Mental Health in Youth Infected with and Affected by HIV: The Role of Caregiver HIV

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Objective To examine the association of youth and caregiver HIV status, and other contextual and social regulation factors with youth mental health. **Method** Data were from two longitudinal studies of urban youth perinatally infected, affected, and unaffected by HIV ($N = 545$; 36% PHIV$^+$ youth; 45.7% HIV$^+$ caregivers). Youth mental health was measured using the Child Behavior Checklist, the Child Depression Inventory, and the State–Trait Anxiety Inventory for Children. **Results** HIV$^+$ youth reported elevated scores on the CDI compared with HIV$^-$ youth. HIV$^+$ caregivers reported fewer symptoms and were less likely to report scores in the clinical range for their children on the CBCL compared with HIV$^-$ caregivers. Caregiver mental health and parent–child communication and involvement were also associated with youth mental health. **Conclusions** Youth who resided with HIV$^+$ caregivers had better mental health. Future research needs to further explore the role of caregiver HIV infection in youth mental health. Understanding and building upon strengths of HIV-affected families may be an effective focus of interventions for this population.

Key words at-risk youth; HIV/AIDS; mental health.

Introduction

In the United States and other countries with access to antiretroviral therapy (ART), children who are perinatally infected with HIV (PHIV$^+$) are now surviving into adolescence and young adulthood (Abrams, 2004; New York City Department Health and Mental Hygiene, 2007). Clinical reports (Havens & Mellins, 2008; Ng, Mellins, & Ryan, 2004) and a few research studies suggest PHIV$^+$ youth may be at greater risk for psychiatric disorders (Mellins et al., 2009) or poor mental health compared with their uninfected peers (Gaughan et al., 2004). However, findings have been inconsistent across studies. Some researchers have found evidence of increased psychiatric disorders or mental health problems among PHIV$^+$ youth (Bose, Moss, Brouwers, Pizzo, & Lorion, 1994; Esposito et al., 1999; Gaughan et al., 2004; Mellins et al., 2009; Nozyce et al., 2006), whereas others have found no difference in youth mental health compared with uninfected or unaffected youth (Bachanas et al., 2001; Chernoff et al., 2009; Franklin, Lim, & Havens, 2007; Gadow et al., 2010).

A possible explanation for the inconsistency of this finding across studies is that the epidemiology of pediatric HIV places PHIV$^+$ adolescents at risk for mental health problems for multiple reasons. The majority experienced

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years of less advanced ART early in their development that may have resulted in neurocognitive deficits and poorly controlled HIV; HIV directly impacts central nervous system function and parts of the brain involved in mood regulation (Brouwers, Belman, & Epstein, 1991; Castellon et al., 2006). Also, by definition, all PHIV$^+$ youth were born to an HIV$^+$ mother. Maternal HIV infection has been associated with youth mental health problems (Esposito et al., 1999; Reyland, McMahon, Higgins-Delessandro, & Luthar, 2002), potentially due to the stress of living with a parent's life-threatening illness, increased understanding of the threat to their own life, or separation from parents due to parental illness or death. Furthermore, high rates of mental health problems and substance abuse have been found in HIV$^+$ women, including mothers (Leonard, Gwadza, Clelanda, Vekariab, & Fernsc, 2008; Mellins et al., 2008). Thus, their children may also be at risk for mental health problems due to genetic and environmental reasons (Havens & Mellins, 2008).

In addition, there are other contextual factors that must also be considered. The majority of HIV$^+$ youth live in large, urban environments and are typically confronted by life stress, family disruption, poverty, and trauma, all of which have been associated with poor behavioral outcomes in youth (Bauman, Camacho, Silver, Hudis, & Draimin, 2002; Havens & Mellins, 2008; Lester et al., 2006; Nostlinger, Bartoli, Gordillo, Roberfroid, & Colebunders, 2006). In particular, the role of family is central in promoting positive adolescent development in youth with chronic illness (Barakat, 2008; Wallander & Varni, 1998), including HIV. Quality of caregiver–child relationship and caregiver monitoring and support have been significantly associated with improved mental health outcomes in youth infected and affected by HIV (Dutra et al., 2000; Forehand et al., 2002; Mellins et al., 2008).

Unfortunately, studies of PHIV$^+$ youth have failed to account for the range of factors that may increase the likelihood of poor mental health in this population, making casual priority difficult to determine. Many studies of PHIV$^+$ youth compare mental health outcomes with the standardized norms associated with mental health measures (Bose et al., 1994; Franklin et al., 2007; Gosling, Burns, & Hirst, 2004; Mialky, Vagnoni, & Rutstein, 2001; Nozyce et al., 2006). However, simply comparing mental health outcomes to published normative data is insufficient because of sample differences on key sociodemographic variables. Comparative studies using appropriate control groups are necessary to determine whether elevated mental health problems are due to youth or maternal HIV infection, or to other sociodemographic factors. A few studies of PHIV$^+$ youth have included comparison groups of HIV$^-$ youth born to HIV$^+$ mothers from similar backgrounds, yet these studies have struggled to distinguish the effects of youth HIV infection from caregiver HIV infection since, by definition, all of the participants were born to HIV$^+$ mothers (Mellins et al., 2003, 2009). Moreover, the relatively small sample sizes in most studies preclude the more complex analyses that would identify factors contributing to mental health outcomes (e.g., Bose et al., 1994; Esposito et al., 1999).

