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Association between psychiatric disorders, substance use, and sexual risk behaviors in perinatally HIV-exposed youth

Stephanie Benson, BA*,

Research Assistant, HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, New York, USA

Katherine S. Elkington, PhD,

Assistant Professor, College of Physicians and Surgeons, Columbia University, New York, New York, USA, and Training Director, HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, New York, USA

Cheng-Shiun Leu, PhD,

Assistant Professor, Mailman School of Public Health, Columbia University, New York, New York, USA, and Biostatistician and Research Scientist, HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, New York, USA

Amelia Bucek, MPH,

Project Director, HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, New York, USA

Curtis Dolezal, PhD,

Research Scientist, HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, New York, USA

Patricia Warne, PhD, and

Associate Director, HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, New York, USA

Claude Mellins, PhD

Professor, Medical Center, Columbia University, New York, New York, USA, and Research Scientist and Co-Director, HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, New York, USA

Abstract

As youth with perinatally-acquired HIV infection age, there is a need for studies that identify predictors and correlates of sexual risk behaviors. We examined the association between psychiatric disorders and substance use disorders (SUD) with sexual risk behaviors in youth with perinatally-acquired HIV infection and perinatally HIV exposed but uninfected youth. Participants were recruited from 4 medical centers in New York City. The Diagnostic Interview Schedule for Children and the Adolescent Sexual Behavior Assessment were administered to assess psychiatric disorders and sexual behaviors, respectively. SUD and behavior disorders were correlated with

*Corresponding Author: Stephanie Benson: sbenson417@gmail.com.

either ever having had penetrative sex or recent condomless sex for participants with perinatally-acquired HIV infection only. Results suggest that clinicians should screen and treat patients for SUD and behavioral disorders to reduce sexual risk behaviors in youth with perinatally-acquired HIV infection.

Keywords

adolescent; HIV; psychiatric disorder; sexual risk behavior; substance use disorder; young adults

With increasingly accessible and effective antiretroviral therapy (ART), children with perinatally-acquired HIV infection are reaching adolescence and young adulthood in large numbers (Sohn & Hazra, 2013). Adolescence is a period of increasing experimentation with substance use and sexual behaviors, which includes onset of and increase in sexually risky behaviors; moreover, psychiatric disorders frequently emerge during this time (Kieling et al., 2011), particularly for adolescents and young adults (youth) from vulnerable backgrounds. In adults living with HIV, mental health problems and substance use predict unprotected sexual behaviors (Lundberg et al., 2011; Machtinger, Wilson, Haberer, & Weiss, 2012; Nehl, Klein, Sterk, & Elifson, 2016), as well as non-adherence to ART and increased viral load, which heightens the risk of transmission to partners (Boone, Cook, & Wilson, 2013; Golub et al., 2010; Machtinger et al., 2012). However, to date, few studies have examined this association in perinatally-infected adolescents, despite their considerable risk for psychiatric disorders and substance use problems (Bhana et al., 2016; Mellins et al., 2012; Mellins & Malee, 2013).

In the United States, studies of youth perinatally-infected with HIV have suggested that issues related to managing a lifelong stigmatizing illness, such as partner disclosure and the potential for partner infection, might make perinatally-infected youth sexual development different from that of their uninfected peers (Marhefka et al., 2011). Studies have found that perinatally-infected youth may delay the onset of sexual behaviors, but that, once sexually active, they may engage in high rates of condomless sex (Bauermeister, Elkington, Robbins, Kang, & Mellins, 2012; Brogly et al., 2007). For these youth, unprotected sexual intercourse carries with it the risk of re-infection with HIV and increased likelihood of sexually transmitted infections (STI), as well as transmission of HIV to their partners. Given this complicated sexual context, understanding specific predictors and correlates of sexual risk behaviors in youth perinatally infected with HIV is critical for informing much needed evidence-based interventions that promote healthy and safe sexual development.

