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Rates and Types of Psychiatric Disorders in Perinatally Human Immunodeficiency Virus-Infected Youth and Seroreverters

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Abstract

Background—The purpose of this study was to examine 1) the prevalence of psychiatric and substance use disorders in perinatally HIV-infected (HIV+) adolescents and 2) the association between HIV infection and these mental health outcomes by comparing HIV+ youths to HIV exposed but uninfected youths (HIV-) from similar communities.

Methods—Data for this paper come from the baseline interview of a longitudinal study of mental health outcomes in 9-16 year old perinatally HIV-exposed youths (61% HIV+) and their caregivers. Three hundred forty youths and their primary adult caregivers were recruited from four medical centers and participated in separate individual interviews. Youth psychiatric disorder was assessed using the caregiver and youth versions of The Diagnostic Interview Schedule for Children (DISC-IV).

Results—According to caregiver or youth report, a high percentage of HIV+ and HIV- youths met criteria for a non-substance use psychiatric disorder, with significantly higher rates among the HIV+ youths (61% vs 49%, OR=1.59; CI=1.03,2.47; $p < .05$). The most prevalent diagnoses in both groups were anxiety disorders (46% for total sample) which included social phobia, separation anxiety, agoraphobia, generalized anxiety disorder, panic disorder, obsessive-compulsive disorder, and specific phobias. One quarter of the sample met criteria for a behavioral disorder (ADHD, conduct disorders, and oppositional defiant disorders), with ADHD being most prevalent. HIV+ youths had significantly higher rates of ADHD (OR=2.45; CI=1.20, 4.99, $p < .05$). Only 7% of youths met criteria for a mood disorder and 4% for a substance abuse disorder. Several caregiver variables (caregiver type and HIV status) were also associated with both child HIV status and mental health outcomes.

Conclusions—Our data suggest that HIV+ youths are at high risk for mental health disorders. Further longitudinal research is necessary to understand the etiology, as well as potential protective factors, in order to inform efficacy-based interventions.

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Keywords

perinatal HIV-infection; seroreverters; adolescents; psychiatric disorder; AIDS; behavior problems; psychiatric practice; mental health

With the advent of antiretroviral therapy (ART), there has been a drastic reduction of perinatally transmitted HIV in the developed world in the last decade (Abrams, 2004). Unfortunately, these advances come late for a cohort of children born with HIV infection before widespread use of ART to prevent mother to child transmission who have had to contend with significant psychosocial, medical, and developmental challenges. In the United States (US), pediatric HIV has become an adolescent epidemic. As of June 2006, in New York City (NYC) where this study takes place, 64% of children living with perinatal HIV infection were older than 12 years (New York City Department Health and Mental Hygiene, 2007). Adolescence is a developmental stage in which psychiatric disorders if present are likely to emerge and a period characterized by experimentation with drug use (Havens & Mellins, 2008). Psychiatric illness and substance abuse have been linked to health risk behaviors including unsafe sex and non-adherence to medications. The emergence of psychiatric illness, drug use and sexual risk behavior can be detrimental to the health and well-being of HIV+ youths and may place others at risk for secondary HIV-transmission, creating a significant public health challenge.

US clinical reports indicate substantive mental health problems in perinatally HIV-infected adolescents (Gaughan, et al., 2004; Havens & Mellins, 2008). However, there are few published studies examining psychiatric disorders, including substance abuse in this population and even fewer that define disorders in accordance with the American Psychiatric Association's Diagnostic and Statistical Manual (DSM) of Mental Disorders system (American Psychiatric Association, 1994). A recent review of the literature revealed only eight studies that looked at DSM psychiatric disorders in HIV+ children and adolescents (Scharko, 2006). It is difficult to draw conclusions given that across studies sample sizes were small, assessment methods varied, youth ages ranged from 4-21 years, studies did not always distinguish mode of infection (perinatal vs. behaviorally acquired), and control groups were not always included.

