and life-threatening illnesses seem to benefit from early disclosure of diagnosis, the stigma associated with HIV disease and concerns about the impact that disclosure may have on a child's emotional health may lead caretakers to delay disclosure to their children.^{9,17,40} A few have reported that children who know their HIV status have higher self-esteem than those who are unaware of their HIV status and parents who have disclosed the status to their children experience less depression than those who do not disclose.⁴⁰ It is disconcerting that only 68% of PHIV youth aged 13 years had had their HIV status disclosed to them. Anecdotally, we are aware that some youth have delayed cognitive development such that their cognitive age is less than their chronologic age due to the long-term effects of HIV and some caregivers are not willing to disclose HIV status to such youth. However, this only accounts for some of the older youth not being told their HIV status. In addition, since the disclosure status of 11% of PHIV youth was unknown or may have not been documented in the chart, our finding may be an underestimate of the true rate of disclosure in our study population. It seems reasonable to believe that persons who know their HIV status are more likely to avoid exposing others and that disclosure of HIV status may be an effective approach for reducing sexual risk behavior among adolescents with perinatally acquired HIV. However, we did not find a significant association between sexual activity and disclosure of HIV status in our study population after adjustments for other cofactors.

Our analysis had several limitations. Our use of a diverse multistate sample broadens the external validity of our findings; however, our findings may not be applicable to HIV-infected youth not receiving regular medical care. Our data were also based on medical record abstraction, which is subject to some misclassification. Finally, we did not have data on some relatively important confounders of interest, including number of sexual partners, age at sexual debut, and consistent condom use.

Our findings confirm previous reports of sexual activity among HIV-infected youth. Among PHI, increasing age, increasing HIV viral load, having a boyfriend or girlfriend and illicit drug use were associated with an increased odds of being sexual active. The presence of STIs, illicit drug use, and pregnancies among our study population is worrying and indicates sexual risk taking is not uncommon in this population.

A challenging aspect of providing care to PHI adolescents is developing effective programs to promote risk reduction strategies and motivate these youth to perform safer practices as they become adults. In an effort to stem the spread of the HIV epidemic, programs have focused on reducing sexual and drug-risk behavior in HIV-infected persons, yet few programs have been developed specifically for adolescents with perinatal HIV infection.¹⁹ Because most PHI youth have life-long relationships with their medical care teams, ample opportunity exists to educate them on sexual risk behavior. Secondary prevention messages

should be stressed in routine medical settings. Strategies found to be effective in HIV-uninfected adolescents could be adapted to meet the needs of this population. Continued research is needed to identify effective behavioral interventions to decrease likelihood of secondary sexual transmission among both behaviorally and perinatally HIV-infected youth. Such research should take into account issues related to long-term HIV survivors and maximizing lines of communication about sexual health with HIV care teams.

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TABLE 1

Association of Participant Characteristics With Sexual Activity in Perinatally HIV-infected Youth (n = 571), LEGACY Study, United States, 2006

Characteristic	N	Sexually Active n (%)	Multivariable Analysis					
			Bivariate		Full Model		Final Model	
			PR [*]	95% CI [†]	APR [‡]	95% CI	APR [‡]	95% CI
Gender								
Male	269	79 (29.4)	Ref	—	Ref			
Female	302	116 (38.4)	1.31 [§]	1.03–1.65	1.18	0.96–1.44		
Age, y								
<16	252	29 (11.5)	Ref	—	Ref	—	Ref	—
16–18	189	77 (40.7)	3.54 [§]	2.41–5.19	1.86 [§]	1.16–3.01	2.26 [§]	1.55–3.32
19–21	109	75 (68.8)	5.98 [§]	4.15–8.61	2.81 [§]	1.73–4.58	3.33 [§]	2.28–4.86
22–25	21	14 (66.7)	5.79 [§]	3.67–9.15	2.91 [§]	1.60–5.28	3.28 [§]	1.98–5.43
Race/ethnicity								
Non-Hispanic white	32	7 (21.9)	Ref	—	Ref	—		
Non-Hispanic black	368	159 (35.1)	1.60	0.82–3.13	1.08	0.60–1.88		
Non-Hispanic other	4	3 (75.0)	3.42 [§]	1.44–8.14	1.69	0.83–4.49		
Hispanic	154	55 (35.7)	1.63	0.82–3.25	0.99	0.55–1.85		
Unknown	13	1 (7.7)	0.35	0.05–2.58	0.30	0.05–1.93		
Educational level								
Elementary/middle school	121	10 (8.3)	Ref	—	Ref	—		
High school	208	81 (38.9)	4.71 [§]	2.54–8.74	1.47	0.73–2.79		
Graduated high school [¶]	41	24 (58.5)	7.08 [§]	3.71–13.54	1.46	0.72–2.94		
Unknown	201	80 (39.8)	4.82 [§]	2.59–8.93	1.37	0.69–2.71		
CD4 nadir								
200 cells/μL	439	136 (30.9)	Ref	—	Ref	—		
<200 cells/μL	132	59 (44.7)	1.44 [§]	1.14–1.83	0.90	0.72–1.13		
Log peak viral load median (IQR [□])		3.9 (2.6, 4.7)	1.17 [§]	1.08–1.29	1.10 [§]	1.00–1.21 [§]	1.09 [§]	1.01–1.19
Illicit drug use								
No	540	172 (31.9)	Ref	—	Ref	—	Ref	—
Yes	31	23 (74.2)	2.33 [§]	1.83–2.97	1.48 [§]	1.13–1.95	1.38 [§]	1.06–1.79
Geographical site								
Northeast	288	111 (38.5)	Ref	—	Ref	—	Ref	—
Southeast	144	42 (29.2)	0.76	0.56–1.01	0.66 [§]	0.51–0.89	0.70 [§]	0.55–0.89
South Central	45	11 (24.4)	0.63	0.37–1.08	0.54 [§]	0.34–0.86	0.57 [§]	0.36–0.89
West Coast	29	14 (48.3)	1.25	0.84–1.88	1.09	0.76–1.57	1.07	0.77–1.46
Puerto Rico	65	17 (26.2)	0.68	0.44–1.05	0.85	0.57–1.27	0.84	0.59–1.17