Psychiatric and substance use problems are well-established correlates of sexual risk behavior in youth (Brown et al. 2010; Elkington, Bauermeister, & Zimmerman, 2010; Lundberg et al., 2011; Nehl et al., 2016). For example, studies have suggested that externalizing symptoms and disorders (e.g., ADHD, conduct disorder) are correlated with greater HIV sexual risk behaviors, including inconsistent condom use and having multiple sexual partners (Brown et al., 2010; Lundberg et al., 2011; Sarver, McCart, Sheidow, & Letourneau, 2014). Although the data have been less consistent, internalizing symptoms and disorders (e.g., depression, anxiety, hopelessness) have also been associated with risk

behaviors such as inability to negotiate condom use and decreased assertiveness, but also with later sexual initiation and decreased sexual activity (Caminis, Henrich, Ruchkin, Schwab-Stone, & Martin, 2007; Donenberg & Pao, 2005).

High rates of psychiatric disorders and substance use problems have been documented in perinatally-infected adolescents (Bauermeister, Elkington, Brackis-Cott, Dolezal, & Mellins, 2009; Elkington, Bauermeister, Brackis-Cott, Dolezal, & Mellins, 2009; Gadow et al., 2012; Mellins et al., 2012), in part due to a confluence of individual and contextual risk factors such as residing in families affected by poverty, violence, discrimination, familial mental illness, substance use, and loss (Bhana et al., 2016; Mellins & Malee, 2013). Yet, despite the well-established associations between mental health problems, substance use problems, and sexual risk behaviors in the general population, the association is not well understood in youth perinatally infected with HIV. In order to develop much needed interventions for this population, we must first understand the specific roles that mental health problems and substance use play in the sexual development and, importantly, sexual risks of youth perinatally infected with HIV, as it may or may not follow the same trajectories as those unaffected by HIV.

Indeed, the few studies that have examined predictors of sexual risk in youth perinatally infected with HIV have focused mostly on substance use and produced conflicting results. For instance, Tassiopoulos et al. (2013) found no association between substance use and sexual debut in a sample of perinatally-infected youth ages 10-18 years. In contrast, in one of the few U.S.-based longitudinal cohort studies of perinatally-infected and perinatally HIV exposed but uninfected youth and their caregivers, Elkington et al. (2009) found that substance use increased the odds of lifetime sexual activity or unprotected sex in both groups, but also found that the association between unprotected sex and alcohol use was weaker for perinatally-infected than for perinatally-exposed but uninfected youth (Elkington, Bauermeister, Santamaria, Dolezal, & Mellins, 2015). In the same cohort study, Mellins et al. (2009) found that depression and anxiety symptoms were significantly associated with onset of sexual behavior and substance use during early to middle adolescence (9-16 years). Differing findings across studies may be a result of (a) the young age of many of the youth in these studies (mean age =12 years) who may not have begun experimentation with sex and substance use and/or for whom mental health problems may not have emerged (MacDonnel, Naar-King, Murphy, Parsons, & Huszti, 2011; Murphy, Wilson, Durako, Muenz, & Belzer, 2001), (b) examination of sexual activity versus sexual risk, and (c) varying definitions of mental health problems and substance use.

The public health consequences of condomless sex by youth perinatally infected with HIV are of concern. In one study, 81% of sexually active youth perinatally infected with HIV had drug resistant strains of the virus, of whom 63% reported unprotected sex (Tassiopoulos et al., 2013). Because unprotected sex in youth perinatally infected with HIV can lead to HIV transmission, including treatment-resistant strains of the virus, it is imperative that researchers identify correlates and predictors of condomless intercourse in this population. We examined whether specific psychiatric disorders and substance use disorders (SUD) were associated with sexual risk behaviors in youth perinatally infected with HIV and how HIV status may influence this relationship by comparing youth perinatally infected with

HIV and youth perinatally exposed but uninfected with HIV who shared many of the same sociodemographic characteristics. Our study addressed limitations of the literature by examining these associations in an older adolescent and young adult sample and by looking at these associations from cross-sectional and longitudinal perspectives in order to inform our understanding of causal priority.

Methods

Participants and Procedures

Project CASA (Child and Adolescent Self-Awareness and Health) is a longitudinal cohort study of HIV-affected families in New York City. Caregiver-youth dyads were originally recruited between 2003 and 2008 from four major medical centers providing primary and tertiary care. Inclusion criteria for enrollment were: children or adolescents ages 9 to 16 years with perinatal exposure to HIV who (a) spoke English or Spanish, (b) possessed cognitive ability to complete the interview, and (c) for those younger than 18 years of age, had a caregiver with legal capacity to sign consent for the child's participation. Of the 443 eligible participants, 17% refused participation or could not be reached by the research staff. Among the 367 caregiver-youth dyads approached, 340 (77% of eligible families; 206 perinatally infected and 134 exposed but uninfected youth) enrolled in the study. Two-hundred and eighty (166 perinatally infected and 114 perinatally exposed) caregiver-youth dyads completed the first follow-up (FU1) interview. FU1 interviews took place approximately 18 months after enrollment.