The role of pediatric HIV in influencing mental health and substance abuse is difficult to determine given the confluence of biomedical, genetic, and environmental factors that place this population at risk. The majority of perinatally infected adolescents experienced years of less than optimal ART that may have resulted in poorly controlled HIV. HIV directly impacts the central nervous system (CNS), affecting neurocognitive function and mood regulation (Brouwers, Belman & Epstein, 1991; Castellon et al., 2006). Given the epidemiology of HIV in US women, the majority of perinatally HIV-infected and HIV-exposed youths live in the inner-city, confronted by stress, poverty, trauma and disrupted family attachments, all of which have been associated with poor behavioral outcomes in other populations (Havens & Mellins, 2008). They are also at risk for mental health and substance use problems for genetic and environmental reasons given the high prevalence of substance abuse and psychiatric disorders in the birth mothers of HIV+ youth, particularly this older cohort (Havens & Mellins, 2008).

In summary, there are many risk factors for mental health problems in perinatally-infected youths. Few studies target this population and use appropriate methods to examine the association of HIV with behavioral outcomes. Understanding the types of mental health and substance abuse disorders, as well as the potential role of HIV disease and other familial factors is a critical step for developing preventive interventions for the growing population

of perinatally-infected adolescents. Using baseline data from Project CASAH (Child and Adolescent Self-Awareness and Health), one of the largest US based studies of psychosocial determinants of behavior in a sample composed of both perinatally HIV-infected (HIV+) and perinatally HIV-exposed, but uninfected (seroreverters; HIV-) youths with similar age and demographic characteristics, this study examines: 1) rates and types of psychiatric and substance abuse disorders in HIV+ 9-16 year old youths; and 2) the association between HIV infection and these mental health outcomes by comparing HIV+ youths to seroreverters. Seroreverters are an ideal comparison group because, with the exception of child HIV status, sociodemographic and family characteristics, including perinatal exposure to HIV are for the most part very similar, providing an opportunity to explore the unique contribution of HIV infection to mental health outcomes.

METHODS

Participants and Procedures

Participants were recruited from four medical centers in NYC that provide family-focused primary and tertiary care to HIV-affected families. Inclusion criteria were: 1) youth ages 9 to 16 years with perinatal exposure to HIV (as confirmed by medical providers), 2) caregiver and youth cognitive capacity to complete interview, 3) English or Spanish speaking, and 4) caregiver with legal capacity to sign consent for child participation (foster care parents can not provide consent for child participation in research in NYC). Among 443 eligible participants across sites, 11% refused contact with the research team and 6% could not be contacted by the site study coordinators. A total of 367 (83%) dyads were approached; 93% were enrolled. Data were not collected on patients who refused to participate. The final baseline sample included 340 caregiver/youth dyads; 206 HIV+ and 134 HIV- youths.

Two sources of data were collected: caregiver and adolescent interviews and medical chart abstractions. The baseline interview was administered over two sessions within four weeks of each other. Caregivers and children were interviewed separately, but simultaneously. All 340 children and their caregivers completed session 1, and 325 children (196 HIV+, 129 HIV-) and caregivers completed both interview sessions (95% of HIV+ and 96% of HIV- dyads). The primary reasons for failure to complete session 2 in both groups were caregiver death and/or relocation. The psychiatric interview was administered in session 1. All other measures were collected in session 2. Medical chart data were collected on HIV+ youths. Institutional Review Board approval was obtained from all sites. All caregivers provided written informed consent for themselves and youths. Youths provided written assent. Monetary reimbursement for time and transportation was provided.

Assessment

Child psychiatric disorder was assessed using The Diagnostic Interview Schedule for Children (DISC-IV; generic parent and child versions; Shaffer et al., 1996), one of the most extensively used and well-validated comprehensive, structured diagnostic instruments to assess the most common diagnoses defined by the American Psychiatric Association's DSM system (American Psychiatric Association, 1994). It can be used by trained lay-interviewers. We focused on the most common DSM-IV child/adolescent diagnoses including anxiety, mood, disruptive behavior, and substance abuse disorders (Hudziak, Copeland, Stanger, & Wadsworth, 2004; Lewinsohn, Shankman, Gau, & Klein, 2004). Caregivers and children were interviewed about the child's experience of symptoms (presence or absence) in the past year. Previous work (Achenbach, McConaughy, & Howel, 1987; Bird et al., 1998; Piacentini, Cohen & Cohen, 1992) has indicated consistent discrepancies between child and caregiver reports, with both showing partial validity. When both are considered, more valid

outcomes are created and thus, based on the recommendations of the above investigators, criterion for a disorder was considered met if indicated by either the caregiver or child.