Understanding the effects of youth HIV infection versus the effects of having an HIV$^+$ caregiver or other important and related contextual factors is an important first step in disentangling the factors associated with mental health in youth infected and affected with HIV. These data can inform the development of targeted mental health interventions. Given the link between mental health and increased HIV risk behavior in youth (Donenberg & Pao, 2005), understanding mental health outcomes can also inform HIV-prevention interventions for these youth, an important public health priority. We had the unique opportunity to examine the role of youth and caregiver HIV status in addition to other key contextual factors on youth mental health outcomes by combining baseline data from two large, longitudinal behavioral studies: (1) a study of perinatally HIV-exposed youth (both infected and uninfected); and (2) a study of HIV$^-$ youth with and without HIV$^+$ caregivers. The resulting sample comprised both PHIV$^+$ and HIV$^-$ youth with either HIV$^+$ or HIV$^-$ caregivers, all of whom were recruited from similar neighborhoods in New York City (NYC).

As with the parent studies (Mellins et al., 2008, 2009), the current study is guided by a theoretical model of behavioral health, Social Action Theory (SAT; Ewart, 1991). The SAT model posts that behavioral health outcomes are influenced by (1) the context in which behavior occurs including both internal context (e.g., biological state) and external context (e.g., environment), and (2) social- and self-regulation processes that include both youth motivation and capabilities and the social interactions that influence self-regulation processes such as those within the family. The objectives of this secondary data analysis were to examine the role of the internal context (youth age, ethnicity, gender, and youth HIV status), the external context (income, caregiver employment, residing with a biological caregiver, caregiver HIV status, caregiver mental health, etc.), and the social regulation processes (e.g., parent–child relationship factors) on youth mental health outcomes. Youth mental health is defined as psychological functioning based on parent and youth self-report of symptoms of youth's emotional and behavior problems assessed with well-established checklists used in prior studies of youth infected and affected by HIV (Bose et al., 1994; Bauman et al., 2002; Bauman, Silver, Draimin, & Hudis, 2007; Forehand et al., 2002; Franklin et al., 2007; Leonard et al., 2008). We hypothesized that (1) youth and caregiver HIV infection will both be associated with poor youth mental health; (2) PHIV$^+$ youth with HIV$^+$ caregivers will have the poorest mental health compared with other youth; and (3) youth mental health will be associated with other contextual and social regulation factors, aside from youth or caregiver HIV infection.

Methods

Sample and Procedures

Data are drawn from the baseline assessments of two longitudinal research projects, Risk and Resilience in Youth with HIV$^+$ Mothers (R&R; Mellins et al., 2008) and Child and Adolescent Self-Awareness and Health Project (CASAH; Mellins et al., 2009). The goal of R&R was to define determinants of resilience and, conversely, of the onset of mental health and behavioral problems, as well as sexual and drug -use risk behaviors, in HIV$^-$ youth with either HIV$^+$ or HIV$^-$ mothers. CASAH was designed to examine differences in mental health and behavioral health outcomes among youth perinatally infected (PHIV$^+$) and youth perinatally exposed but uninfected with HIV (i.e., seroreverters; PHIV$^-$).

Both study samples were drawn from medical centers based in the same inner-city environments in NYC and included English- and Spanish-speaking families. In both studies, caregivers and youth were excluded if they demonstrated severe cognitive impairment (e.g., autism and other pervasive developmental disorders) that precluded understanding study questions, as determined by provider report. Data were not collected on patients who refused to participate in CASAH or R&R, given issues related to confidentiality and HIV. For both R&R and CASAH, all measures were administered by trained interviewers, of whom most were bilingual and of similar ethnicity as the participants. For both studies, Institutional Review Board approval was obtained from all study sites. All caregivers provided written informed consent for themselves and their youth; youth provided assent. Monetary reimbursement for time and travel was provided. (See Mellins et al., 2008, 2009 for more extensive details.)

Risk and Resilience Participants and Procedures

Research participants included HIV$^-$ early adolescents and their birth mothers from two groups (1) mothers who were HIV$^+$ and (2) mothers who were uninfected or who had not been tested. Families (mother–child dyads) were eligible if the youth was between 10 and 14 years of age, the mother was the birth parent of the youth, and the mother and youth had lived together for at least the past 6 months. All families were recruited between 1998 and 2000 from sites located in inner-city neighborhoods with high HIV seroprevalence, including general pediatric and HIV primary care clinics at medical centers, and a network of HIV care providers. Recruitment procedures included posting fliers and approaching potential participants in clinic waiting rooms to describe the study and assess eligibility and interest for HIV$^-$ caregivers. For HIV$^+$ caregivers, to preserve confidentiality of HIV status, primary care providers in HIV clinics approached the potential participants to assess eligibility and interest in the project before referring them to the research team. Of the 294 eligible families approached for the study, 14% refused to participate primarily due to time constraints, and 11% frequently cancelled or failed to show up for interviews. The remaining 220 (75%) families completed the baseline interview; data from all 220 youth–caregiver dyads ($N = 100$ HIV$^+$ mothers/HIV$^-$ youth and $N = 120$ HIV$^-$ mothers/HIV$^-$ youth) are included in the current analyses. Caregiver and adolescent interviews were conducted separately, but simultaneously when possible.

CASAH Participants and Procedures

Research participants were youth aged 9–16 years perinatally exposed to HIV (as confirmed by medical providers) who had a caregiver with legal capacity to sign consent for the child participation (foster-care parents cannot provide consent for child participation in behavioral research in NYC). Participants were recruited, between 2003 and 2005, from four medical centers in NYC that provide family-focused primary and tertiary care to HIV-affected families. Primary care providers approached the potential participants to assess eligibility and interest in the project before referring them to the research team. 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%) caregiver–youth dyads were approached, of whom $N = 340$ were enrolled (77% of eligible families). The baseline interview was administered over two sessions within 4 weeks of each other. Caregivers and children were interviewed separately, but simultaneously with interviews lasting 60–90 min over two sessions. The current analyses focused on the 325 caregiver–youth dyads who completed both baseline interview sessions (73% of eligible families available across sites).