Although not in the initial study plan, we secured additional funding to continue following the cohort for three more interviews (FU2, FU3, FU4). The mean time interval between FU1 and FU2 was approximately 3 years. The FU2, FU3 and FU4 interviews took place between 2008 and 2015 and occurred approximately 12 months apart. Eighty-four percent (179 perinatally infected and 105 perinatally exposed) of the originally enrolled participants were re-recruited.

Analyses for this paper come from the FU2 and FU4 CASA time points. Data came from youth and caregiver interviews and medical charts from FU2 and youth interviews and medical charts from FU4. The quantitative interviews ranged in length from approximately 1.5-3 hours, depending on the time point. Trained bachelor -level and master s-level research assistants administered structured interviews to assess participants' mental health and an audio computer-assisted self-interview (ACASI) was utilized to measure participants' sexual behaviors. Youth and caregivers were interviewed separately, but concurrently at their homes, medical centers, or the CASA research offices.

Following the interview, medical charts, including CD4+ T cell count, HIV RNA viral load, and ART regimens, were obtained from health care providers. Participants were compensated for their time and reimbursed for travel expenses. Institutional review board approval was acquired from all four medical centers, including Jacobi Medical Center, New York Presbyterian Hospital, Harlem Hospital Center, and Metropolitan Hospital Center. Caregivers provided written informed permission for youth younger than 18 years.

Participants younger than 18 provided written assent, and those 18 years and older provided written informed consent.

Measures

Demographics—Demographic variables included participant age, gender, race, ethnicity, and HIV status. Age and gender at birth were obtained at enrollment and current age was calculated based on date of birth and date of interview. Given that the vast majority of participants were African American or Latino, race and ethnicity were dichotomized as African American/Black versus other races and Latino versus not Latino, respectively.

HIV-related information—Medical chart data on HIV RNA viral load (VL) was obtained at enrollment and each follow-up interview. Health care providers were asked to provide the three VL values closest to the interview. For the purposes of these analyses, VL was categorized as 1,000 copies/ml or lower versus more than 1,000 copies/ml.

Sexual behaviors—The Adolescent Sexual Behavior Assessment (ASBA; Dolezal, Mellins, Brackis-Cott, & Meyer-Bahlburg, 2006) is a brief measure of sexual behavior appropriate for children as young as 9 years of age. The ASBA was administered via audio computer-assisted self-interviewing (ACASI) and used to assess past and current sexual behaviors, including kissing, touching partners' genitals, and oral, anal, and vaginal sex. The primary outcome variables in our analyses were (a) lifetime vaginal/anal sex (ever had sex vs. never had sex), (b) condomless penetrative sex in the previous 3 months, and (c) age at first sexual experience. Reports of unprotected vaginal and anal sex were aggregated into one variable due to the low frequency of anal sex.

Participant psychiatric and substance use disorders—Psychiatric function of participants was assessed with the interviewer-administered Diagnostic Interview Schedule for Children (DISC-IV; Shaffer et al., 1996). The DISC-IV is a well-structured diagnostic instrument that assesses the most frequent childhood and adolescent diagnoses including anxiety (i.e., social phobia, separation anxiety disorder, specific phobia, panic disorder, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder), mood (i.e., major depression, dysthymic disorder, mania, hypomania), disruptive behavior (i.e., attention deficit hyperactivity disorder, oppositional defiant disorder, conduct disorder), and SUD (i.e., alcohol use disorder, marijuana use disorder, other substance use disorder). Caregivers and youth were asked about the child's experiences of symptoms in the previous year. Youth met criteria for a disorder if they screened positive on the DISC-IV, either through self-report, caregiver report, or combined youth and caregiver reports.

