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Transmission Risk Among Youth Living With HIV in the U.S.

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A B S T R A C T

Purpose: HIV treatment as prevention is effective for reducing the risk of HIV transmission and the messaging campaign, undetectable = untransmittable, is gaining recognition. As youth living with HIV (YLWH) who have condomless sex may acquire and potentially transmit other sexually transmitted infections (STIs), the purpose of this study was to assess potential differences in transmission risk of HIV and other STIs among YLWH to inform subsequent HIV and STI prevention efforts.
Methods: A cohort of 600 HIV behaviorally infected youth aged 13–24 years who were engaged in medical care completed an audio computer-assisted self-interview including questions about demographics, HIV disclosure, mental health, substance use, and sexual behaviors and beliefs. HIV viral loads and the presence of other STIs were abstracted from medical records. A viral load <200 copies/mL was considered undetectable. Univariate and bivariate analyses were conducted to examine differences by viral load and STIs.
Results: Participants were categorized into four groups: (1) undetectable without STIs (55.2%); (2) undetectable with STIs (14.2%); (3) detectable without STIs (22.8%); and (4) detectable with STIs (7.8%). In comparison to the other three groups, youth in the undetectable group with STIs reported more favorable sexual risk reduction attitudes and beliefs, internet use for finding sex partners, anal sex with male partners, and condomless anal sex with male partners.
Conclusions: YLWH with undetectable viral loads and other STIs engaged in higher risk behaviors. To realize the promise of the messaging campaign, undetectable = untransmittable, efforts must focus on sustained viral suppression and prevention of STIs among YLWH.

IMPLICATIONS AND CONTRIBUTION

Virally suppressed youth may be less concerned with transmitting HIV but are still at risk for other sexually transmitted infections. This study documented that youth with undetectable viral loads who contracted STIs were more likely to engage in risky behaviors, suggesting the undetectable = untransmittable campaign must reinforce sustained viral suppression and condom use.

There has been a clear and growing consensus that when persons living with HIV (PLWH) achieve viral suppression, their risk of sexual HIV transmission is essentially eliminated [1]. The Prevention Access Campaign's strongly endorsed consensus statement indicates that "people living with HIV on antiretroviral

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therapy (ART) with an undetectable viral load in their blood have a negligible risk of sexual transmission of HIV" and that "HIV viral suppression should be monitored to assure both personal health and public health benefits" [2]. Their Undetectable = Untransmittable or U=U campaign has been endorsed by the Centers for Disease Control and Prevention (CDC), the National Institutes of Health, and several other groups [2,3].

Successful medical care for HIV that results in sustained viral suppression not only prevents sexual HIV transmission but also averts the development of AIDS. Youth are a population greatly impacted by HIV both nationally and globally, and youth living with HIV (YLWH) are a key population to identify and treat [4]. In the U.S., there were an estimated 50,900 YLWH, with 44% unaware of their HIV serostatus at the end of 2016 [4]. Current prevention and treatment strategies have focused on the sequential steps along the HIV Continuum of Care (CoC) from the initial diagnosis to linkage and retention in care to ART to viral suppression [5]. Among YLWH in 2015, it has been reported that 36% received some HIV care, 27% were retained in care, and only 25% were virally suppressed, the lowest percentages for any age group in the U.S. [4]. Prior research has shown that measuring a single point in time for viral suppression is not sufficient for YLWH and has suggested that an additional step of Sustained Suppression be added to the CoC for YLWH [6].

It is evident that HIV diagnosis and treatment must remain a top priority for youth. Still, there is also a distinct population of YLWH in the U.S. who are receiving needed HIV medical care. Effective HIV treatment on both an individual and population level may allow a secondary focus on other medical conditions that YLWH can acquire and transmit, such as other sexually transmitted infections (STIs).

