A Comparison of Friendship Quality and Social Functioning Among Children With Perinatally Acquired HIV, Children With Persistent Asthma, and Healthy Children of HIV-Positive Mothers

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Objective To examine the friendships and social expectations of children with perinatally acquired HIV and compare them to children with moderate to severe persistent asthma and healthy children of HIV-positive mothers.

Methods 70 children (ages 8–14 years) were recruited from pediatric allergy and immunology multidisciplinary clinics and hospital-based HIV-support programming. Children completed measures of friendship quality and interpersonal functioning. Caregivers completed a measure of child psychosocial functioning.

Results Children with asthma, not HIV, demonstrated poorer indicators of friendship and the most negative social expectations of the three groups. Children with HIV maintained best friendships and rated themselves as socially well-adjusted.

Conclusions Comprehensive multidisciplinary services and ancillary supports may have buffered against stressors and facilitated positive psychosocial outcomes in children with HIV. Children with asthma displayed higher disease activity, possibly contributing to poorer outcomes. Results suggest a need to better understand the protective factors that enhance social functioning in children with HIV.

Key words asthma; friendship; HIV; internal representations.

Peer relations are an important consideration for children with a chronic illness. By influencing perceived support, adherence to treatment regimen, and participation in health-promoting behaviors, peer relationships can play a significant positive role in the lives of children managing a chronic condition or disease (La Greca, Bearman & Moore, 2002). However, concerns about physical appearance, lifestyle modifications due to hospitalizations or intensive treatments, and restriction or interruption of daily activities can interfere with the ability of these children to establish and maintain stable, meaningful friendships. A number of negative short- and long-term consequences are associated with a lack of enriching friendships, including low self-esteem (Ladd & Troop-Gordon, 2003); school adjustment problems (Lopez & DuBois, 2005); psychopathology (Bukowski & Adams, 2005); and misconduct and delinquency (Boivin, Vitaro, & Poulin, 2005). When coupled with the challenges of managing a chronic illness, poor peer relationships can have even greater consequences for children’s coping and quality of life.

Children perinatally infected with the human immunodeficiency virus (HIV) may be at higher risk of disrupted peer relations than children with other chronic conditions such as diabetes, cancer, and sickle cell disease. Children living with HIV are at risk for developing cognitive, neuropsychological, sensory–motor, and behavioral deficits associated with the effects of the retrovirus on the central nervous system (CNS) if the disease is not properly treated.
(Knight, Mellins, Levenson, Arpadi, & Kairam, 2000; Wolters, Brouwers, & Moss, 1995). Even in HIV-positive children who appear asymptomatic, subtle neurocognitive impairment often exists (Fundaro et al., 1998; Nozyce et al., 2006) and can worsen over time without effective antiretroviral treatment (Franklin et al., 2005). In general, children with CNS-related health conditions have been found to have difficulty developing age-appropriate peer relationships. A review of over 20 years of empirical research on the topic reported that children with CNS conditions, including HIV, were less socially competent and more isolated than physically healthy children and children with non-CNS-related health conditions such as diabetes (Nassau & Drotar, 1997). Possible reasons for this discrepancy include cognitive deficits that interfere with basic social understanding, varying degrees of impairment (with more severe or visible manifestations leading to stigmatization and rejection by peers), and educational and rehabilitation settings that limit social opportunities.

Furthermore, the stigma that continues to be associated with HIV infection may also contribute to social difficulties in this group of children (La Greca et al., 2002). In HIV-positive adults, high levels of internalized HIV-related stigma predict feelings of anxiety, depression, and hopelessness, and also interfere with support seeking from peers, family, and health provider networks (Lee, Kochman, & Sikkema, 2002; Mak et al., 2007). In a meta-analysis of the impact of disclosure on stigma and social support in adults living with HIV, Smith, Rossetto, & Peterson (2008) concluded that both disclosure and social support will continue to be compromised until the stigma surrounding HIV has diminished. While research has not explicitly explored the impact of HIV-related stigma on children living with the disease, it is logical to extrapolate from the adult literature that fear of stigma is likely to have significant implications for disclosure and the quality of their social relationships. Studies of general social functioning in children with HIV indicate that they experience fewer social interactions, lower involvement in activities, and poorer school functioning than their healthy peers (Bose, Moss, Brouwers, Pizzo, & Lorion, 1994). However, children who feel comfortable enough to disclose their HIV status to friends may experience observable health benefits (e.g., increased CD4 percentage) associated with decreased levels of worry and increased access to support in maintaining their health (Sherman, Bonanno, Weiner, & Battles, 2000).