Demographics included child and caregiver age, gender, ethnicity, and HIV status; caregiver work, education, relationship to child (e.g. biological vs adoptive parent, relative); and household composition and income. We also collected data on any deaths of primary caregivers (available for 297 youths).

History of mental health treatment—Caregivers reported on child's history of mental health treatment, including medications and hospitalizations.

Health variables for HIV+ youths—CD4+ cell count (cells/mm^3) and HIV RNA viral load (copies/ml) values from the date closest to the interview were obtained from medical records. Based on variation in assay methodology all VL ≥ 100,000 copies/ml were coded as 100,000 copies/ml and all values ≤ 400 copies/ml were coded as undetectable. Chart data were available for 205 HIV+ youths.

Statistical Analysis

Descriptive statistics were generated for all study variables. To ensure group comparability on demographic variables, HIV+ and HIV- adolescents were compared using t-test and chi-square tests for continuous and categorical variables, respectively. In order to reduce the number of outcome variables in statistical analyses, summary dichotomized variables were created based on the presence or absence of any a) non-substance abuse psychiatric disorder (herein referred to as any psychiatric disorder), b) mood disorder, c) anxiety disorder, d) behavioral disorder, and e) substance abuse disorder based on either caregiver or youth report. Given the high rates of attention deficit hyperactivity disorder (ADHD) reported in several studies of HIV+ youths (Scharko, 2006), we examined predictors of that specific behavioral disorder. In primary analyses, logistic regression was used to examine the association between youth HIV status and the types of disorders, as well as the relationship between mental health outcomes and key demographic, HIV health and mental health treatment indicators; the odds ratios, p-values, and 95% confidence intervals are reported for all significant results, with p-values less than .05 considered statistically significant.

RESULTS

Demographics and Health

Data on demographic characteristics of the HIV+ and HIV- groups, and for the total sample, as well as statistics on group differences are presented in Table 1. HIV+ and HIV- youths were comparable for all demographic variables, with the exception of three variables. Significantly fewer HIV+ youths were living with a biological parent, primarily a mother, and thus, an HIV+ caregiver. Given the study requirement that all children were born to an HIV+ mother, 100% of biological mothers are HIV+ by study definition, and thus, there is a high correlation between caregiver type and caregiver HIV status (p=.873, p < .001). Families of HIV+ youths reported a slightly higher average annual income ($25,000-30,000) than families of HIV- youths ($20,000-25,000) to support an average of 4 people.

Corresponding with the finding that more HIV+ youths were living with a non-biological parent, more HIV+ youths lost their primary caregiver, (e.g. biological or adoptive parent who raised them from birth or early childhood) (53% vs 24%; $\chi^2 = 9.84$, p = .001, n=297). Among the HIV+ youths, the majority had been told their diagnosis (70%) and were currently receiving ART (n=194; 84%). The mean CD4+ cell count was 605 cells/mm^3 (median 577 cells/mm^3, Sd=318); 10% had CD4+ < 200 cells/mm^3. The median HIV RNA

viral load was 3200 copies/ml (Sd=26,383 copies/ml); 35% had undetectable viral loads (≤ 400 copies/ml) and 5% had viral load values ≥ 100,000 copies/ml.

Mental Health Treatment History

HIV+ youths were significantly more likely to have ever seen a therapist for "feelings or behavior" (53% vs 36%;χ^2= 7.50, p < .01, n=325), but both groups were equally likely to have ever received psychopharmacologic treatment (37% of HIV+ vs 43% of HIV-, χ^2=.23, p=ns, n=150), and to have had a psychiatric hospitalization (4.1% vs 2.3%, χ^2=.30, p= ns, n=325).