Characteristic	N	Sexually Active n (%)	Multivariable Analysis					
			Bivariate		Full Model		Final Model	
			PR [*]	95% CI [†]	APR [‡]	95% CI	APR [‡]	95% CI
Disclosure of HIV status								
No	120	23 (19.2)	Ref	—	Ref	—		
Yes	389	150 (38.6)	2.01 [§]	1.36–2.96	0.91	0.63–1.33		
Unknown	62	22 (35.5)	1.85 [§]	1.12–3.04	1.00	0.66–1.51		
Had boyfriend/girlfriend								
No	74	14 (18.9)	Ref	—	Ref	—	Ref	—
Yes	178	120 (67.4)	3.56 [*]	2.19–5.77	2.68 [§]	1.72–4.18	2.74 [§]	1.75–4.29
Unknown	192	53 (27.6)	1.46	0.86–2.46	1.45	0.90–2.34	1.45	0.89–2.34

^{*} Prevalence ratio.

[†] Confidence interval.

[‡] Adjusted prevalence ratio.

[§] $p < 0.05$.

[¶] Includes one participant with college/vocational school training.

[□] interquartile range.

TABLE 2

Association of Mode of HIV Transmission and Participant Characteristics With Risk of STI Diagnosis* in Sexually Active Youth (n = 357), LEGACY Study, United States, 2006

Outcome	N	STI Diagnosis N (%)	Bivariate		Multivariable	
			PR [†]	95% CI [‡]	APR [§]	95% CI
Mode of HIV transmission						
Behavioral	162	52 (32.1)	Ref	—	Ref	—
Perinatal	195	20 (10.3)	0.32 [¶]	0.20–0.51	0.25 [¶]	0.13–0.46
Gender						
Male	128	37 (28.9)	Ref	—	Ref	–
Female	229	75 (32.8)	0.53 [¶]	0.35–0.79	0.55 [¶]	0.35–0.86
Age, y						
<16	32	6 (18.7)	Ref	—	Ref	—
16–18	102	28 (27.4)	0.88	0.34–2.25	0.93	0.26–3.29
19–21	139	44 (31.6)	1.43	0.60–3.39	1.14	0.33–3.93
21–25	84	34 (40.5)	1.68	0.69–4.05	1.17	0.34–4.10
Log peak viral load median (IQR [□])		4.2 (3.1, 4.8)	1.29 [¶]	1.04–1.59	1.28 [¶]	1.04–1.57
CD4 nadir						
200 cells/μL	279	85 (30.5)				
<200 cells/μL	78	27 (34.6)	1.19	0.74–1.91		
Had boyfriend/girlfriend						
No	23	8 (34.8)	Ref	—		
Yes	229	65 (28.4)	0.52	0.26–1.03		
Unknown	105	39 (37.1)	0.91	0.45–1.81		
Contraceptives use (prescribed)						
No	20	9 (45.0)	Ref	—		
Yes	300	85 (28.3)	0.41 [¶]	0.22–0.74	0.63	0.33–1.19
Unknown	37	10 (48.6)	0.65	0.28–1.49	0.94	0.46–1.92
Illicit drug use						
No	302	92 (84.6)	Ref	—	Ref	—
Yes	55	20 (15.4)	1.21	0.71–2.05	1.05	0.60–1.85

* Sexually transmitted infections (documented infection with *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Trichomonas vaginalis*, herpes simplex virus type 2, syphilis, Human papillomavirus, or genital warts).

[†]Prevalence ratio.

[‡]Confidence interval.

[§]Adjusted prevalence ratio.

[¶]P < 0.05.

[□]Interquartile range.