Combining the Two Study Samples

To examine our study goals, we combined both datasets, which allowed us to examine the unique association of youth HIV status ($N = 196$ HIV^+ youth, vs. $N = 349$ HIV^- youth) and caregiver HIV status ($N = 249$ HIV^+ and $N = 296$ HIV^- caregivers), as well as the interaction of these two factors, on youth mental health. Given that these two data sets were established with different goals, before pooling the data, we had to address two factors that differentiated the datasets. First, although all youth in CASAH were born to HIV^+ mothers, not all resided with their birth mothers as a large number of mothers had died or had relinquished primary care of their child. In CASAH, 68 (34.7%) PHIV^+ youth and 90 (69.8%) PHIV^- youth resided with a birth parent, the vast majority a mother. In contrast, 100% of youth in R&R study resided with a birth mother, by study definition. To address this difference, we included whether the youth resided with a birth parent as a contextual variable in our model (see Data Analysis Section). Second, over a third of youth in CASAH ($N = 129$; 39.7%) were perinatally exposed to HIV, but were uninfected. However, in the R&R study, data were not collected on possible perinatal exposure to HIV among HIV^- youth with HIV^+ mothers ($N = 100$; 45.5% of youth in R&R). Thus, as we could not definitively identify perinatal HIV exposure for R&R, we examined the association of youth HIV status to mental health outcomes by comparing those youth who were HIV^+ (i.e., PHIV^+ youth) with all HIV^- youth, irrespective of potential perinatal exposure to HIV.

Table I presents the demographic characteristics for the total sample ($N = 545$). Approximately half of the total sample were male with a mean age of 12.1 years ($SD = 1.9$), and the majority were African American or Hispanic. The majority of caregivers were females and all caregivers were birth mothers in R&R compared with 48.6% in CASAH. Among the HIV^+ youths in CASAH, the majority had been told their diagnosis (70.4%) and were currently receiving ART ($N = 194$; 84%). The median HIV RNA viral load was 3,200 copies/ml ($SD = 26{,}383$ copies/ml); 35% had undetectable viral loads (≤ 400 copies/ml) and 5% had viral load values $\geq 100{,}000$ copies/ml.

Measures

The majority of instruments used had been extensively validated (Achenbach, 1991; Smucker, Craighead, Craighead & Green, 1987; Spielberger, 1973) and used with inner-city, ethnic-minority adolescents (Barreto & McManus, 1997; Bauman et al., 2007; Leonard et al., 2008).

Child Mental Health

Caregivers reported on their child's emotional and behavioral problems using the *Child Behavior Checklist* for ages 4–18 years (CBCL; Achenbach, 1991). Parents rate on a 3-point scale how "true" the items are in describing their child's behavior. Standardized scores, based on age and gender are computed. Adequate psychometric properties have been established for Internalizing behavior problem (e.g., anxiety, withdrawal, depression), Externalizing behavior problem (e.g., aggression, delinquency), and Total behavior problem scales (Achenbach, 1991). We found good reliability for each of these scales: total scale coefficient $\alpha = .93$; internal scale coefficient $\alpha = .89$; external scale coefficient $\alpha = .91$. In order to compare severity of symptoms based on whether youth met clinical criteria, we also generated a dichotomous score based on the clinical cut-off (>63) for the total and each of the two subscales (Achenbach, 1991).

Youth completed two instruments assessing depression and anxiety symptoms, the Child Depression Inventory (CDI; Kovacs, 1992) and the trait scale of the State–Trait Anxiety Inventory for Children (STAIC; Spielberger, 1973), respectively. The CDI is comprised of 27 items rated on a 3-point scale [0 (none) to 2 (distinct symptom)]. Total CDI scores range from 0 to 54 with several recommended clinical cut-off scores (e.g., >13; 13–18; ≥ 19) to indicate elevated depressive symptoms in youth (Kovacs, 1992); we found good internal consistency ($\alpha = .80$). In the current analysis, we used the total CDI scale score as well as generating a dichotomous score based on the recommended clinical cut-off >13 [which corresponds to "slightly above average" (Kovacs, 1992)] for the CDI, as has been done is other studies of youth affected by HIV (Bose et al., 1994; Bauman et al., 2007). The STAIC trait scale is a widely used self-report indicator of trait anxiety, permitting the identification of subjects who are prone to generalized anxiety. The trait scale consists of 20 4-point Likert-format items that assess an individual's tendency to experience anxiety states. Each item is rated on a 3-point scale reflecting the degree to which the child experiences each symptom; adequate reliability and validity have been established (Spielberger, 1973). We found high internal consistency for the trait scale ($\alpha = .88$). The STAIC does not provide clinical cut-offs to denote elevated levels of anxiety.

Contextual Factors

We assessed factors associated with both the internal and external contexts as described below.

Table I. *Demographic Characteristics of the Sample* (N = 545)