HIV Status and Psychiatric Disorders

According to caregiver or youth report, a high percentage of HIV+ and HIV- youths met criteria for any psychiatric disorder, with significantly higher rates among the HIV+ youths (Table 2). The most prevalent psychiatric diagnoses in both groups were anxiety disorders, including social and specific phobias, separation anxiety, agoraphobia, generalized anxiety, panic, and obsessive-compulsive disorders. The least prevalent disorders were mood disorders (including both depression and bipolar disorders), reported by 7.3% HIV+ and 5.2% HIV- of youths. Approximately 25% of youths had a behavioral disorder (ADHD, conduct disorders, and oppositional defiant disorders), with ADHD being most prevalent. Among the specific categories of psychiatric disorders, significant group differences were found only for ADHD; HIV+ youths were over 2 times more likely to meet criteria for ADHD (OR=2.45; CI=1.20, 4.99, p = .01). Only 4% of youths met criteria for a substance use disorder (marijuana or alcohol), with no significant group differences.

Among the youth who met criteria for any psychiatric disorder, 33% met criteria for two or more disorders, with no differences between HIV+ and HIV- youth in rates of co-morbid disorders (0 vs 1 vs 2 or more; χ^2 = 4.60, p =.10). The most prevalent co-morbid disorders were a) behavioral and anxiety disorders (11%), b) behavioral, anxiety and mood disorders (2.6%), and c) mood and anxiety disorders (2.1%). Less than 1% of children met criteria for all the other combinations. Among the 12 youth who had a substance use disorder, 10 also met criteria for a non-substance use psychiatric disorder.

The association between caregiver and youth reports on the DISC was poor (Table 2). These findings are consistent with previous studies of youth psychiatric disorders and support the recommendation that both caregiver and youth reports be considered in assessing mental health (Bird et al., 1988;Piacentini et al., 1992).

Demographic Characteristics and Mental Health Outcomes

With the exception of behavioral disorders, none of the demographic variables were associated with the DISC outcome variables. Older youths (13-16 years) were more likely than younger youths (9-12) to have a behavioral disorder (OR=2.01; CI=1.12,3.31; p=.01). Youths were less likely to have a diagnosis of ADHD if they were living with biological parents (OR=.51; CI=.27,.95; p=.04), HIV+ caregivers (OR=.38; CI=.19,.75; p<.01), or caregivers with less education (OR=1.15; CI=1.04,1.27; p=.01).

In exploratory analyses, if any demographic characteristic was associated with child HIV status, we included these as covariates in any regression equations that previously indicated an association between HIV and mental health (i.e., any psychiatric disorder and ADHD). There were only three demographic variables that were associated with child HIV status: caregiver HIV-status, caregiver type, and household income. We considered the effect of each in separate regression equations because of multicollinearity (as described above). After accounting for the demographic covariate, the adjusted odds ratio for child HIV status

on any psychiatric disorder did not change substantively, although the statistical significance became marginal in two cases, most likely due to reduced power (Table 4). When we sought to examine the association between child HIV status and ADHD, controlling for a demographic covariate, we were unable to reliably test this association as only 48 children met criteria for ADHD (37 HIV+ and 11 HIV-) (data not shown).

Health, Mental Health Treatment, and Mental Health Outcomes

None of the HIV specific variables (disclosure, CD4 cell count, viral load, ART use) were associated with mental health outcomes among the HIV+ youths. History of ever seeing a mental health provider was associated with presence of any psychiatric disorder (OR=2.27; CI=1.45,3.56; p<.001), a behavioral disorder (OR=4.17; CI=2.41,7.21; p<.001), and ADHD (OR= 6.04; CI=2.81,13.00; p<.001). History of a psychiatric hospitalization was associated with presence of a mood disorder (OR=15.52; CI=4.28,56.33; p<.001), a behavioral disorder (OR=5.68; CI=1.62,19.93; p=.01), and ADHD (OR=3.70; CI=1.04,13.19; p=.04). The significant association of mental health treatment variables and mental health outcomes suggests, in part, that we are correctly identifying youths with psychiatric problems using the DISC.

DISCUSSION

Perinatally-infected youths are now entering adolescence in large numbers in countries with longstanding access to ART. This study is one of the first to examine DSM-based psychiatric and substance abuse disorders in perinatally HIV-infected adolescents and to examine the association of HIV with these mental health outcomes by comparing a large sample of perinatally HIV-infected adolescents (HIV+) to a comparison group of HIV-exposed, uninfected adolescents (HIV-) with very similar sociodemographic characteristics.