The purpose of this study was to examine the friendship quality and social functioning of children perinatally infected with HIV. Two key elements of children’s internal representations of relationships, the affect tone of relationship expectancies (i.e., the extent to which relationships are assumed to be destructive and threatening versus safe and enriching) and emotional investment in relationships (i.e., the ability to relate to others in a meaningful and committed manner), were also examined. The friendships and social expectations of children with perinatally acquired HIV were then compared to those of children with moderate to severe persistent asthma and healthy children born to an HIV-positive mothers. Children with moderate to severe asthma were selected as a comparison group due to the serious but comparatively nonstigmatizing nature of their illness. Similar to children with HIV, children with higher levels of asthma severity must monitor their symptoms, take daily medications, and visit the doctor regularly as part of their disease management regimen, often resulting in considerable burden to the child and family and interfering with opportunities for the child to develop and maintain relationships with peers. Research has demonstrated that behavioral difficulties, particularly internalizing problems such as anxiety, depressive symptoms, and withdrawal, are more pronounced in children with asthma as disease severity increases (McQuaid, Kopel, & Nassau, 2001). Greater asthma severity has also been associated with increased feelings of loneliness in children and less favorable ratings from peers (Graetz & Shute, 1995) as well as higher levels of negative peer sociability (Halterman et al., 2006). However, despite a growing recognition of its potential severity by the general public, asthma is typically not associated with high levels of stigma like other diseases such as HIV. Uninfected children of HIV-positive mothers were included as a second comparison group due to the similar family and environmental stressors experienced (e.g., HIV in a parent) without the added strain of managing a childhood illness. We hypothesized that the children with HIV would demonstrate poorer indicators of friendship quality and social adjustment than the two comparison groups, as reported by both the child and the caregiver.

Method
Participants
Study participants included 70 children (39 males, 31 females) between the ages of 8 and 14 years (M = 11.39, SD = 1.56) recruited from a multidisciplinary immunology clinic, support programming for families affected by HIV (including uninfected family members), and a high-risk asthma specialty clinic at an urban Midwestern children’s hospital. Of the total sample, 21 children were perinatally infected with HIV, 24 children were born to an...
HIV-positive mother but were themselves uninfected, and 25 children had a diagnosis of moderate or severe persistent asthma as defined by the National Heart, Lung, and Blood Institute (NHLBI; 2007) guidelines (i.e., a minimum of: daily symptoms, weekly nighttime awakenings, daily use of a short-acting β₂ agonist for symptom control, some limitation in daily activities, FEV₁ < 80% predicted). There was a statistically significant difference in age among the three groups, F(2,69) = 6.54, p = .003, with post hoc comparisons indicating that the mean age for the healthy children (M = 10.33, SD = 1.61) was significantly younger than the HIV group (M = 11.67, SD = 2.11), 95% CI (−2.64 to −0.03), p = .04, as well as the asthma group (M = 12.16, SD = 1.75), 95% CI (−3.07 to −0.58), p = .002. Children were predominantly African American (94%), reflecting the ethnic composition of the population from which the sample was drawn; 3% were Hispanic/Latino and 3% were Caucasian. There were no significant differences in ethnicity or gender among the groups. For the children with HIV, caregivers reported that 57% were fully disclosed to their disease status (i.e., aware that they have HIV and had been educated about transmission and treatment), 14% of children were partially disclosed (i.e., knew that there is a virus in their blood for which they must take medication but did not know the name of the disease), and 29% had not yet been disclosed about their illness. Only one child had disclosed his HIV status to a friend at the time of the study.

Demographic data for the caregivers of children living with HIV differed from that of the two comparison groups. In the HIV group, only 24% of caregivers were biological mothers; for children with asthma and healthy children, biological mothers accounted for 84% of caregivers. Age of caregivers also differed significantly among the groups, F(2,65) = 9.49, p = .000. Caregivers of children with HIV were significantly older (M = 49.28, SD = 12.76) than both the caregivers of children with asthma (M = 39.76, SD = 10.98), 95% CI (1.75 to 17.29), p = .013, and healthy children (M = 35.04, SD = 7.54), 95% CI (6.32 to 22.15), p = .000. This was expected, as it is common for children with HIV to live with an extended family member (e.g., grandparent) or other caregiver due to poor maternal health status or following the death of a parent from HIV-related complications. Median household income for the HIV group fell between $20,001 and $30,000 per year; median income for the asthma and healthy groups ranged from $10,001 to $20,000 per year. Demographic information for children and caregivers can be found in Table I.