Engagement in condomless vaginal or anal sexual behaviors by YLWH contribute to new STIs in the U.S. Prior research has shown that some adolescents and young adults who are living with HIV practice condomless anal or vaginal sexual activities with HIV-negative or unknown HIV serostatus sexual partners [7–13]. A review of the literature on condom use among male and female YLWH in the U.S. showed that 40%–60% reported engaging in condomless sex [14]. Several factors have been identified in previous work as being associated with condomless sex among YLWH, including high frequency of finding sex partners online, substance use, and mental health problems [15,16]. Other research has found that positive sexual risk reduction attitudes and beliefs, increased self-efficacy for sexual risk reduction, and HIV disclosure are all associated with engaging in consistent condom use [17,18].

Consistent condom use may have varying importance in preventing STIs. Among YLWH who have detectable HIV viremia, the presence of another STI implies that there may have also been risk for HIV transmission. The purpose of this secondary data analysis was to evaluate prevalence and risk factors for STIs among YLWH in the U.S. with and without viral load suppression. We sought to explore potential differences in sociodemographics, sexual risk reduction attitudes and beliefs, self-efficacy for sexual risk-reduction, HIV disclosure, finding sex partners online, sexual behaviors, mental health, and substance use among YLWH who fell into one of four categories of "transmission risk" based on HIV viral suppression and prevalence of another STI to guide public health intervention efforts and maximize the potential of the campaign, U=U.

Methods

This secondary data analysis is part of a parent study in the Adolescent Medicine Trials Network for HIV/AIDS Interventions (ATN), "ATN 125 PHASES—Provision of HIV Treatment at ATN Sites: An Evaluation for Stakeholders," conducted to evaluate the success of initial and ongoing treatment among YLWH at 14 academic medicine clinics affiliated with the ATN located in mostly urban areas throughout the U.S. with a high HIV disease burden. The details of the study have been described elsewhere [6,19,20].

Participants and recruitment

Participants were recruited between February 2015 and February 2016. Youth were eligible to participate in the study if they were (1) between the ages of 13 and 24 years; (2) behaviorally HIV infected (defined as infection with HIV through sexual behaviors or injection drug use); (3) currently receiving or planning to receive HIV medical care at one of the participating clinics; (4) proficient in verbal and/or written English; and (5) willing to allow research staff to access their medical records. Each of the participating sites received approval from their individual institutional review boards (IRBs) to conduct the study.

Study procedures

Youth were approached by research staff to assess study interest and eligibility; those eligible were invited to participate. Signed informed consent was obtained from the individual or assent with signed parental/legal guardian permission as determined by the local IRB. On consent, an audio computer-assisted self-interview (ACASI) was completed at baseline that included questions about demographics, sexual risk reduction attitudes and beliefs, self-efficacy for sexual risk reduction, HIV disclosure, finding sex partners online, sexual behaviors, mental health, and substance use. Participants were given a modest monetary incentive determined by each of the participating sites' IRB.

Over the course of 6 months, research staff reviewed medical charts and abstracted documentation of any STI, including chlamydia, gonorrhea, *Lymphogranuloma Venereum*, *Trichomonas Vaginalis*, and pelvic inflammatory disease. Syphilis and Herpes were not included in this analysis, as these can both be chronic or latent infections. Charts were also abstracted for HIV viral load measures. A 6-month study period was defined for each participant, and the start of their study period was the date of their study enrollment visit. To be included in the analyses, participants needed to have at least 6 months of follow-up data after enrollment and to have at least one HIV viral load during their 6-month study period.

Measures

Demographic characteristics. Participants' demographics included age, gender identity, race/ethnicity, education, income (past 30 days), housing status (stable or marginal with marginal defined as living in a foster home or group home, in a rooming, boarding, halfway house, or a shelter/welfare hotel, on the street [s]), and number of incarcerations.