Statistical Analysis

Descriptive statistics of demographic characteristics and youth HIV-related information, sexual behaviors, psychiatric disorders, and SUD were generated for all participating youth subjects pooled and separated by HIV status. Subject characteristics were compared between the two groups (perinatally infected vs. perinatally exposed but not infected) using Chi-Square tests for categorical variables and *t*-tests for continuous variables. We evaluated the associations between participant sexual behaviors and psychiatric and substance use

disorders using logistic regression for dichotomous outcomes (i.e., lifetime vaginal/anal sex behavior [*ever* vs. *never*] and condomless penetrative sex in the previous 3 months [*yes* vs. *no*]). We analyzed the full sample and conducted subgroup analyses for the perinatally-infected and perinatally-exposed but not infected participants. In each of the regression analyses, participant age and gender were included in the model to adjust for potential confounding factors. Participant HIV status was also entered in the model in the analysis for the full sample, but not in the subgroups. We analyzed all subjects on lifetime sex behaviors; however, when examining condomless sex in the previous 3 months, we included only those participants who reported being sexually active during this 3-month time period ($n = 42$ at FU2; $n = 118$ at FU4). Adjusted odds ratios and their corresponding p -values as well as 95% confidence intervals (95% CI) for findings from logistic regression analysis are presented. To assess the association between sexual debut and psychiatric and substance use disorders, we employed log-rank tests to examine whether the probability of an event (i.e., ever had vaginal/anal sex) at any time point differed between participants with or without disorder for the full sample and also separately by their HIV status. P -value .05 was considered statistically significant. Data were analyzed using IBM SPSS Statistics 23.

Results

Sample Characteristics

Table 1 shows differences at FU2 and FU4 in sample demographic characteristics and clinical and sexual behavior outcomes by HIV status. The age range at FU2 was 13 to 24 years ($M = 17$ years) and 15-26 years ($M = 19$ years) at FU4. Approximately half of the participants were male. About 83% of the participants identified themselves as straight or heterosexual. Approximately 12% of participants identified as bisexual and the remaining 5% identified as gay, lesbian, unsure, or did not specify. On average, the perinatally-infected participants were significantly older, by about a year and a half, than perinatally-exposed but uninfected participants ($p < .001$). Also, more perinatally-infected participants were African American ($p = \text{NS}$), reflecting the epidemic in New York and the United States (Centers for Disease Control and Prevention, 2017; New York City Department of Health and Mental Hygiene, 2015) and a greater proportion of perinatally-exposed but uninfected than perinatally-infected participants were of Hispanic origin ($p = \text{NS}$).

Prevalence of Sexual Behavior and Psychiatric Disorder by HIV Status

There were few differences by HIV status in sexual behavior at either time point. At FU2, approximately half the sample, 57% of perinatally infected and 49% of perinatally exposed but uninfected reported lifetime vaginal/anal sex ($p = \text{NS}$); of those who reported sexual intercourse, 13% of perinatally infected and 21% of perinatally-exposed but uninfected reported condomless sex in the previous 3 months ($p = .082$).

At FU2, there were no significant differences in rates of any psychiatric disorder, as well as subcategories of psychiatric disorders between the two groups. However, significantly more perinatally-infected participants had an SUD than perinatally-exposed but uninfected participants ($p = .033$).

At FU4, many more participants were sexually active in both groups: 76% of perinatally-infected and 69% of perinatally-exposed but uninfected reported lifetime penetrative sex ($p = \text{NS}$); of these, 24% of perinatally-infected and 20% of perinatally-exposed but uninfected had condomless sex in the previous 3 months at FU4 ($p = \text{NS}$).

Similar to FU2, at FU4 there were no differences between HIV groups in rates of any psychiatric disorder or any subcategories. There was also no significant difference in rates of SUD.

Sexual Behavior and its Association with Psychiatric Disorder

Tables 2 and 3 present the adjusted associations between psychiatric disorders and SUD, lifetime penetrative sex, and condomless penetrative sex in the previous 3 months (of those sexually active), by cross sectional and prospective analysis.