**Caregiver Measures**

**Demographic Questionnaire**

Demographic variables included child and caregiver gender, age, and ethnicity; child grade in school; caregiver relationship to the child; caregiver marital and employment status; and household income. Parents of children with HIV and asthma also reported days missed from school due to illness. For children with HIV, questions about disclosure status were also included. Data regarding immunologic status (i.e., viral load and CD4 percentage) closest in proximity to the date of study completion were obtained from the child’s medical record with documented caregiver permission.

**Social Adjustment**

The Personality Inventory for Children, Second Edition Behavioral Summary (PIC-2, Lachar & Gruber, 2001) is a parent-report instrument consisting of 96 true–false questions about child/adolescent emotional, behavioral, cognitive, and interpersonal functioning. Only the Social Adjustment Composite was used in this study, due to its theoretical correspondence with the construct of friendship quality. Reliability and validity for the PIC-2 fall in the acceptable range (see Lachar, 2007). For the adjustment scales, Cronbach’s α coefficients ranged from .75 to .91, with most α-values in the .80s. The PIC-2 Standard Form and Behavioral Summary have been found to correlate highly with corresponding scores on the early versions of the measure, with teacher report on the Student Behavior Survey (SBS), and with student report on the Personality Inventory for Youth (PIY). The PIC-2 has been used in other studies as a means of assessing child friendship quality via parent report (e.g., Cunningham, Dixon Thomas, & Warschausky, 2007).

**Child Measures**

**Affective Representations of Relationships**

The Children’s Affective Representations of Relationships Scale (CARRS, Baker & Niec, 2007) was developed from attachment, object relations, and social cognitive foundations to create a brief, collaborative measure of children’s internal representations. It consists of 86 statements tapping children’s affective tone of relationships, ability to invest emotionally in relationships, and locus of control orientation, printed on cards for children to sort into four piles ranging from “Not at all like me” to “Very much like me”. Affect Tone is defined as the extent to which one expects relationships to be destructive and threatening or safe and enriching (example item: “When I’m sad, there’s always someone I can talk to”). Emotional Investment is defined as the ability to
relate to others in a meaningful and committed manner (example item: “I would do almost anything for my closest friend”). Locus of control was not a variable of interest for this study and responses to those items were not analyzed. A pilot study conducted with a sample of elementary-age community children provided preliminary support for the CARRS as a measure of children’s expectations of relationships and capacity to invest emotionally in others (Baker & Niec, 2007). Correlations between the CARRS Affect Tone and Emotional Investment scales were statistically significant \(p < .01\) and in expected directions. Internal consistency for the Affect Tone scale was very good \(\alpha = .81\); and reliability of the Emotional Investment scale reached the acceptable range \(\alpha = .68\). The scales positively correlated with the Social Cognition and Object Relations Scale, Global Rating Method (Hilsenroth, Stein, & Pinsker, 2004), providing evidence of construct validity.

Friendship Interview

The Friendship Interview (Vandell, 1999) asks children to identify their best friends, rate how each friendship is going (i.e., “great,” “good,” “not so good,” or “bad”), and provide information about where the friends usually interact as well as the frequency of contact between the friends. The interview was modified for disclosed children with HIV to include questions about their disclosure to friends.

Friendship Quality

The Friendship Quality Questionnaire – Revised (FQQ-R, Parker & Asher, 1993) consists of 40 statements that characterize one’s best (or closest) friendship. Children were asked to rate how true each statement is for his or her best friendship on a 5-point scale (0 = “not at all true”; 4 = “really true”). The FQQ-R yields six subscales that pertain to different qualitative aspects of friendship: Validation and Caring, Conflict Resolution, Conflict and Betrayal, Help and Guidance, Companionship and Recreation, and Intimate Exchange. The psychometric properties of the instrument are well-established (see Parker & Asher, 1993). The FQQ-R subscales have demonstrated good internal consistency \(\alpha\)-coefficients ranging from .73 for the Conflict Resolution scale to .90 for the Help & Guidance and Validation & Caring scales). The measure has been validated using sociometric rating methods, with lower accepted children demonstrating poorer quality friendships on each of the six FQQ-R subscales than average- and high-accepted children.