Sexual risk reduction attitudes and beliefs. Participants completed an 11-item measure that assesses attitudes and beliefs toward risk reduction strategies, including serosorting, strategic

Table 1
Demographic characteristics of the sample (N = 600)

Demographics	Mean (SD) or n (%)
Age	21.4 (2.0)
Age at HIV diagnosis	18.8 (2.3)
Gender	
Male	471 (78.5%)
Female	109 (18.2%)
Transgender woman	20 (3.3%)
Race/ethnicity[a]	
Black/non-Hispanic	441 (73.7%)
Hispanic/Latino	109 (18.2%)
Other/non-Hispanic	30 (5.0%)
White/non-Hispanic	18 (3.0%)
Education	
Less than high school	126 (21.0%)
High school or GED	256 (42.6%)
Some college/in college	169 (28.1%)
Master's degree or higher	49 (8.3%)
Income (past 30 days)	
None or less than $50	120 (20.0%)
$51–$249	101 (16.8%)
$250–$499	82 (13.7%)
$500–$999	101 (16.8%)
$1,000–$5,000 or more	111 (18.5%)
Refuse/do not know	85 (14.2%)
Housing	
Stable	559 (93.2%)
Marginal	41 (6.8%)
Number of incarcerations[a]	
0	377 (62.9%)
1 time	106 (17.7%)
2–5 times	89 (14.9%)
6 or more times	27 (4.5%)

GED = general education diploma; SD = standard deviation.
[a] Missing values: race/ethnicity = 2; number of incarcerations = one.

positioning, and viral load level (example items: "I purposely look for other HIV positive people to have sex with"; "If my viral load is low or undetectable I am less likely to infect another person with HIV if I have unprotected sex."). Items were rated by participants on a 4-point Likert-type scale (1 = "strongly disagree" to 4 = "strongly agree"). Items were summed such that higher scores indicate more favorable attitudes and beliefs toward these three risk reduction strategies. This scale has been used in prior work with YLWH [18] and demonstrated adequate psychometric properties in this sample ($\alpha = .79$).

Self-efficacy for sexual risk reduction. Participants read four different stories in which they evaluated their level of self-efficacy or confidence in their ability to engage in risk reduction strategies during sex: (1) while under the influence of alcohol; (2) when feeling lonely; (3) with an ex-partner; and (4) with a long-term partner who does not want to use condoms. Items (e.g., "How confident are you that you could make an effective decision of whether to tell this person you are HIV positive in this situation?" and "How confident are you that you could bring up the need to practice safer sex in this situation?") were rated by participants on a 10-point Likert-type scale (0 = "cannot do at all" to 10 "certain to do") for each scenario. Items were summed such that higher scores indicate higher levels of self-efficacy for risk reduction. This measure has been used in a past study with YLWH [18]. Cronbach's alpha for the present study was .85.

HIV disclosure. Participants were asked to report (0 = "no" and 1 = "yes") if they had revealed their HIV status to anyone and to whom they had disclosed (e.g., current sex partner, past sex partner, current steady boyfriend or girlfriend, past steady boyfriend or girlfriend).

Finding sex partners online. One question asked participants to identify if they had used the internet in the past 6 months to search for a sex partner. Responses were either 0 = "no" and 1 = "yes."

Sexual behaviors. Questions assessed number of partners in the past 6 months and whether participants had engaged in sexual activity (e.g., vaginal or anal) by partner HIV status (e.g., HIV positive or HIV negative/unknown) and gender identity (e.g., male or female). We created a series of binary variables to examine differences in each of the transmission risk groups and different sexual behaviors.

Mental health. Participants completed two subscales from the Brief Symptom Inventory [21], which included the 6-item anxious symptom subscale ($\alpha = .89$) and the 6-item depressive symptom subscale ($\alpha = .88$). Items have the following response options: 0 = "not at all," 1 = "a little bit," 2 = "moderately," 3 = "quite a bit," and 4 = "extremely." Each subscale was summed such that greater values indicate higher levels of symptoms.

Substance use. Participants completed the Alcohol, Smoking and Substance Involvement Screening Test, which assess alcohol, marijuana, and other drug use [22]. The Alcohol, Smoking and Substance Involvement Screening Test includes frequency in the prior 3 months for alcohol, cannabis, and other drug use (e.g., cocaine, amphetamines, inhalants, sedatives, hallucinogens, opioids, and other drugs). Participants indicate the frequency of use with the categories of "never," "once or twice," "monthly," "weekly," and "daily."