Both groups of perinatally HIV-exposed youths in our sample, recruited from NYC-based HIV care programs, had high rates of any psychiatric disorder, with higher rates among the HIV+ youths. Although, longitudinal studies are necessary to determine the causal priority of study variables, these data are among the first to suggest an association between perinatal HIV infection and youth psychiatric outcomes, consistent with some studies of HIV+ adults (Remien & Mellins, 2007). The rates of disorder in the HIV+ youths are higher than studies of inner-city youths and youths with other chronic health conditions (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Kovacs, Goldston, Obrosky, & Bonar, 1997) and similar to studies of adolescents in psychiatric care (Donenberg, Bryant, Emerson, Wilson, & Pasch, 2003) or of juvenile detainees (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002).

HIV+ and HIV- youths were similar in rates of mood, anxiety, and overall behavioral disorders. However, the HIV+ youth had higher rates of ADHD. This finding is different from several studies of younger children that failed to find an association between HIV status and ADHD (Havens, Whitaker, Feldman, & Ehrhardt, 1994; Mellins et al., 2003). ADHD is a neurodevelopmental disorder characterized by impulsivity, distractibility, and hyperactivity. ADHD's etiology has been attributed to several factors including genetics, biologic adversity (lead contamination, prenatal cigarette and alcohol exposure and low birth weight), psychosocial adversity, and neurobiology (Spencer, Biederman, & Mick, 2007; Swanson et al., 2007). In the current study, other factors associated with higher reported rates of ADHD included three caregiver variables (higher education, negative HIV status, and non-biological parent). Because of the sample size and multicolinearity among many of the caregiver demographics with each other and with child HIV status much larger longitudinal studies are needed to disentangle the effects of these variables. By definition, all birth mothers of the children in this study were HIV+, therefore caregiver HIV status and type of caregiver are confounded. Also, because the odds of perinatal transmission of HIV

increase with advanced maternal illness (i.e., higher viral load), the HIV+ youths were more likely to have had sicker mothers who may have died more quickly with the limited treatment options available when many of these children were born (Garcia et al., 1999). Hence, they are more likely to have lost a parent to HIV and to be living with a non-infected, non-biological parent. We do not have data on the birth mother's health status to establish these causal links in this study. Therefore, the current study can not determine the causality of ADHD. It is likely that multiple factors were involved, including variables such as the influences of progressive HIV disease and poorly controlled viral replication, the CNS effects of ART, or other unknown environmental or psychosocial effects on behavior, including the stress of having a stigmatized, chronic, and potentially fatal illness. There may also be biomedical and psychosocial characteristics of HIV+ mothers who transmitted the virus to their babies that may influence long term child mental health.

Regardless of reasons for the HIV status group differences, the ramifications of poor mental health are serious for all youths, particularly for youths with a sexually transmittable health condition. Studies have linked mental health problems and substance use to sexual risk behavior during adolescence (Donenberg, Emerson, Bryant, Wilson, & Wever-Shifrin, 2001; Teplin et al., 2005; Stiffman, Dore, Earls, & Cunningham, 1992). Psychiatric disorders are likely to interfere with the ability of HIV+ youths to make decisions in situations of sexual possibility or substance use (Brown, Danovsky, Lourie, DiClemente, & Ponton, 1997), or to evaluate the consequences of non-adherence to ART. Although evidenced-based interventions to reduce mental health problems and health risk behavior have targeted HIV+ adults (Remien & Mellins, 2007), few have targeted perinatally-infected youths. Our data suggest that such interventions are urgently needed to promote the well-being of the infected youths, but also to prevent a significant public health challenge, namely the transmission of HIV, including treatment resistant HIV to uninfected youths.

Relatively low rates of substance use disorders were reported in this study, limiting our ability to examine group differences. Given that the mean age of the youths was 12 years, these low rates are not surprising. Following these youth into older adolescence will be critical for understanding their risk for substance use, negative peer influences, and substance use-related sexual risk behavior. Previous studies of uninfected youths have demonstrated high rates of substance abuse in youths with psychiatric disorders (Donenberg & Pao, 2005), which in turn may exacerbate HIV transmission risk behaviors (Brown et al., 1997; Donenberg et al., 2001).