Variable	Total (*N* = 545) %	R&R (*N* = 220) %	CASAH (*N* = 325) %	Comparisons by study sample χ^2/t
Internal context				
Male	50.5	50.9	50.2	0.03
Hispanic	41.3	44.1	39.4	1.2
African American	50.6	43.6	55.4	7.2**
Other[a]	8.1	12.3	5.2	8.8**
Age[b]	12.1 (1.9)	12.1 (1.4)	12.1 (2.2)	0.1
HIV$^+$	36.0	n/a	60.3	–[c]
Viral load[d]			3,200 copies/ml	
Disclosed			70.4	
External context				
Caregiver female	92.5	100	87.4	–[c]
Caregiver age[b]	44.2 (11.3)	38.1 (6.0)	48.3 (12.1)	11.6***
Residing with birth parent	69.2	100	48.6	–[c]
HIV$^+$	45.7	45.5	45.8	0.01
Income[b]	4.7 (2.6)	3.5 (1.7)	5.1 (2.7)	9.6***
Currently employed	28.7	32.3	26.5	2.1
Caregiver BDI[b]	8.9 (8.2)	10.0 (9.0)	8.2 (7.5)	2.6**
Caregiver STAI[b]	21.7 (11.6)	30.7 (4.1)	15.6 (11.1)	44.7***
Social regulation				
Caregiver–child communication[b]	3.2 (0.4)	3.2 (0.4)	3.3 (0.4)	1.8
Caregiver involvement[b]	3.2 (0.3)	3.2 (0.4)	3.3 (0.3)	0.9
Youth autonomy[b]	1.7 (0.6)	2.3 (0.4)	1.3 (0.4)	25.8***
Youth mental health				
CBCL total[b]	50.4 (12.2)	53.2 (12.3)	48.5 (11.8)	4.4***
CBCL internalizing[b]	49.0 (11.8)	52.6 (12.0)	46.6 (11.0)	5.9***
CBCL externalizing[b]	51.1 (11.3)	53.1 (11.5)	49.8 (11.0)	3.3**
CDI[b]	6.5 (5.4)	6.5 (5.0)	6.5 (5.7)	1.2
STAI[b]	33.8 (7.4)	34.8 (6.9)	33.1 (7.7)	2.9**
Clinical cut-offs				
CBCL total	14.4	19.7	10.8	8.3**
CBCL internalizing	11.8	18.4	7.4	14.9***
CBCL externalizing	16.1	20.6	13.0	5.6*
CDI	16.7	15.0	17.9	0.8

Note. R&R = Risk & Resilience; CASAH=Child and Adolescent Self-Awareness and Health Project.

[a] Other race/ethnicity comprises white, Caribbean-American, and mixed race/ethnicity.

[b] Mean score (*SD*).

[c] Comparisons not conducted due to lack of variability (i.e., 100%) in R&R sample.

[d] Median score (*SD* = 26,383 copies/ml).

*$p < .05$. **$p < .01$. ***$p < .001$.

Internal context. ‘‘Youth HIV status’’ was determined via youth enrolment in an HIV primary care clinic, verified by clinicians. Youth ‘‘demographics’’ included age, gender, and race/ethnicity.

External context. ‘Caregiver HIV status’ was assessed via several questions about personal HIV tests and the results. These were confirmed, when possible, via clinician report. For data analysis, caregiver’s HIV status was treated as a dichotomous variable (HIV infected vs. uninfected or untested). ‘‘Caregiver Demographics’’ included caregiver age, gender, relationship to the child (birth parent vs. non-birth parent), current employment, and household income. ‘‘Caregiver mental health’’ was assessed with two well-validated self-report measures that correspond with child measures, the Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1998) and the trait scale of the State-Trait Anxiety Inventory (STAI; Spielberger, 1987) corresponding with the youth measures. The BDI is a 21-item scale of depressive symptoms experienced in the past 2 weeks. The trait scale of the STAI is a 20-item scale measuring how the respondent feels in general. For each measure, a total score was created. We found high internal consistency for the STAI trait scale ($\alpha = .92$) and the BDI ($\alpha = .89$).

Social Regulation Factors

"Family Functioning" was assessed with the Parent Child Relationship Inventory (PCRI; Gerard, 1994), a self-report instrument for caregivers acting in a parental role. Three subscales were used: (1) involvement (i.e., spending time with and showing interest in the child), (2) quality of communication (i.e., parent empathy and conversation across situations), and (3) autonomy (i.e., the extent to which the caregiver promotes the child's independence). Each item is rated on a 4-point scale (0 = Strongly Agree to 3 = Strongly Disagree). Higher scores on involvement, communication, and autonomy scales indicate more caregiver involvement, good communication, and youth autonomy. We found good internal consistency for the involvement ($\alpha = .80$), communication ($\alpha = .81$), and autonomy ($\alpha = .66$) scales.

Statistical Analysis

All analyses were conducted in Stata 8.0SE. To test equivalency between samples (R&R and CASAH), differences in demographic/contextual and clinical characteristics were examined using chi-square (χ^2) and *t*-tests for categorical or continuous variables, respectively (Table I). Second, after pooling the sample, we examined the association between youth mental health and youth HIV status, caregiver HIV status, and other key contextual factors using multiple linear and logistic regressions for continuous (i.e., scale scores) and dichotomous variables (i.e., clinical cut-offs), respectively. In each model, we entered the data in a stepwise fashion (i.e., three blocks) to correspond with the three domains of the SAT model: (1) internal context, (2) external context, and (3) social regulation factors. All predictors were retained at each step.

To determine the multiplicative effect of caregiver status and youth HIV status on youth mental health outcomes, we examined the interaction term of child HIV status by caregiver HIV status as a fourth step. We found no significant interactions between caregiver and youth HIV status for any of the mental health outcomes and so we did not include them in the tables. We also conducted sensitivity analyses (not shown) removing predictor variables that were not significant at $p < .10$ from each step and found that the final models contained the same significant predictors as our final models presented in the tables.

The natural logarithmic transformation was used to normalize CBCL internalizing and externalizing problem behavior subscales as well as the CDI and STAIC scales for the linear regression models. Note that we increased the CDI scale score (raw range 0–30) by a constant of one unit before the log-transformation as such shift in scales avoids a possible undefined value [i.e., log(0)] after transformation. We present non-transformed means in the text and Table I, but all test statistics reflect analysis conducted on transformed mean scores.

Results

Contextual and Social Regulation Factors and Youth Mental Health Outcomes

Table I presents significant differences across the two studies (R&R and CASAH) in relevant SAT constructs and the primary mental health outcome.