Transmission risk. Research staff abstracted information from each participant's medical record regarding any diagnosis of chlamydia, gonorrhea, *Lymphogranuloma Venereum*, *Trichomonas Vaginalis*, and pelvic inflammatory disease. Participants with one or more STIs during the study period were classified as having an STI. Viral load data were also abstracted from the participant's medical record. Participants with at least one viral load >200 copies/mL during their 6-month study period were classified as detectable. In total, 20.5% of participants with an undetectable viral load had an STI, and 25.5% of participants with a detectable viral load had an STI. A four-category variable for transmission risk was created to categorize participants into the following groups: (1) undetectable without STIs; (2) undetectable with STIs; (3) detectable without STIs; and (4) detectable with STIs.

Statistical analysis

Descriptive statistics were calculated for all variables included in the analyses including the distribution of scales, with appropriate tests for normality (e.g., skewness). There was minimal missing data (i.e., two participants did not report their race/ethnicity, and one participant did not report history of incarceration). Given the minimal missing data, case-wise deletion was used for missing values. We then examined bivariate associations between study variables and (1) the four-category transmission risk group variable; and (2) separately for gender and race/ethnicity using analysis of variance with post-hoc Tukey

Table 2
Bivariate comparisons by the four category STI transmission risk variables

Characteristic/ measure	Undetectable without STIs (n=331), n (%) or mean (SD)	Undetectable with STIs (n=85), n (%) or mean (SD)	Detectable without STIs (n=137), n (%) or mean (SD)	Detectable with STIs (n=47), n (%) or mean (SD)	Test statistic
Demographics					
Age	21.47 (1.94)	21.14 (2.16)	21.45 (1.98)	20.96 (2.31)	$F(3, 597) = 1.35$, $p = .257$
Age at HIV diagnosis	18.90 (2.19)	18.96 (2.04)	18.81 (2.36)	18.26 (2.82)	$F(3, 597) = 1.22$, $p = .301$
Gender					$\chi^2(6) = 18.15$, $p = .01$
Male	257 (77.6)	78 (91.8)	99 (72.3)	37 (78.7)	
Female	62 (18.7)	7 (8.2)	34 (24.8)	6 (12.8)	
Transgender woman	12 (3.6)	0	4 (2.9)	4 (8.5)	
Education					$\chi^2(9) = 25.47$, $p = .01$
Less than high school	53 (16.0)	16 (18.8)	43 (31.2)	14 (29.8)	
High school or GED	155 (46.5)	31 (36.5)	54 (39.1)	17 (36.2)	
Some college/in college	97 (29.3)	25 (29.4)	34 (24.6)	13 (27.7)	
Master's degree or higher	26 (7.9)	13 (15.3)	6 (4.3)	3 (6.4)	
Housing					$\chi^2(3) = 9.95$, $p = .02$
Marginal housing	14 (4.2)	8 (9.4)	12 (8.8)	7 (14.9)	
Stable housing	316 (95.8)	77 (90.6)	125 (91.2)	40 (85.1)	
Number of incarcerations					$\chi^2(9) = 29.80$, $p = .001$
0	227 (68.6)	56 (66.7)	67 (48.9)	27 (57.4)	
1 time	54 (16.3)	16 (19.0)	25 (18.2)	11 (23.4)	
2–5 times	42 (12.7)	8 (9.5)	31 (22.6)	8 (17.0)	
6 or more times	8 (2.4)	4 (4.8)	14 (10.2)	1 (2.1)	
Sexual risk reduction attitudes and beliefs	26.98 (7.1)[a]	30.32 (11.5)[b]	26.87 (7.2)[a]	27.09 (5.9)[a]	$F(3, 597) = 4.50$, $p = .001$
Self-efficacy for sexual risk reduction	88.76 (20.01)	82.84 (20.78)	88.20 (20.81)	83.82 (23.59)	$F(3, 597) = 2.35$, $p = .072$
HIV nondisclosure					
Current casual sexual partners	220 (78.9)	55 (72.4)	84 (75.0)	24 (63.2)	$\chi^2(3) = 5.25$, $p = .154$
Past casual sexual partners	176 (63.1)	46 (63.1)	67 (59.8)	23 (60.5)	$\chi^2(3) = .46$, $p = .928$
Past/current steady sexual partners	120 (43.0)	34 (44.7)	53 (47.3)	15 (39.5)	$\chi^2(3) = .95$, $p = .815$
Internet use for finding sex partners	107 (32.3)	48 (56.5)	43 (31.4)	20 (42.6)	$\chi^2(6) = 26.16$, $p = .001$
Sexual behaviors					
Number of male partners	3.70 (6.32)[a]	6.64 (12.88)[b]	4.61 (7.21)[a]	5.61 (7.42)[a]	$F(3, 597) = 2.86$, $p = .04$
Number of female partners	2.00 (3.22)	2.50 (4.55)	2.04 (3.96)	1.25 (1.28)	$F(3, 597) = 2.35$, $p = .903$
Number of total partners	3.78 (6.30)[a]	6.79 (13.33)[b]	4.77 (7.64)[a]	5.44 (7.25)[a]	$F(3, 597) = 2.91$, $p = .03$
Any anal sex with male partners	164 (49.5)	60 (70.6)	70 (50.7)	25 (53.2)	$\chi^2(3) = 12.53$, $p = .01$
Any insertive anal sex with male partners	152 (45.9)	56 (65.9)	60 (43.5)	25 (53.2)	$\chi^2(3) = 12.95$, $p = .01$
Any insertive condomless anal sex with male partners	88 (26.6)	38 (44.7)	40 (29.0)	13 (27.7)	$\chi^2(3) = 10.81$, $p = .01$
Any receptive anal sex with male partners	139 (42.0)	50 (58.8)	60 (43.5)	25 (53.2)	$\chi^2(3) = 9.07$, $p = .03$