<table>
<thead>
<tr>
<th>Table I. Demographic Data by Group</th>
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</thead>
<tbody>
<tr>
<td><strong>Children</strong></td>
</tr>
<tr>
<td>Age (M, SD)</td>
</tr>
<tr>
<td>11.67 (2.11)</td>
</tr>
<tr>
<td>Grade (M, SD)</td>
</tr>
<tr>
<td>Gender (female) (%)</td>
</tr>
<tr>
<td>Race (African American) (%)</td>
</tr>
<tr>
<td>HIV Disclosure Status (%)</td>
</tr>
<tr>
<td>Fully Disclosed</td>
</tr>
<tr>
<td>Partially Disclosed</td>
</tr>
<tr>
<td>Not Disclosed</td>
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<tr>
<td><strong>Caregivers</strong></td>
</tr>
<tr>
<td>Age (M, SD)</td>
</tr>
<tr>
<td>Gender (female) (%)</td>
</tr>
<tr>
<td>Race (African American) (%)</td>
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<tr>
<td>Relationship to child (%)</td>
</tr>
<tr>
<td>Biological mother</td>
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<tr>
<td>Other relative</td>
</tr>
<tr>
<td>Foster parent</td>
</tr>
<tr>
<td>Adoptive parent</td>
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<tr>
<td>Other caregiver</td>
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<tr>
<td>Yearly income (median)</td>
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</tbody>
</table>

Note. **p < .01; ***p < .001.
Further, the six FQQ-R subscales were found to be strongly predictive of child loneliness (Parker & Asher, 1993).

Receptive Vocabulary
The Peabody Picture Vocabulary Test, Third Edition (PPVT-III, Dunn & Dunn, 1997) is a measure of receptive vocabulary in individuals between the ages of 2 years, 6 months and 90+ years. For the purposes of this study, it was used as a screen for children’s intelligence and verbal ability; the validity of the PPVT for this purpose has been widely demonstrated (e.g., Carvajal, Hayes, Miller, Wiebe, & Weaver, 1993). Alpha and split-half reliability coefficients of the PPVT-III range from .86 to .98 for both Forms A and B, while parallel forms reliabilities fall between .88 and .96 with the lower coefficients in the lowest and highest chronological age groups. Correlations with the Wechsler Intelligence Scale for Children, Third Edition (WISC-III) are .91 and .92 for Forms II A and II B, respectively. The validity of the PPVT-III is well-established in the manual and in the literature (e.g., Campbell, Bell, & Keith, 2001).

Psychosocial Functioning
The Behavior Assessment System for Children, Second Edition: Self-Report of Personality (BASC-2 SRP, Reynolds & Kamphaus, 2004) consists of 139 (child version) or 176 (adolescent version) items in a true–false and multiple choice format that measures children’s emotions and self-perceptions of daily functioning. It yields 15 primary scales and five composite scales: internalizing problems, inattention/hyperactivity, personal problems, school problems, and the emotional symptoms index. The composite scores have demonstrated internal consistency reliability ranging from 0.84 to 0.96. The BASC-2 SRP has demonstrated convergent validity with the ASEBA Youth Self-Report Form, Conners–Wells Adolescent Self-Report Scale, the Children’s Depression Inventory, and the original BASC Self-Report of Personality (Reynolds & Kamphaus, 2004). In this study, the Interpersonal Relations scale, which assesses success in relating to others and the degree of enjoyment experienced within relationships, was used as an indicator of children’s social functioning.

Procedure
Upon receipt of Institutional Review Board approval, study advertisements were mailed to families of eligible children aged 8–14 years with HIV and moderate to severe persistent asthma followed in the Division of Allergy, Immunology, and Rheumatology at an urban Midwestern children’s hospital. Families were also approached by the first author during their scheduled clinic visits. In the HIV clinic, 81% of families approached completed the study, while 89% of families recruited in the asthma clinic completed all study measures. To recruit uninfected children of HIV-positive mothers, study advertisements were distributed during programs at the hospital designed to address the psychosocial needs of youth affected by HIV. Interested mothers called the first author directly or provided a phone number for later screening.