Contextual Factors

The CASAH sample contained significantly more African American youth, $\chi^2(1, N = 545) = 7.2$, $p < .01$, and families reporting significantly higher income ($t = 9.6$, $p < .001$), although the majority of both groups were significantly impoverished. R&R had more youth of "other" race/ethnicity $\chi^2(1, N = 545) = 8.8$, $p < .001$. Caregivers in R&R compared with caregivers in CASAH were younger ($t = 11.6$, $p < .001$), and reported higher means scores on the BDI ($t = 2.6$, $p < .01$) and the STAI ($t = 44.7$, $p < .001$).

Social Regulation Factors

Caregivers of youth in R&R reported significantly more autonomy in the parent–child relationship than did caregivers in CASAH ($t = 25.8$, $p < .001$)

Youth Mental Health

Overall, youth had mean parent-reported CBCL scores that were within normal range (<63) on the internalizing ($M = 49.0$, $SD = 11.8$), externalizing ($M = 51.1$, $SD = 11.3$) and total ($M = 50.4$, $SD = 12.2$) behavioral problem scales. Youth in R&R reported significantly higher mean scores and scores in the clinical range on all scales of the CBCL compared with youth in CASAH. On average, youth reported scores within the normal to mild range on the CDI ($M = 6.5$, $SD = 5.4$) and STAI ($M = 33.8$, $SD = 7.4$); R&R reported significantly higher mean scores on the STAIC than did youth in CASAH.

Differences in Youth Mental Health Outcomes

Tables II and III present the associations between key contextual and social regulation factors on youth mental health total scale scores, and scores in the clinical

Table II. *Regression Models of Mental Health in Youth (N = 545)*

	CBCL Total Score		CBCL Internalizing Behavior Problems		CBCL Externalizing Behavior Problems		CDI		STAI (Trait)	
	B	SE	*B*	SE	*B*	SE	*B*	SE	*B*	SE
Step 1: Internal context										
Male	−0.10	1.03	0.02	0.02	−0.02	0.02	−0.22	0.07**	−0.06	0.02**
Age	0.13	0.26	−0.01	0.01	0.01	0.00	0.02	0.02	−0.02	0.01**
African American	0.48	1.07	−0.03	0.02	0.03	0.02	−0.18	0.08*	−0.01	0.02
Youth HIV$^+$	0.43	1.34	0.03	0.03	−0.02	0.03	0.01	0.10	−0.02	0.03
	F (4, 536) = 1.51*, $R^2 = 0.01$		F (4, 536) = 5.13***, $R^2 = .04$		F (4, 536) = 3.02*, $R^2 = .02$		F (4, 540) = 4.7**, $R^2 = .03$		F (4, 540) = 5.84***, $R^2 = .04$	
Step 2: External context										
Caregiver female	1.28	2.00	0.01	0.04	0.03	0.04	0.01	0.14	0.02	0.04
Caregiver age	−0.02	0.06	0.01	0.01	−0.01	0.01	0.01	0.01	−0.01	0.01
Caregiver HIV$^+$	−4.93	1.39***	−0.09	0.03**	−0.08	0.03**	−0.01	0.10	−0.01	0.03
Residing with birth parent	1.87	2.06	0.06	0.04	0.03	0.04	0.03	0.15	−0.04	0.04
Household income	−0.21	0.23	−0.004	0.00	−0.01	0.01	0.02	0.02	−0.01	0.00
Caregiver employed	−1.44	1.23	−0.03	0.02	−0.02	0.02	0.01	0.09	0.01	0.02
Caregiver BDI	0.34	0.08***	0.01	0.01***	0.01	0.01**	0.01	0.01	0.01	0.01*
Caregiver STAI	0.16	0.06*	0.01	0.01***	0.01	0.01	0.01	0.01*	0.01	0.01
	F (12, 488) = 7.40*** $R^2 = .15$		F (12, 488) = 10.04***, $R^2 = .20$		F (12, 488) = 5.38***, $R^2 = .12$		F (12, 491) = 2.87***, $R^2 = .07$		F (12, 491) = 3.26***, $R^2 = .07$	
Step 3: Social regulation factors										
Communication	−3.00	1.58	−0.02	0.03	−0.08	0.03**	−0.08	0.11	0.04	0.03
Involvement	−4.67	1.95*	−0.09	0.04*	−0.08	0.04*	−0.18	0.14	−0.06	0.04
Autonomy	−1.21	1.00	−0.01	0.02	−0.03	0.02	−0.09	0.07	−0.01	0.02
	F (15, 468) = 8.01***, $R^2 = 0.20$		F (15, 468) = 9.18***, $R^2 = 0.23$		F (15, 468) = 7.08***, $R^2 = 0.18$		F (15, 471) = 2.80***, $R^2 = .08$		F (15, 471) = 2.82***, $R^2 = .08$	

Note. CDI = Child Depression Inventory; STAIC = State-Trait Anxiety Inventory-Child; CBCL = Child Behavior Checklist; SE = I; OR = odds ratio; CI = confidence interval.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table III. *Regression Models of Clinical Range Mental Health in Youth* (N = *545*)