Association between FU2 psychiatric disorders and FU2 sexual behavior—At FU2, there were no significant associations between any psychiatric disorder and penetrative sex. However, participants with SUD (AOR = 5.87; 95% CI = 1.95-17.7, $p < .01$) were significantly more likely to ever have had penetrative sex compared to those without SUD. The association between having a behavior disorder and lifetime penetrative sex was just shy of statistical significance (AOR = 2.02, CI = 1.00-4.10, $p = .051$). In sub-group analyses, the odds of ever having had penetrative sex were significantly higher among perinatally-infected participants with behavior disorders (AOR = 2.82; 95% CI = 1.12-7.06, $p < .05$) and SUD (AOR = 4.68; 95% CI = 1.52-14.37, $p < .01$). There were no significant associations for perinatally-exposed but uninfected participants. Additionally, there were no significant associations between any psychiatric disorder or SUD and condomless sex in the previous 3 months.

Association between FU4 psychiatric disorders and FU4 sexual behavior—There were no significant associations between FU4 psychiatric disorder variables and lifetime penetrative sex at FU4. However, sub-group analyses showed that perinatally-infected participants with SUD were significantly more likely to ever have had penetrative sex at FU4 than perinatally-exposed but uninfected participants without SUD (AOR = 8.78, 95% CI = 1.14-67.39, $p < .05$). Similar to FU2, there were no such significant associations for perinatally-exposed but uninfected participants.

Having a behavior disorder (AOR = 4.76; 95% CI = 1.47-15.35, $p < .01$) and SUD (AOR = 2.80; 95% CI = 1.08-7.27, $p < .05$) at FU4 significantly increased the odds of condomless sex in the previous 3 months for all participants. Sub-group analysis revealed that perinatally-infected participants with SUD (AOR = 3.89; 95% CI = 1.22-12.42, $p < .05$) were significantly more likely to engage in condomless sex in the previous 3 months at FU4.

Association between psychiatric disorders at FU2 and sexual behavior at FU4—There were no significant associations between any FU2 psychiatric disorder and SUD variables and initiation of penetrative sex by FU4 in the overall sample or in the subgroup analyses by HIV status. However, odds of engaging in condomless sex in the previous 3 months at FU4 more than doubled for participants who met criteria for a behavior disorder at

FU2 (AOR = 2.74; 95% CI = 1.08-6.93, $p < .05$). There were no significant associations between condomless sex in the previous 3 months at FU4 with FU2 mood or anxiety disorders or with FU2 SUD. Further, there were no significant findings in subgroup analyses by HIV status in the association between FU2 psychiatric disorders and condomless sex in the previous 3 months at FU4.

Association between psychiatric disorders and time to first sex—Findings from log-rank tests suggested that time to first vaginal/anal sex differed between (a) those with and without behavior disorders at FU2 (full sample: $p = .006$, perinatally infected: $p = .006$); (b) those with and without SUD at FU2 (full sample: $p < .001$, perinatally-infected: $p < .001$, perinatally-exposed but uninfected: $p = .009$); and (c) those with and without SUD at FU4 (full sample: $p < .001$, perinatally-infected: $p < .001$). In each of these cases, the risk of a vaginal/anal sex event was consistently greater for the disorder group than the non-disorder group.

Discussion

To our knowledge, this is the first study to longitudinally examine the association between psychiatric disorders, including specific categories of disorders, and sexual risk behaviors in perinatally-infected youth. We found few differences in rates of any penetrative sex and condomless sex, or in rates of different types of psychiatric disorders between perinatally-infected and perinatally-exposed but uninfected youth over time. Differences were seen in the associations between specific psychiatric disorders and SUD and sexual behaviors over time and by HIV status. Specifically, behavior disorders and SUD, but not mood or anxiety disorders, were correlated with certain sexual risk behaviors at different time points, suggesting that externalizing disorders were more relevant to sexual risk than internalizing disorders for perinatally-infected youth. While some studies have shown that perinatally-infected youth demonstrated delayed sexual debut (Bauermeister et al., 2012; Brogly et al., 2007), we found no difference by HIV status for this variable at either time point, suggesting that, by later adolescence, perinatally-infected youth have caught up to their uninfected peers in terms of sexual debut. Additionally, among sexually active participants, there were no differences by HIV status for condomless sex at either time point. This finding was inconsistent with studies reporting that sexually active perinatally-infected youth engaged in riskier sexual behaviors than their uninfected peers (Bauermeister et al., 2012; Brogly et al., 2007).