Table 2
Continued

Characteristic/ measure	Undetectable without STIs (n=331), n (%) or mean (SD)	Undetectable with STIs (n=85), n (%) or mean (SD)	Detectable without STIs (n=137), n (%) or mean (SD)	Detectable with STIs (n=47), n (%) or mean (SD)	Test statistic
Any receptive condomless anal sex with male partners	80 (23.2)	33 (38.8)	43 (31.2)	17 (36.2)	$\chi^2(3) = 9.25$, $p = .03$
Any anal/vaginal sex with female partners	23 (6.9)	4 (4.7)	10 (7.2)	2 (4.3)	$\chi^2(3) = 1.08$, $p = .783$
Any condomless anal/vaginal sex with female partners	12 (3.6)	3 (3.5)	7 (5.1)	0	$\chi^2(3) = 2.57$, $p = .463$
Depressive symptoms	7.26 (6.46)	8.51 (6.68)	8.00 (6.43)	9.06 (7.73)	$F(3, 597) = 1.75$, $p = .156$
Anxious symptoms	5.45 (5.89)	6.05 (5.91)	6.23 (5.96)	7.38 (7.05)	$F(3, 597) = 1.69$, $p = .168$
Alcohol, past 3 months					$\chi^2(9) = 15.63$, $p = .075$
Daily/almost daily	13 (3.9)	2 (2.4)	5 (3.6)	4 (8.5)	
Weekly	61 (18.5)	24 (28.6)	24 (17.5)	13 (27.7)	
Once or twice monthly	198 (60.0)	46 (54.8)	72 (52.6)	24 (51.1)	
Never	58 (17.6)	12 (14.3)	36 (26.3)	6 (12.8)	
Marijuana, past 3 months					$\chi^2(9) = 12.15$, $p = .205$
Daily/almost daily	91 (27.7)	30 (35.7)	44 (32.1)	22 (46.8)	
Weekly	30 (9.1)	8 (9.5)	14 (10.2)	5 (10.6)	
Once or twice monthly	73 (22.2)	15 (17.9)	28 (20.4)	6 (12.8)	
Never	135 (41.0)	31 (36.9)	51 (37.2)	14 (29.8)	
Any other drug, past 3 months					$\chi^2(9) = 16.94$, $p = .152$
Daily/almost daily	4 (1.2)	3 (3.5)	0	0	
Weekly	7 (2.1)	4 (4.7)	3 (2.2)	2 (4.3)	
Once or twice monthly	56 (16.9)	15 (17.6)	33 (23.9)	13 (27.7)	
Never	262 (79.2)	61 (71.8)	101 (73.2)	32 (68.1)	