	CBCL Total		CBCL Internalizing Behavior Problems		CBCL Externalizing Behavior Problems		CDI	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Step 1: Internal context								
Male	1.2	(0.7–2.2)	1.8	(0.9–3.4)	0.9	(0.5–1.6)	0.4**	(0.2–0.6)
Age	1.1	(0.9–1.3)	1.1	(0.9–1.3)	1.2*	(1.0–1.4)	1.1	(0.9–1.2)
African American	1.3	(0.7–2.4)	1.3	(0.6–2.6)	2.2*	(1.2–4.0)	0.5*	(0.3–0.8)
Youth HIV$^+$	1.3	(0.6–3.0)	0.8	(0.3–2.0)	1.4	(0.7–3.0)	2.4*	(1.2–4.7)
	χ^2 (4, *N* = 541) = 3.16, *Pseudo* R^2 = .00		χ^2 (4, *N* = 541) = 10.8*, *Pseudo* R^2 = .03		χ^2 (4, *N* = 541) = 6.26, *Pseudo* R^2 = .01		χ^2 (4, *N* = 545) = 19.2***, *Pseudo* R^2 = .04	
Step 2: External context								
Caregiver female	1.7	(0.3–9.0)	0.9	(0.2–3.8)	1.0	(0.3–3.6)	0.7	(0.2–2.2)
Caregiver age	1.0	(0.9–1.0)	1.0	(0.9–1.0)	1.0	(0.9–1.0)	1.0	(0.96–1.0)
Caregiver HIV$^+$	0.3**	(0.1–0.6)	0.1***	(0.1–0.3)	0.3**	(0.1–0.6)	1.6	(0.7–3.4)
Residing with birth Parent	1.5	(0.4–5.4)	1.6	(0.4–6.2)	2.6	(0.8–8.3)	0.7	(0.2–1.9)
Household Income	1.0	(0.9–1.1)	1.0	(0.9–1.2)	1.0	(0.9–1.1)	1.0	(0.9–1.1)
Caregiver employed	0.5	(0.2–1.0)	0.5	(0.2–1.1)	0.6	(0.3–1.3)	0.8	(0.4–1.5)
Caregiver BDI	1.1**	(1.0–1.1)	1.1**	(1.0–1.1)	1.1**	(1.0–1.1)	1.0	(0.9–1.0)
Caregiver STAI	1.0	(1.0–1.1)	1.0	(1.0–1.1)	1.0	(1.0–1.1)	1.0**	(1.0–1.1)
	χ^2 (12, *N* = 501) = 50.4***, *Pseudo* R^2 = .13		χ^2 (12, *N* = 501) = 55.2***, *Pseudo* R^2 = .16		χ^2 (12, *N* = 501) = 48.7***, *Pseudo* R^2 = .11		χ^2(15, *N* = 504) = 35.0***, *Pseudo* R^2 = .08	
Step 3: Social regulation factors								
Communication	0.5	(0.2–1.2)	1.3	(0.5–3.5)	0.4*	(0.2–0.9)	1.0	(0.4–2.3)
Involvement	0.6	(0.2–1.6)	0.4	(0.1–1.1)	0.5	(0.2–1.4)	0.5	(0.2–1.4)
Autonomy	0.8	(0.5–1.4)	0.7	(0.3–1.3)	0.7	(0.4–1.3)	0.6	(0.4–1.0)
	χ^2 (15, 484) = 63.3***, *Pseudo* R^2 = .17		χ^2 (15, *N* = 484) = 56.1***, *Pseudo* R^2 = .18		χ^2 (15, 484) = 72.0***, *Pseudo* R^2 = .17		χ^2 (15, *N* = 487) = 43.8***, *Pseudo* R^2 = .11	

Note. CDI = Child Depression Inventory; STAIC = State-Trait Anxiety Inventory-Child; CBCL = Child Behavior Checklist; OR = odds ratio; CI = confidence interval.

**p* < .05. ***p* < .01. ****p* < .001.

range, respectively. Although there was almost no effect of youth HIV status or type of caregiver, we found caregiver HIV status and several other contextual and social regulation factors were associated with youth mental health as described below.

CBCL Behavior Problem Scale

Findings for the CBCL Total Score scale (Table II and Table III) are similar to those of the internalizing and externalizing scales; we just present findings for the specific scales below.

Internalizing behavior problem scale. We examined the association between contextual and social regulation factors and youth scores on the internalizing scale [$F(15, 468) = 9.18$, $p < .001$). Specific contextual factors significantly associated with increased internalizing symptoms included caregiver HIV$^-$ status ($B = -0.09$, $SE = 0.03$, $p < .01$), and higher caregiver depression ($B = 0.01$, $SE = 0.00$, $p < .001$) and anxiety scores ($B = 0.01$, $SE = 0.00$, $p < .001$). The social regulation factor significantly associated with increased internalizing symptoms was less parent–child involvement ($B = -0.09$, $SE = 0.04$, $p < .05$).

In the model examining factors associated with internalizing scores in the clinical range [$\chi^2(15, N = 484) = 56.1$, $p < .001$), we found caregiver's HIV$^-$ status (odds ratio [OR] = 0.1, 95% confidence interval [CI] = 0.1–0.3, $p < .001$) and higher caregiver depression scores (OR = 1.1, 95% CI = 1.0–1.1, $p < .01$) were associated with higher odds of reporting scores in the clinical range for their youth. Social regulation factors were not associated with internalizing scores in the clinical range.

Externalizing behavior problem scale. We found associations between external contextual and social regulation factors and youth scores on the externalizing behavior problem scale [$F(15, 468) = 7.08$, $p < .001$]. Specific contextual factors significantly associated with increased externalizing behavior symptoms included caregiver HIV$^-$ status ($B = -0.08$, $SE = 0.03$, $p < .01$), and higher caregiver depression scores ($B = 0.01$, $SE = 0.01$, $p < .01$). Social regulation factors associated with externalizing behavior symptoms included less caregiver communication ($B = -0.08$, $SE = 0.03$, $p < .01$) and involvement ($B = -0.08$, $SE = 0.04$, $p < .05$).