Overall rates of psychiatric disorders, including SUD, were relatively high in our sample, with few HIV status differences. In comparison to the estimated 21.4% of adolescents in the general population who experience mental health problems (National Alliance on Mental Illness, 2015), 47% of perinatally-exposed but uninfected participants and 39% of perinatally-infected participants met criteria for any psychiatric disorder at FU4. Perinatally-infected participants did have higher rates of SUD than uninfected participants at FU2 (mean age 17 years), but that was the only disorder that varied by HIV status. Thus, other factors shared by these two groups might account for the high rates of mental health problems. Both groups tended to reside in high-stress and low-resourced communities and some studies have suggested that stressful neighborhoods were associated with increased mental health

symptoms in adolescents, including perinatally-infected youth (Alegria, Molina, & Chen, 2014; Kang, Mellins, Dolezal, Elkington, & Abrams, 2011; Mutumba et al., 2016) and thus, may make both groups vulnerable to psychiatric disorders and SUD. In fact, while earlier studies suggested a difference in overall rates of having any psychiatric disorders, more recent studies from CASA and other cohorts suggest that both groups have similar rates of psychiatric disorders as they enter older adolescence and young adulthood. This finding suggests that contextual factors, more than HIV status, influence the mental health of this population (Mutumba et al., 2016).

Among the disorders examined in our study, only SUD and behavior disorders were associated with either ever having had sex or recent condomless sex, extending a large literature that has found similar associations in other adolescent populations (Brown et al., 2010; Hosain, Berenson, Tennen, Bauer, & Wu, 2012; Lundberg et al., 2011; Sarver et al., 2014). Closer examination of our findings suggests that this association was largely driven by behavior disorders and SUD in perinatally-infected youth only. At first glance, this finding appears to be in contrast to the findings of Elkington et al. (2015) with the same cohort, which found that the association between substance use and condomless sex was stronger for perinatally-exposed but uninfected than perinatally-infected youth when they were younger. We found that for perinatally-infected participants, SUD was correlated only with ever having penetrative sex at the first time-point, but at the second time-point, SUD was associated with both ever having penetrative sex and condomless sex. However, Elkington et al. (2015) did not look at substance use *disorder*, and the contrast in findings with our study suggests that more serious and problematic use of substances was associated with greater sexual risk among perinatally-infected participants, particularly as they aged. In another paper from this cohort, perinatally-infected participants with SUD and behavior disorders were less likely to be adherent to medication (Bucek et al., 2016). Together, these papers suggest that interventions with perinatally-infected youth may need to consider focusing on mental health, adherence, and sexual risk behaviors to prevent poor outcomes in this population and further transmission to others. These data support previous calls for integrating mental health into health care services for this population (Havens, Mellins, & Hunter, 2008; Mellins & Malee, 2013) and, more specifically, point to the need to identify and treat behavior disorders and SUD in order to reduce sexual risk behaviors and HIV transmission to others.

We found no association between mood and anxiety disorders and sexual behavior, a finding that was also in contrast with some, albeit inconsistent, literature about youth. Studies have found depression and anxiety to be related to decreased sexual activity as well as increased sexual risk behaviors in the general child and adolescent population (Caminis et al., 2007; Donenberg & Pao, 2005). Examining sexual activity as well as sexual risk behaviors, we found no association with internalizing disorders, regardless of HIV status. This finding suggested that internalizing disorders might be less salient than externalizing disorders in predicting sexual risk in older youth.

Our study had several limitations. First, due to the low frequency of anal sex, we did not differentiate between condomless anal sex and vaginal sex. Data from other studies (Duby & Colvin, 2014) suggested that anal sex was often used as a pregnancy prevention method by

heterosexual youth. Given that the risk of HIV transmission is greater for anal sex (Boily et al., 2009), future studies should distinguish between condomless anal and vaginal sex in this population. We also could not examine differences by sexual orientation, as few of our participants reported same-sex behaviors. However, as these participants age, more may identify as gay or bisexual or report same sex behavior, which might increase our ability to examine differences by sexual orientation. We also could not examine the number of sexual partners as a measure of sexual risk, another important variable for future studies. Additionally, future studies might consider how knowledge of sex and sex/HIV education influence the relationship between mental health problems and condomless sex. Now that pre-exposure prophylaxis (PrEP) is available and increasingly being scaled up in youth at risk for HIV (Pace, Siberry, Hazra, & Kapogiannis, 2013), future studies might also want to consider the partners of perinatally-infected youth and their use of PrEP as a reason for condomless sex.