Although HIV+ youths had significantly higher overall rates of psychiatric disorders, 49% of the HIV- youths also presented with a disorder. This rate is similar to previous studies with vulnerable youths (Costello et al., 2003; Kovacs et al., 1997). Unfortunately, HIV-exposed but uninfected youths are often difficult to identify. They are typically not followed in HIV care clinics, unless they are part of a limited number of descriptive and clinical trial studies. The adult clinics that treat HIV+ parents don't usually identify the mental health needs of their patients' children. There is no sign that the numbers of uninfected, but HIV-affected children are diminishing, as HIV disease in women continues to grow. Our data suggest that this population is at high risk for poor outcomes, given the association between psychiatric disorders and risky sexual behavior that can in turn lead to STDs, pregnancy, and behaviorally acquired HIV disease (Brown et al., 1997; Donenberg et al., 2001; Donenberg & Pao, 2005).

There are several other limitations to this study. Although, we were able to interview 77% of participants who met criteria for our study in the recruitment clinics, this sample of convenience may not reflect the larger population of perinatally HIV-infected and HIV-exposed adolescents, particularly those outside NYC and not followed in HIV care clinics.

Although we attempted to recruit both groups from similar communities based on the demographics of pediatric HIV disease, other factors (e.g., differential rates of study refusal or access to services) may have altered the group effects. Due to issues of privacy and confidentiality no data were collected on participants who refused participation. Furthermore, we did not match groups on key study variables (e.g., age, gender). However, with the exception of only a few caregiver demographics, key study demographic characteristics (e.g., child age, gender, ethnicity) were very similar in both groups. Also, when we accounted for the few caregiver demographics, the relationship between child HIV-status and any psychiatric disorder did not change substantively. There are other caregiver variables which we did not study which may be important to understand. For example, this study did not have corresponding measures of caregiver psychiatric disorder or birth mother health during pregnancy. Finally, there is significant literature indicating that parental death is one of the strongest predictors of child mental health problems (Rutter, 1966; Havens & Mellins, 2008). In this study, we were unable to tease apart the influences of parental death from caregiver HIV status and child HIV status. Larger, longitudinal studies are needed to have the power to sufficiently examine the contribution of each of these familial variables to child mental health.

Other limitations include biases related to self-report instruments. Although the DISC is one of the most widely used measures of mental health, it is possible that participants may withhold information or not recognize or over-report symptoms. The poor correspondence between caregiver and youth report is similar to that found in previous studies and is an important rational for including multiple sources of data in assessing youth psychiatric disorders (Bird et al., 1988; Piacentini et al., 1992).

In spite of the limitations there are a number of clinical ramifications of our study. As children with HIV age into adolescence they are increasingly confronted with complications associated with their illness and its treatment. Providers have typically focused on physical health complications such as lipodystrophy and hyperlipidemia (Ene et al., 2007). Our data suggest that these youths are also at risk for mental health disorders, another long term complication. While the etiology of these mental health disorders is likely multifactorial, the implications are important to consider. Many pediatric HIV programs in the US already include mental health professionals. Unfortunately, these youths are less likely to find such co-located services as they transition to adult medical care. In addition, many of these youths are already receiving pharmacologic interventions for their mental health disorders further increasing the daily pill burden and the challenges they already face around adherence to ART. Drug-drug interactions between psychotropic medications and antiretroviral therapies will need to be studied to assure that neither treatment is compromised by the other. Finally, there is a critical need to consider the implications of this work on the existing antiretroviral treatment paradigm. It will be important to fully understand the etiology of these mental health disorders and consider their importance alongside traditional outcomes such as AIDS, opportunistic infections, and death as we continue to evaluate ART strategies and methods to optimize care for children and youths with HIV infection.