Data collection took place between April 2008 and August 2009. Consent and assent were obtained upon arrival at the research center; only children who provided assent and had documented parental/caregiver consent were permitted to participate in the study. Children scoring below a standard score of 70 on the PPVT-III were to be excluded from study analyses; however, all children scored at or above this mark and therefore none were excluded. Caregivers completed the demographic questionnaire and the PIC-2 Behavioral Summary individually. Children were taken to a separate room to complete the PPVT-III, Friendship Interview, FQQ-R, CARRS, and the BASC-2 SRP. If children had difficulty reading, the measures were read aloud to them. Each child completed the protocol individually with the experimenter and was given a small token of appreciation (e.g., pencils, stickers, etc.) for participating. Caregivers were compensated $20.00, along with a $5.00 gas card to reimburse travel expenses if needed.

Results
Health and Cognitive Data
Approximately half of the children in the HIV group (48%) had an undetectable viral load (i.e., less than 48 copies of the virus per milliliter of blood) on the test date closest to their study visit. The median viral load for the study sample was 75 copies/ml. One child had not previously been on medication and had a viral load reading of over 24,000 copies/ml on the date of the study visit; although the child was asymptomatic, an antiretroviral medication regimen was initiated at that time.

The median number of school days missed by children with asthma in the past year for illness-related reasons fell between 11 and 15, while the median number of days missed by children with HIV fell between 6 and 10. The association between illness group (asthma or HIV) and days missed was not statistically significant, \( \chi^2(5, n = 46) = 9.58, p = .09 \); however, a medium effect size (Cramer’s \( V = .46 \)) indicated a moderate association between the variables.
For the total sample, receptive vocabulary scores on the PPVT-III ranged from 70 to 118 (M = 92.29, SD = 10.27). There were no significant differences in scores among children with HIV, children with asthma, and healthy children on this measure.

Descriptive Friendship Data
During the Friendship Interview, 31% of children in the total sample named three best friends, 27% reported having two best friends, 29% had one best friend, and 13% reported having no best friend. When children reported no best friend, they were asked to describe their closest friendship, even if they did not consider that individual a "best" friend. Of the 9 children with no best friend, 7 were in the asthma group and 2 were in the HIV group. Results of a two-way ANCOVA that included age as a covariate revealed a significant main effect of group, F(2,63) = 4.82, p = .011, with a medium effect size (partial η² = .13). Pairwise comparisons revealed that children in the asthma group reported having significantly fewer best friends on average (M = 1.29, SE = 0.21) than children in the healthy group (M = 2.20, SE = 0.22), 95% CI (−1.54 to −0.29), p = .005, and the HIV group (M = 2.00, SE = 0.24), 95% CI (−1.34 to −0.09), p = .026, based on estimated marginal means.

Hypothesized Differences Among Groups
Descriptive statistics for all study measures are summarized by group in Table II.

Internal Representations of Relationships
Univariate ANCOVAs were performed to determine whether scores on the two CARRS subscales differed based on whether children had HIV, asthma, or no illness, after controlling for the influence of age and gender. Age and gender were included as covariates with illness group based on findings from the literature. When the Affect Tone scale was entered as the dependent variable, the main effect of group was significant, F(2,63) = 5.56, p = .006, with a large effect size (partial η² = .15). Examination of estimated marginal means for Affect Tone scores by group revealed that on average, it was the asthma group that scored the lowest on the scale (M = 49.80, SE = 1.74), while the HIV group scored somewhat higher (M = 53.80, SE = 2.00) and the healthy children scored the highest (M = 58.60, SE = 1.85). Planned comparisons among the groups indicated that children with asthma differed significantly in their Affect Tone scale responses from healthy children, 95% CI (−14.07 to −3.53), p = .001, while children with HIV did not differ significantly in their responses from the healthy group or the asthma group. Additionally, the main effect of age was significant, F(1,63) = 10.80, p = .002, partial η² = .15, suggesting that child maturity may have impacted scores.

When the Emotional Investment in Relationships scale score was entered as the dependent variable, ANCOVA revealed a significant main effect for group, F(2,63) = 3.40, p = .040, partial η² = .10, as well as gender, F(1,63) = 9.15, p = .004, partial η² = .13. The asthma group again scored the lowest on average (M = 48.41, SE = 1.39), with the HIV group scoring higher.