Despite these limitations, our study provided important contributions to the existing literature on relationships between mental health problems and sexual risk behaviors in perinatally-infected youth. Overall, behavior disorders and SUD were the most consistent predictors of sexual risk behaviors for this population, whereas mood and anxiety disorders were not correlated with sexual risk. These results have important implications for interventions and clinical practice.

Conclusion

Our findings underscore the need for sexual risk reduction interventions that address substance use and behavior disorders in perinatally HIV-infected youth. Our results also suggest that integrating mental health into primary health care could be effective for reducing sexual risk behaviors. Finally, we know that many providers do not discuss sex with their adolescent patients (Fuzzell, Shields, Alexander, & Fortenberry, 2017). It might be particularly valuable to teach HIV practitioners how to communicate clearly and effectively about sex and condom use when perinatally-infected youth are young.

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Key Considerations

- Integrating mental health into health care services might be valuable for reducing sexual risk behaviors in adolescents and young adults who were perinatally infected with HIV.
- Screening for and treating behavior disorders and substance use disorders in primary care settings is a first step toward preventing sexual risk behaviors and HIV transmission to others.
- Integrating conversations about sex and condom use into health care services would be valuable for youth who were perinatally infected with HIV, especially when they are younger.

Table 1

Sample Demographics by HIV Status in a Sample of Perinatally-Exposed Youth

Characteristics	HIV uninfected (N = 105)		HIV infected (N = 178)		T-Test/ χ^2
	N	%	N	%	
Male	51	49%	92	51%	.646
Straight/Heterosexual	86	83%	145	83%	.999
Age (Mean)	16.41 (2.58)		17.98 (2.76)		< .001
<i>Race/ethnicity</i>					
African American	53	51%	110	62%	.071
Hispanic	52	50%	79	44%	.402
<i>HIV characteristics</i>					
Viral load >1,000 copies/ml			75	43%	
<i>Sexual behavior</i>					
Ever had penetrative sex at FU2	51	49%	101	57%	.175
Ever had penetrative sex at FU4	65	69%	108	76%	.279
Condomless sex at FU2	22	21%	23	13%	.082
Condomless sex at FU4	19	20%	34	24%	.520
<i>Psychiatric disorder</i>					
Any psych disorder excluding SUD at FU2	50	48%	76	42%	.398
Any psych disorder excluding SUD at FU4	45	47%	55	39%	.187
Mood/anxiety at FU2	43	41%	60	34%	.209
Mood/anxiety at FU4	39	41%	50	35%	.342
Behavior at FU2	25	24%	37	21%	.536
Behavior at FU4	20	21%	17	12%	.051
SUD at FU2	10	10%	34	19%	.033
SUD at FU4	17	18%	34	24%	.290

Note. SUD = substance use disorder; FU2 = follow-up time 2; FU4 = follow-up time 4.

Table 2

Association Between Disorder and Lifetime Penetrative Sex

Lifetime Penetrative Sex											
Association between FU2 Covariates and FU2 Outcomes											
Predictor	All participants						Sub-group analysis				
							HIV uninfected			HIV infected	
	AOR	95% CI	p	AOR	95% CI	p	Lower	Upper		Lower	Upper
Any psych excluding SUD	1.55	0.86	2.79	.149	1.25	0.45	3.46	.672	1.72	0.82	3.60
Mood/anxiety	1.12	0.61	2.07	.711	1.14	0.40	3.24	.808	1.05	0.49	2.27
Behavior	2.02	1.00	4.10	.051	1.23	0.37	4.11	.739	2.82	1.12	7.06
SUD	5.87	1.95	17.68	.002		N			4.68	1.52	14.37
Association between FU4 Covariates and FU4 Outcomes											
Predictor	All participants						Sub-group analysis				
							HIV uninfected			HIV infected	
	AOR	95% CI	p	AOR	95% CI	p	Lower	Upper		Lower	Upper
Any psych excluding SUD	1.18	0.61	2.26	.624	1.26	0.46	3.43	.654	1.20	0.49	2.93
Mood/anxiety	1.17	0.60	2.31	.641	1.32	0.46	3.82	.607	1.12	0.45	2.82
Behavior	0.88	0.37	2.10	.772	1.25	0.36	4.30	.727	0.65	.18	2.30
SUD	2.42	0.86	6.76	.093	0.92	0.24	3.53	.908	8.78	1.14	67.39
Association between FU2 Covariates and FU4 Outcomes											
Predictor	All participants						Sub-group analysis				
							HIV uninfected			HIV infected	
	AOR	95% CI	p	AOR	95% CI	p	Lower	Upper		Lower	Upper
Any psych excluding SUD	1.44	0.75	2.75	.274	1.27	0.48	3.30	.631	1.61	0.66	3.90
Mood/anxiety	1.18	0.60	2.32	.639	1.28	0.48	3.39	.619	1.07	0.41	2.76