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Table 1

Comparisons of demographic characteristics of perinatally HIV-infected (HIV+) and perinatally HIV-exposed, but uninfected (HIV-) youth (N=340)

Variables[1]	**Total**	**HIV+**	**HIV-**	**Statistic**[2]
	N (%)[1]	**N (%)**	**N (%)**	**Chi Square**
Adolescent Gender = Female	174 (51)	105 (51)	69 (52)	.001
Adolescent race/ethnicity African-American Latino	185 (54) 105 (31)	119 (58) 62 (30)	66 (49) 43 (32)	3.53
Caregiver Gender = Female	297 (87)	178 (86)	119 (89)	.23
HIV+ Caregiver	157 (46)	65 (32)	92 (69)	43.49**
Caregiver is biological parent	169 (50)	75 (36)	94 (70)	35.64**
Caregiver lives with a partner (N=324)	134 (41)	82 (42)	52 (40)	.04
Caregiver is employed (N=325)	86 (27)	59 (30)	27 (21)	2.91
		Mean (SD)	Mean (SD)	t
Child age (years)	12.2 (2.3)	12.3 (2.2)	11.9 (2.4)	-1.40
Caregiver education (N=323)	11.6 (3.2)	11.7 (3.3)	11.5 (2.9)	-.66
Household income[3] (N=309)	5.5 (2.8)	5.8 (2.9)	5.0 (2.5)	-2.52*
Household size (N=324)	4.5 (1.8)	4.4 (1.8)	4.6 (1.8)	.90

based on chi-square tests for dichotomous variables and t-tests for continuous variables comparing HIV+ and HIV-.

[1] N=340 unless otherwise indicated

[2] Chi-Square Statistics used continuity correction for 1 df tests.

[3] Income assessed using a categorical variable for which 5=$20-25,000; 6=$25-30,000.

* p < .05;

** p < .001;

Table 2

Frequency of psychiatric disorder for the total sample (n=340) and separately by youth and caregiver report

	Caregiver Only	Youth Only	Both Caregiver and Youth	Total	Kappa*
Any psychiatric disorder	83	58	50	191	.09
Anxiety disorder	61	61	34	156	.11
Mood disorder	12	10	0	22	-.03
Behavioral disorder	61	19	5	85	.01
ADHD	44	3	1	48	.02
Substance Abuse	2	8	2	12	.27

*Kappa is a statistical measure of intra-rater agreement (with <0.40 meaning poor agreement, 0.41 to 0.75 meaning fair to good agreement, 0.75 to 1.00 meaning excellent agreement) beyond chance.

Table 3

Rates of categories of psychiatric disorder by caregiver or youth report by HIV status

	Total N=340	**HIV+ N=206**	**HIV- N=134**	**OR**	**95% CI**
	N (%)	**N (%)**	**N (%)**		
Any psychiatric disorder	191 (56.2)	125 (60.7)	66 (49.3)	1.59*	1.03, 2.47
Anxiety disorder	156 (45.9)	101 (49.0)	55 (41.0)	1.38	0.89, 2.14
Mood disorder	22 (6.5)	15 (7.3)	7 (5.2)	1.43	0.57, 3.59
Behavioral disorder	85 (25.0)	53 (25.7)	32 (23.9)	1.10	0.67, 1.83
ADHD	48 (14.1)	37 (18.0)	11 (8.2)	2.45*	1.20, 4.99
Substance Abuse	12 (3.5)	4 (1.9)	8 (6.0)	0.31	0.09, 1.06

* < .05, based on logistic regression

Table 4

Relationship between child HIV status and Any Psychiatric Disorder, adjusting for caregiver demographic characteristics associated with child HIV status*

Variable	Odds Ratio	95% CI	p-value
Child HIV status only	1.59	1.03, 2.47	.04
Child HIV status* caregiver status	1.50 0.86	0.94, 2.41 0.54, 1.36	.09 .51
Child HIV status caregiver type	1.57 0.96	0.98, 2.49 0.61, 1.51	.06 .85
Child HIV status Caregiver income	1.61 0.95	1.01, 2.57 0.88, 1.04	.05 .26

* Relationship between any psychiatric disorder and child HIV status was examined using logistic regression model; each row in this table represented the results from an analysis considering any psychiatric disorder as the outcome and variable listed in column one as the covariate(s). For example, in the first row, child HIV status is the only covariate in model whereas child HIV status and caregiver's HIV status are both entered in the second model.