Examining factors associated with externalizing behavior problem scores in the clinical range [$\chi^2(15, N = 484) = 72.0$, $p < .001$], we found older (OR = 1.2, 95% CI = 1.00–1.4, $p < .05$) and African American youth (OR = 2.2, 95% CI = 1.2–4.0, $p < .05$) had higher odds of externalizing behavior scores in the clinical range. External contextual scores associated with externalizing behavior scores in the clinical range were caregiver HIV$^-$ status (OR = 0.3, 95% CI = 0.1–0.6, $p < .01$) and higher caregiver depression scores (OR = 1.1, 95% CI = 1.0–1.1, $p < .01$). The social regulation factor associated with externalizing behavior scores in the clinical range was less caregiver communication (OR = 0.4, 95% CI = 0.2–0.9, $p < .05$).

CDI

We found associations between internal and external contextual factors and youth scores on the CDI [$F(15, 471) = 2.80$, $p < .001$]. Specifically, internal contextual factors associated with lower CDI scores were being male ($B = -0.22$, $SE = 0.07$, $p < .01$) and African American ($B = -0.18$, $SE = 0.08$, $p < .05$). External contextual scores associated with higher CDI scores were higher caregiver anxiety ($B = 0.01$, $SE = 0.01$, $p < .05$). There were no social regulation factors associated with youth CDI scores.

Examining factors associated with *CDI* scores in the clinical range [$\chi^2(15, N = 487) = 43.8$, $p < .001$], we found males (OR = 0.4, 95% CI = 0.2–0.6, $p < .01$) and African American (OR = 0.5, 95% CI = 0.3–0.8, $p < .05$) had lower odds of reporting CDI scores in the clinical range. Youth who were HIV$^+$ had higher odds of reporting scores in the clinical range (OR = 2.4, 95% CI = 1.2–4.7, $p < .05$). External contextual scores associated with higher CDI scores were higher caregiver anxiety (OR = 1.0, 95% CI = 1.0–1.1, $p < .01$). There were no social regulation factors associated with youth CDI scores in the clinical range.

STAIC Trait Scale

Finally, we examined the association between contextual and social regulation factors and youth scores on the STAIC trait scale [$F(15, 471) = 2.82$, $p < .001$]. Internal contextual factors associated with lower trait anxiety scores were being male ($B = -0.06$, $SE = 0.02$, $p < .01$) and older ($B = -0.02$, $SE = 0.01$, $p < .01$). External contextual scores associated with higher trait anxiety scores were higher caregiver depression scores ($B = 0.01$, $SE = 0.01$, $p < .05$). There were no social regulation factors associated with youth trait anxiety scores. There are no available clinical range scores for the STAIC.

Discussion

The current study sought to extend the literature by examining the association of youth mental health and key contextual and social regulation factors, including youth and caregiver HIV status, by combining two study samples of urban adolescents infected, affected, or unaffected by HIV, all recruited from similar low socioeconomic status (SES) neighborhoods in NYC. In both studies, the majority of youth were African American or Hispanic, in early adolescence (mean age: 12 years), and lived with a female caregiver. Almost three quarters lived below the poverty line for NYC. On average, youth in this set of analyses had mental health scores that fell within the ''normal range'' and were similar to other studies of HIV-infected, affected youth (Bachanas et al., 2001; Franklin et al., 2007) or unaffected youth from similar urban settings using similar measures (McFarlane, Groff, O'Brien, & Watson, 2003; Purugganan, Stein, Silver, & Benenson, 2003).

Although the rates of elevated or clinical scores were low in this sample, we found that youth who reported symptoms of depression in the clinical range on the CDI were over twice as likely to be HIV^+, supporting a need for mental health interventions for PHIV^+ youth. However, for the most part, we found that youth HIV status was not associated with youth mental health, after adjusting for the effects of other key contextual or social regulation factors such as caregiver HIV status, caregiver mental health, and family processes. This was inconsistent with our hypothesis but consistent with a number of prior studies (Chernoff et al., 2009; Franklin et al., 2007; Gadow et al., 2010).

Also, contrary to our second hypothesis, we found that youth with HIV^+ caregivers had better mental health, even after adjusting for differences in youth HIV status and other contextual and social regulation factors. Interestingly, differences in youth mental health outcomes by caregiver HIV status were found for caregivers' report of their children's symptoms on the CBCL, but not for youth self-report on the CDI or STAI. This differing association may be related to the respondent (e.g., child vs. parent report) or the different measures used. However, the caregiver and the youth report of internalizing problems were both, on average, within the ''non-clinical'' range. We also did not find an interaction effect of youth and caregiver HIV status on youth mental health. This suggests that the role of caregiver HIV status on child mental health was primary and was not augmented by the youth's HIV status.

The association between better child mental health and caregiver HIV infection is surprising and is in contrast to prior studies that have either found no association between caregiver HIV status and mental health (Dutra et al., 2000; Leonard, et al., 2008; Mellins et al., 2003) or that caregiver HIV status was associated with worse youth mental health outcomes (Esposito et al., 1999; Reyland et al., 2002). The observed association in the current study was independent of youth HIV status, caregiver mental health, residing with a birth parent, or family-regulation processes. Differences between the current study and prior findings may reflect our ability to examine the unique effects of caregiver *and* youth HIV status, in addition to other key contextual factors. Alternatively, youth whose caregivers are HIV^+ may have much greater access to mental health services through their caregiver's access to HIV treatment and services (Chernoff et al., 2009). Clinics from which HIV^+ families were drawn either provided on-site mental health services or linked families to needed mental health treatment. However, limited access to services data precludes our ability to examine this factor. Conversely, caregivers who are HIV^+ may feel stigmatized and judged negatively in all aspects of their functioning, including parenting, and many have had previous interactions with child welfare agencies (Boyd-Franklin et al., 1995). Thus, they may be more likely to minimize mental health or behavioral difficulties in their youth. Finally, findings may reflect a form of selection bias whereby HIV^+ caregivers and their youth who were functioning less well were less likely to be found seeking medical services of any kind, and thus not enrolled in the study.