Lifetime Penetrative Sex									
Association between FU2 Covariates and FU2 Outcomes									
Predictor	All participants					Sub-group analysis			
						HIV uninfected		HIV infected	
	AOR	95% CI	Lower	Upper	p	AOR	95% CI	Lower	Upper
Behavior	2.19	0.96	4.98	.063	.063	1.88	0.60	5.90	.278
SUD	2.36	0.64	8.72	.199	.199	0.74	0.07	7.90	.804
								0.69	15.97

Note.

* Data not available due to size of cell; SUD = substance use disorder; CI = confidence interval; AOR = adjusted odds ratio; FU2 = follow-up time 2; FU4 = follow-up time 4.

Table 3

Association Between Disorder and Condomless Penetrative Sex

Condomless Penetrative Sex in Past 3 Months												
Association between FU2 Covariates and FU2 Outcomes												
Predictor	All participants				Sub-group analysis							
	AOR	95% CI		p	HIV uninfected				HIV infected			
		Lower	Upper		AOR	95% CI		p	AOR	95% CI		p
						Lower	Upper			Lower	Upper	
Any psych excluding SUD	1.57	0.37	6.72	.543			NA *		0.42	0.05	3.33	.414
Mood/anxiety	1.70	0.40	7.31	.475			NA *		0.48	0.06	3.83	.489
Behavior	2.16	0.39	11.84	.374			NA *		1.25	0.14	11.08	.842
SUD	0.98	0.23	4.07	.974	1.01	0.08	12.34	.994	1.07	0.18	6.55	.939
Association between FU4 Covariates and FU4 Outcomes												
Predictor	All participants				Sub-group analysis							
	AOR	95% CI		p	HIV uninfected				HIV infected			
		Lower	Upper		AOR	95% CI		p	AOR	95% CI		p
						Lower	Upper			Lower	Upper	
Any psych excluding SUD	2.15	0.98	4.74	.056	3.33	0.72	15.49	.124	1.71	0.67	4.36	.259
Mood/anxiety	1.41	0.64	3.13	.395	1.93	0.45	8.37	.379	1.24	0.47	3.24	.665
Behavior	4.76	1.47	15.35	.009	6.26	0.91	42.97	.062	3.68	0.80	16.98	.095
SUD	2.80	1.08	7.27	.034	0.91	0.15	5.45	.915	3.89	1.22	12.42	.022
Association between FU2 Covariates and FU4 Outcomes												
Predictor	All participants				Sub-group analysis							
	AOR	95% CI		p	HIV uninfected				HIV infected			
		Lower	Upper		AOR	95% CI		p	AOR	95% CI		p
						Lower	Upper			Lower	Upper	
Any psych excluding SUD	1.51	0.70	3.28	.298	1.00	0.24	4.11	.996	1.79	0.69	4.63	.228
Mood/anxiety	1.13	0.50	2.53	.773	0.90	0.21	3.78	.881	1.33	0.49	3.63	.576
Behavior	2.74	1.08	6.93	.033	2.73	0.52	14.33	.234	2.82	0.89	8.92	.077
SUD	0.77	0.27	2.17	.622	3.58	0.27	46.76	.331	0.50	0.15	1.69	.266

Note.

* Data not available due to size of cell; SUD = substance use disorder; CI = confidence interval; AOR = adjusted odds ratio; FU2 = follow-up time 2; FU4 = follow-up time 4.