[a,b]Means having different superscripts differ from each other significantly at the $p < .05$ level by Tukey comparison (for continuous variables).
GED = general education diploma; SD = standard deviation; STIs = sexually transmitted infections.

tests and chi-square tests. All analyses were conducted with SPSS version 25 (IBM SPSS Statistics).

Results

Participants ranged in age from 13 to 24 years (mean = 21.4, SD = 2.0). As shown in Table 1, the majority of the sample identified as male (78.5%) and non-Hispanic black (73.7%). The sample was relatively low in indicators of socioeconomic status, such that nearly two thirds of the sample had a high school degree/general education diploma or less (63.6%) and earned less than $1,000 in the past month (67.3%). Participants had a total of 1,100 viral load results during the 6-month study period, with 40% having one viral load, 42% having two viral loads, and 18% having three to six viral loads.

Participants reported engaging in insertive and receptive condomless anal sex with male partners at overall rates of 30% and 29%, respectively, with significantly higher rates of 45% and 39% among youth who tested positive for one or more STIs and were virally suppressed. Rates of HIV nondisclosure averaged across all four groups were highest for current casual sex partners (72%), medium for past casual sex partners (62%), and lowest for current or past steady sex partners (44%), with no difference in these rates among youth who were and were not virally suppressed.

Table 2 presents bivariate comparisons examining differences in the four-category transmission risk group by demographic characteristics, sexual risk reduction attitudes and beliefs, self-efficacy for sexual risk reduction, HIV nondisclosure, finding sex partners online, sexual behaviors, mental health, and substance use. In terms of demographics, significant factors included education, housing, and incarceration history.

There were significant differences in sexual risk reduction attitudes and beliefs and internet use to find sex partners. Post-hoc least significant difference comparisons illustrated that youth in the undetectable group with STIs had significantly higher scores compared with youth in the other groups. A greater proportion of youth in the undetectable group with STIs reported

Table 3
Bivariate comparisons of study variables by gender identity

Characteristic/measure	Female, n (%) or mean (SD)	Male, n (%) or mean (SD)	Trans women, n (%) or mean (SD)	Test statistic
Sexual risk reduction attitudes and beliefs	25.35 (6.55)[a]	27.91 (8.15)[b]	27.55 (5.25)	$F(2, 597) = 4.77$, $p = .009$
Self-efficacy for sexual risk reduction	85.09 (21.52)	88.25 (20.30)	80.26 (23.03)	$F(2, 597) = 2.20$, $p = .112$
HIV nondisclosure				
Current casual sexual partners	2 (11.2)	110 (27.5)	2 (12.5)	$\chi^2(2) = 11.74$, $p = .003$
Past casual sexual partners	23 (25.8)	167 (41.8)	3 (18.8)	$\chi^2(2) = 10.45$, $p = .004$
Past/current steady sexual partners	54 (60.7)	222 (55.5)	7 (43.8)	$\chi^2(2) = 1.80$, $p = .406$
Internet use for finding sex partners	3 (2.8)	211 (44.8)	4 (20.0)	$F(2, 597) = 70.64$, $p = .000$
Sexual behaviors				
Number of total partners	2.36 (5.53)[a]	4.95 (8.26)[b]	7.27 (13.88)[b]	$F(2, 597) = 4.28$, $p = .014$

[a,b]Means having different superscripts differ from each other significantly at the $p < .05$ level by Tukey comparison (for continuous variables).
SD = standard deviation.

using the internet to find sex partners compared with the other groups.