Few studies have examined the range of factors that may increase the likelihood of poor mental health in PHIV^+ youth. In our SAT model, we hypothesized that internal and external contextual factors in addition to social regulation factors would influence youth mental health. Consistent with national trends (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003), we found that male and younger youth reported fewer problems associated with either depression or anxiety. Elevated scores for externalizing symptoms among African American youth are also consistent with prior studies (Costello et al., 1988). Furthermore, irrespective of youth or caregiver HIV status, there were two other domains that were consistently associated with youth mental health in multiple regression models: caregiver mental health and family processes. Greater caregiver anxiety and depression were associated with worse youth psychological outcomes. These findings are consistent with the large literature linking maternal mental health to youth mental health (Miller, Warner, Wickramaratne, &Weissman, 1999; Weissman et al., 2006). Family interactional variables, including more caregiver–child communication and caregiver involvement, were also associated with better CBCL scores. These findings also replicate studies of youth affected by HIV (Dutra et al., 2000; Repetti, Taylor, & Seeman, 2002), and underscore the critical role of the caregiver–child relationship, maternal mental health, and environmental or genetic influences on mental health in youth healthy development.

Parental death is a significant predictor of child mental health problems (Dowdney, 2000; Tremblay & Israel, 1998); however, we were unable to examine the impact of parental loss on youth mental health. We found that residing with a birth parent had very little impact on youth mental health outcomes. Birth parent and youth HIV status, however, were highly correlated in the current sample (88% of HIV$^-$ youth resided with a birth parent compared with 36% of HIV$^+$ youth). Furthermore, almost half of the HIV$^+$ youth who resided with a non-birth caregiver were living with extended family members and this may have reduced any distress associated with parental separation. Larger studies are needed to better explore the association between type of caregiver, child HIV status, and youth mental health.

Limitations

Several other limitations to this study must be considered when interpreting our results. These are secondary data analyses involving pooled data of a sample of youth who were recruited at different times and so differences in mental health outcomes may reflect historical or cohort differences between the two study samples. For example, HIV$^+$ caregivers in CASAH (the later cohort) may have been healthier due to improved antiretroviral regimens. The impact of study timing on the association between caregiver HIV status and youth mental health is unclear. The sample is a convenience sample, largely recruited from either HIV primary care clinics or medical clinics that may not reflect the larger population of urban youth, either infected or affected by HIV, particularly those outside NYC and not followed in HIV care or medical clinics. Also, although we attempted to recruit both study samples from similar communities based on the demographics of pediatric HIV disease, other factors (e.g., differential rates of study refusal) may have altered the group effects. As noted, among the HIV$^-$ youth in R&R, we were unable to distinguish between perinatally HIV exposed and unexposed. As HIV status for the non-infected caregivers was based on self-report, the HIV$^-$ caregiver group may have included caregivers who were HIV$^+$ but either undiagnosed or refused to endorse their own seropositivity. Also, physical symptoms of children with physical illness (i.e., HIV) may be misinterpreted on the CBCL by caregivers (Perrin, Stein, & Drotar, 1991). However, there were no differences in CBCL scores by youth HIV status, which one might expect if caregivers of HIV$^+$ youth were misinterpreting physical symptoms as mental health symptoms. Finally, differences in access to psychiatric services may have occurred due to youth or caregiver's HIV status and connection to care.

Future Research and Clinical Implications

These limitations notwithstanding, the current study represents a first step in understanding the role of caregiver *and* youth HIV infection, in addition to other contextual and social regulation factors on youth mental health and warrants replication. Caregiver HIV status was associated with youth mental health. Continued empirical efforts are necessary to understand the role of caregiver HIV infection, exploring further the strengths of families affected by HIV (HIV$^+$ caregiver) and through what processes residing with an HIV$^+$ caregiver may promote positive youth mental health. For example, youth with HIV$^+$ caregivers may be involved in their caregiver's care and treatment and may assist the caregiver in managing the family. Such youth may feel empowered by adult responsibilities, deriving a sense of purpose and positive future orientation. Given limited statistical power to examine additional variables and absence of data across both studies, we were unable to also examine the role of key self-regulatory processes of the SAT model, such as youth self-esteem or future orientation. Such studies are needed in order to understand the developmental trajectory of youth infected and affected by HIV and to develop targeted psychosocial interventions for these youth.

Irrespective of youth HIV status or caregiver mental health, youth who resided with HIV$^+$ caregivers had better mental health outcomes. Our findings suggest resilience in these youth is in part derived from the presence of promotive factors, such as better caregiver–child communication and involvement, within the family. Some researchers and clinicians (Remien & Mellins, 2007) have suggested that receiving an HIV diagnosis as an adult serves to empower the individual to increase positive and health-related behavior, a change which may in turn serve to improve parenting practices and thus child mental health. Clinical approaches may well benefit from utilizing a positive youth-development approach, one which builds upon existing strengths and resources within the family to promote mental health, in addition to preventing negative outcomes in these youth (Catalano, Hawkins, Berglund, Pollard, & Arthur, 2002).

In sum, our findings shed important light on the mental health of youth infected or affected by HIV. Most notably, our findings suggest that caregiver HIV status may play a more influential (and positive) role on these youths' mental health than their own HIV status, and that other contextual and social regulatory factors (e.g., caregiver mental health and family processes) also have a strong influence on the mental health of these youth. Given the staggering numbers of youth infected and affected by HIV worldwide, it is critical to understand the role of youth and caregiver HIV infection and key contextual and social regulatory factors on youth mental health outcomes to inform exploration and amelioration of these issues in international settings.

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