Table II. Descriptive Statistics for Study Measures by Group

<table>
<thead>
<tr>
<th>Measure</th>
<th>Asthma (n = 25) M (SD)</th>
<th>HIV (n = 21) M (SD)</th>
<th>Healthy (n = 24) M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARRS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affect tone</td>
<td>50.64 (9.11)</td>
<td>53.62 (8.46)</td>
<td>56.75 (8.96)</td>
</tr>
<tr>
<td>Emotional investment</td>
<td>47.92 (9.08)</td>
<td>52.14 (4.61)</td>
<td>53.88 (5.91)</td>
</tr>
<tr>
<td>FQQ-R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Companionship &amp; recreation</td>
<td>0.38 (0.19)</td>
<td>0.50 (0.15)</td>
<td>0.54 (0.16)</td>
</tr>
<tr>
<td>Validation &amp; caring</td>
<td>2.83 (0.95)</td>
<td>3.18 (0.48)</td>
<td>3.45 (0.34)</td>
</tr>
<tr>
<td>Help &amp; guidance</td>
<td>2.55 (0.82)</td>
<td>2.78 (0.72)</td>
<td>2.94 (0.36)</td>
</tr>
<tr>
<td>Intimate disclosure</td>
<td>2.17 (1.04)</td>
<td>2.09 (0.96)</td>
<td>2.85 (0.75)</td>
</tr>
<tr>
<td>Conflict resolution</td>
<td>2.60 (1.01)</td>
<td>2.70 (0.97)</td>
<td>3.14 (0.74)</td>
</tr>
<tr>
<td>Conflict &amp; betrayal</td>
<td>1.05 (0.69)</td>
<td>1.08 (0.63)</td>
<td>0.82 (0.61)</td>
</tr>
<tr>
<td>PIC-2 Social adjustment</td>
<td>55.12 (10.50)</td>
<td>51.14 (15.42)</td>
<td>53.67 (11.72)</td>
</tr>
<tr>
<td>BASC-2 Interpersonal relations</td>
<td>47.08 (11.17)</td>
<td>50.62 (9.30)</td>
<td>50.29 (11.73)</td>
</tr>
<tr>
<td>PPVT-III</td>
<td>92.16 (10.66)</td>
<td>92.00 (12.15)</td>
<td>92.67 (8.30)</td>
</tr>
</tbody>
</table>

Note. CARRS = Children's Affective Representations of Relationships Scale; values are raw scores. FQQ-R = Friendship Quality Questionnaire – Revised; values range from 0 to 4. PIC-2 = Personality Inventory for Children, Second Edition; values are T-scores (higher = more severe). BASC-2 = Behavioral Assessment System for Children, Second Edition, Self-Report of Personality; values are T-scores (higher = more adaptive functioning). PPVT-III = Peabody Picture Vocabulary Test, Third Edition.
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Child Report of Friendship Quality and Social Functioning
Contrary to hypotheses, mean FQQ-R subscale scores for the children with HIV were consistent with those obtained by average- to high-accepted children in the normative sample (Parker & Asher, 1993) and generally reflected satisfactory levels of friendship quality. To test the hypothesis that children with HIV would differ from children with asthma and healthy children in their report of friendship quality, a between-subjects MANCOVA was performed with the six FQQ-R subscales as dependent variables. Again, contrary to expectations, FQQ-R scores did not differ significantly by illness group. In other words, indicators of friendship quality as a whole did not differ based on whether children had HIV, asthma, or no chronic illness.

Hypothesized group differences in more general child-reported social functioning on the BASC-2 SRP Interpersonal Relations Scale were then tested using ANCOVA. The main effect of group was significant, $F(2,63) = 3.39$, $p = .040$, with a medium effect size ($\eta^2 = .10$); there were no interaction effects. Estimated marginal means showed that once again, children in the asthma group scored lowest ($M = 45.56$, $SE = 2.07$), children with HIV scored higher on average ($M = 51.10$, $SE = 2.38$), and healthy children with an HIV-positive mother scored the highest ($M = 53.40$, $SE = 2.19$). Planned pairwise comparisons demonstrated that children with asthma scored significantly lower than healthy children on this measure, 95% CI ($-14.09$ to $-1.59$), $p = .015$. Despite this difference, mean scores of children in all three groups fell in the subclinical range with regard to self-reported interpersonal functioning.