There were also significant mean differences with respect to sexual partners. Post-hoc least significant difference comparisons illustrated youth in the undetectable group with STIs reported a significantly greater number of total and male sex partners compared with those in the other groups. In addition, a greater proportion of youth in the undetectable group with STIs reported any anal sex with male partners, any insertive anal sex with male partners, any insertive condomless sex with male partners, any receptive anal sex with male partners, and any receptive condomless sex with male partners compared with youth in the other three groups. No significant differences were noted for self-efficacy for sexual risk reduction, HIV status nondisclosure, mental health, or substance use across the four groups.

Finally, we explored whether there were differences by gender and racial/ethnic identity in study variables as shown in Tables 3 and 4. Although both cisgender and transgender women were underrepresented in this sample, we did find small but significant differences between cisgender men and women in their sexual risk reduction attitudes and beliefs. Significant differences in HIV nondisclosure to causal sexual partners and internet use for finding sex partners were also observed for both gender and race/ethnicity. In addition, the total number of sexual partners significantly differed for gender identity but not race/ethnicity.

Discussion

Our study includes several important findings. First, among a sample of youth receiving medical care in the U.S., YLWH with undetectable viral loads who have other STIs are a group engaging in more sexual risk behaviors than other YLWH. Second, the group of YLWH who have other STIs endorsed the most favorable attitudes toward their own ability to engage in sexual risk reduction. Third, rates of HIV nondisclosure among YLWH are highest for current casual sex partners, medium for past casual sex partners, and lowest for current or past steady sex partners, with no difference in these rates among youth who were and were not virally suppressed.

In this study, we found a large percentage of YLWH were engaging in insertive and receptive condomless anal sex with male partners, especially in the group who were virally suppressed and also tested positive for one or more STIs. We also found favorable endorsement of items on the measure of sexual risk-reduction attitudes and beliefs. For example, we found high agreement with the following statement: "If my viral load is undetectable, I am less likely to infect another person with HIV if I have unprotected sex." Condomless sex in this population will not lead to HIV transmission as long as viral suppression is maintained. However, this finding raises concern as sexual risk behavior is associated with acquiring and/or transmitting other STIs. In addition, the risk for HIV transmission may still be present as sustained viral suppression among youth may not be consistently achieved.

It is also important to point out that the majority of our participants did not disclose their HIV status to past or current casual sexual partners. Although the finding of nondisclosure among YLWH is not new, it is interesting that there was no difference in rates of disclosure among youth who were virally suppressed compared with those who were detectable. It is

Table 4
Bivariate comparisons study variables by race/ethnicity

Characteristic/measure	Hispanic	Black non-Hispanic	Other race non-Hispanic	White non-Hispanic	Test statistic
	n (%) or mean (SD)	n (%) or mean (SD)	n (%) or mean (SD)	n (%) or mean (SD)	
Sexual risk reduction attitudes and beliefs	28.74 (7.99)	27.19 (7.92)	26.60 (4.30)	27.06 (9.73)	$F(3, 597) = 1.27$, $p = .285$
Self-efficacy for sexual risk reduction	84.13 (21.09)	88.54 (20.14)	83.03 (23.66)	86.06 (24.25)	$F(3, 597) = 1.79$, $p = .148$
HIV nondisclosure					
Current casual sexual partners	29 (30.9)	77 (21.1)	11 (42.3)	5 (27.8)	$\chi^2(3) = 8.94$, $p = .03$
Past casual sexual partners	45 (47.9)	126 (34.5)	14 (53.8)	8 (44.4)	$\chi^2(3) = 8.79$, $p = .032$
Past/current steady sexual partners	59 (62.8)	192 (52.6)	7 (73.1)	7 (61.1)	$\chi^2(3) = 6.72$, $p = .082$
Internet use for finding sex partners	53 (48.6)	151 (34.2)	8 (26.7)	6 (33.3)	$F(3, 597) = 41.44$, $p = .000$
Sexual behaviors					
Number of total partners	4.28 (4.29)	4.49 (8.60)	4.89 (7.47)	9.43 (15.32)	$F(3, 597) = 1.72$, $p = .162$

possible that YLWH who are virally suppressed may not feel that it is necessary to disclose their HIV status to their partners because they are not currently infectious. On the contrary, prior research has found that youth are not often accurate in knowing whether they are detectable or undetectable [23]. Thus, strategies that promote frequent viral load monitoring are needed to optimize the U=U campaign.