Parent Report of Child Social Adjustment
Group differences in caregiver-reported social functioning on the PIC-2 Social Adjustment Composite were assessed using ANCOVA. Results showed no significant main effect [$F(2,63) = 1.13$, $p = .32$, $\eta^2 = .04$] or interaction effect [$F(2,63) = 0.56$, $p = .57$, $\eta^2 = .02$], indicating that contrary to the original hypothesis, group differences in social adjustment did not exist based on caregiver report. Caregivers across groups rated their children as generally well-adjusted in the social domain (i.e., mean scores did not fall in the clinically significant range).

Discussion
The purpose of this study was to examine the friendships and social expectations of children with perinatally acquired HIV, an understudied area in the literature. Results were unexpected, in that they showed a trend for the children with asthma, not HIV, to demonstrate poorer self-reported indicators of friendship and the most negative social expectations of the three groups. The children with HIV reported friendship quality on par with established norms, as well as age-appropriate interpersonal functioning. It is worth pointing out that these children were physically healthy, with low-viral loads and fewer illness-related missed school days than their peers with asthma. Their low-viral loads suggest that most of the children were adequately adherent to their antiretroviral medications, reducing not only their risk of perceptible illness but also the potential for associated neurocognitive impairment that can lead to poor social functioning. PPVT-III scores, while somewhat lower than established norms, fell in the average range for the HIV-positive youths and were not significantly different from the scores of children with asthma or healthy children. While the PPVT is only an estimate of cognitive functioning and neurocognitive impairments linked to HIV tend to be more subtle and specific in nature, it is encouraging that scores were comparable to those of uninfected children in this urban setting. It is quite plausible that a combination of overall good health, satisfactory cognitive functioning, and regular school attendance helped these children establish and maintain satisfying friendships with peers despite living with a chronic illness.

While it is encouraging that the children with HIV, as well as healthy children affected by HIV, reported having best friends and experiencing rewarding relationships with peers, the findings that children with asthma may not be faring as well are concerning. Compared with the other two groups, children with moderate to severe persistent asthma in this sample reported significantly fewer best friends, displayed more negative affect as it related to their expectations of others in social contexts, demonstrated less of an ability to invest emotionally in relationships, and reported inferior interpersonal relations. This supports existing research showing poor psychosocial outcomes for youth with more severe forms of asthma (e.g., Calam, Gregg, & Goodman, 2005; Fritz & McQuaid, 2000), particularly in low income urban areas (Weil et al., 1999).
What factors might account for these differences? Although the answer is likely multifaceted, level of disease activity may be one explanation. While HIV and persistent asthma are both potentially life-threatening diseases that require daily management and regular monitoring by a medical team, symptom expression differed between the groups. As noted previously, the children with HIV were physically healthy, usually demonstrating no outward signs of illness. In contrast, the children with asthma had to exhibit symptoms (e.g., wheezing) at least once per day in order to be diagnosed with the moderate or severe persistent form of the disease. Their symptoms would be visible to peers and be more likely to impact their activity level and socialization opportunities. Greater symptom expression would also likely result in more frequent trips to the hospital or clinic, with implications for school attendance and peer interaction. Our findings showed that the children with asthma missed more school due to their illness than those with HIV, suggesting that their opportunities to interact with peers may have been impacted to a greater degree, with implications for the quality of their social functioning.

Lower socioeconomic status may have also played a role. The median yearly household income of the asthma group fell between $10,001 and 20,000 per year, while median income for the HIV group was slightly higher ($20,001–30,000). Although income levels for the asthma and healthy groups were comparable, inadequate resources in conjunction with the burden of high disease severity experienced by the children with persistent asthma could be expected to increase family stress and reduce quality of life. Family stress has been linked to more severe illness presentation in children with asthma via pathways that include less vigilant parenting and illness management practices (Drotar & Bonner, 2009; Kaugars, Klinnert, & Bender, 2004) as well as child emotional states that affect airway inflammation (Wood et al., 2006). It follows that poverty-related family stress and greater disease severity may have accounted for some of the social difficulties reported by the children with asthma in our sample.