The U=U campaign endorsed by the CDC and other health organizations around the world as a prevention method indicates that PLWH who are undetectable will not transmit HIV to uninfected sexual partners [24]. In particular, the CDC states that PLWH adherent to ART as prescribed who achieve and maintain an undetectable viral load (200 copies/mL or less) have essentially no risk of HIV transmission to uninfected sexual partners [25]. According to the Prevention Access Campaign, this message has powerful implications that may help to (1) reduce PLWH's potential concern regarding transmitting HIV to others; (2) destigmatize PLWH as being promiscuous, irresponsible, or possibly dangerous; (3) encourage PLWH to initiate and stay on treatment to improve or maintain their health; and (4) support universal access to treatment and care for all PLWH [26].

The U=U movement is an important step toward helping to end the HIV pandemic in that it links HIV prevention with HIV treatment. Beyond the undetectable U, there are essentially two options. Once someone achieves initial viral load suppression, they can either maintain viral suppression or not. A lack of sustained viral suppression can be because of nonadherence to treatment or the emergence of a resistant virus. It is important that messages about the benefit of achieving initial viral suppression be coupled with the need for PLWH to continually monitor and sustain viral suppression over time. Durable viral suppression is critical for YLWH, but difficult to achieve. In fact, prior analyses from this study showed that over 40% of YLWH who achieved suppression were unable to maintain viral suppression at 1 year [6]. Notably, those with histories of incarceration, substance use, and home instability were particularly at risk for treatment failure [6]. YLWH need effective linkage to care and support to stay engaged in care.

Our findings are subject to some limitations. First, our findings may not generalize to other YLWH because the participants in our sample were currently engaged in care at one of our participating clinics in the ATN. YLWH who are receiving treatment at a non-ATN–affiliated site or who are not currently in care may be different than those in care at one of the participating sites. In addition, this study focused on behaviorally infected youth, so our findings may not generalize to youth infected perinatally. Second, our data were primarily collected through self-report, which is subject to recall bias and social desirability bias. However, we minimized these effects by using ACASI with all our participants in the study [27–30]. Third, the study protocol did not include routine screening for STIs and relied solely on documentation of STIs in medical records. It is possible that this is a minimization of the number of STIs among youth in this sample. Fourth, in calculating our transmission risk variable, we did not distinguish between oral, genital, and anal STIs and acknowledge that this may not take into account their individual potential impact on HIV transmission.

Despite these limitations, our study has several strengths that include having a large national dataset of YLWH in the U.S. who are engaged in medical care. Abstracted medical records for these participants have provided information about viral loads and STIs. In addition, ACASI interviews have allowed us to learn about their attitudes and beliefs. The results suggest that youth with undetectable viral loads who have contracted STIs are engaging in behavior that puts them at higher risk for STI acquisition and transmission than other YLWH who are engaged in medical care.

Although the U=U campaign may be oversimplified, its elegance stems from the clear linkage of treatment and prevention. HIV care providers are increasingly being asked to take on not only the care of their patient but also the care of their patient's sexual partners, at least when it comes to preventing HIV. Findings from this study highlight additional opportunities for HIV prevention, especially among those with HIV who test positive for another STI. Initial and then sustained suppression need close monitoring and the addition of sustained suppression to the HIV CoC cascade would highlight the importance of this metric. Furthermore, the role of risk reduction, specifically disclosure and condom use in the presence of STIs, need to be clarified in the era of U=U. Great strides have been made in both HIV treatment and prevention, but evidence of risky behavior among YLWH who have viral suppression and other STIs highlights an important area for further research.

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