It is also possible that an explanation for the observed group differences lies in the systems of care in place for these different populations of children. Federal funding via the Ryan White Care Act has established a structure of supportive services for individuals and families affected by HIV, which in addition to medical care includes case management, mental health services, and advocacy programs. The children in our sample were seen every 2 months in a pediatric specialty clinic by a multidisciplinary team of physicians, nurses, social workers, psychologists, and case managers specializing in HIV/AIDS. They were routinely referred to free hospital-sponsored educational programs, support groups, and camps. Groups and camps, while designed to bring children together in a fun and supportive atmosphere, also included educational activities with social skill-building themes (e.g., communication, problem solving, etc.). Recurring contacts with supportive professionals and the availability of these free services likely translate into greater knowledge of HIV, higher levels of self-efficacy in managing the effects of the virus, and increased accountability that may result in better clinic attendance and enhanced health outcomes (Naar-King et al., 2007). Support services were also available for entire families affected by HIV, allowing mothers with HIV and their uninfected children to increase knowledge while reducing stigma and building social support within the HIV community. In sum, the children with HIV and the healthy children with HIV-positive mothers were “hooked in” to a supportive structure of services that may have buffered against stressors associated with living with a chronic illness in an economically disadvantaged area, and indirectly may have resulted in better psychosocial outcomes. This comprehensive approach is consistent with the “medical home,” defined by the American Academy of Pediatrics (2004) as accessible, family-centered, continuous, coordinated, compassionate, and culturally effective care. Unsurprisingly, care within a medical home has been associated with positive outcomes for youth, including better provider relationships, improved family functioning, fewer missed school days, and better physical and mental health than those who do not receive inclusive services (Homer et al., 2008).

In contrast, no such comprehensive, federally funded program exists for children with asthma despite published statistics on asthma-related morbidity and mortality, particularly in urban minority populations. The children with asthma in this study also received care in a pediatric specialty clinic by a multidisciplinary team. However, hospital- and community-based programs were not available to these families to provide additional support in managing illness-related stressors and other life challenges. Kang, Mellins, Ng, Robinson, & Abrams (2008) noted that people living with HIV in poor urban settings are able to access services that improve quality of life over and above what would be attainable for uninfected individuals in the same socioeconomic circumstances. A definite need exists to extend similar services to other at-risk groups; rates of pediatric asthma-related morbidity and mortality clearly identify this group as one in need of additional support.
Limitations and Future Directions

One limitation of this study is sampling. The number of subjects in each group was small, with ages ranging from middle childhood to early adolescence. Because the population of children with HIV is aging and the incidence of perinatal infection in the United States has decreased significantly in recent years, it will be increasingly difficult to obtain adequate sample sizes of younger children from a single site. Collaboration with other pediatric HIV clinics would provide a large enough sample to adequately examine child social functioning at different stages of disclosure to their HIV status. It is also possible that selection bias may partially explain the better child social functioning in the healthy sample. Mothers with HIV who actively attend support groups are likely higher functioning than those who do not, with more emotional resources to cope with the stressors of living with chronic illness; it follows that this may positively impact their children with regard to physical and psychosocial outcomes. Finally, this study did not include a control group of healthy urban children completely unaffected by HIV/AIDS. Future studies of friendship in children with HIV should incorporate a demographically matched sample of children who do not have a biological parent living with HIV in order to identify the effects of various HIV-related stressors on child social functioning. Given these limitations, results should be viewed as preliminary and verified with additional study.

Awareness of illness status varied across the three comparison groups, as well as within the HIV group. Some children with HIV had not yet been fully disclosed to their illness, although all were aware of a medical need to take medicine and see a doctor regularly; this is a function of age and maturity, as children are typically not disclosed to their diagnosis until they reach puberty and this knowledge becomes necessary. Also, some healthy children were not aware of their mother’s HIV diagnosis, since child maturity and family preference dictate when this information is disclosed. Different levels of awareness made it difficult to assess the potential impact of stigma on children’s social functioning; this relationship should be explored in future studies with somewhat older children. Future research should also include adolescents with perinatally acquired HIV, for whom the decision to disclose their diagnosis begins to have more important implications for both emotional and physical health. Targeting older youth may prove fruitful in exploring the potential health and psychosocial benefits of disclosure to friends.

Results of this study bring encouraging new information to light about the psychosocial functioning of children with perinatally acquired HIV in the era of HAART. Clinically, it is important for practitioners to be aware of the potential for peer relationship difficulties in this group of children and to make the topic of social functioning a routine part of the assessment process. Further research is needed to better understand the factors that promote positive social adjustment in this group of at-risk children, in order to inform and advance interventions for youth living with HIV at the individual, family, and community levels.

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References


