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Assessing psychiatric symptoms in youths affected by HIV: Comparing a brief self-administered rating scale with a structured diagnostic interview

Miriam Chernoff, Ph.D.¹, Konstantia (Nadia) Angelidou, M.S.¹, Paige L. Williams, Ph.D.^{1,2}, Pim Brouwers, Ph.D.³, Meredith Warshaw, M.S.S., M.A.¹, Sharon Nachman, M.D.⁴, and for the IMPAACT P1055 Study Team

¹Center for Biostatistics in AIDS Research, Harvard T.H. Chan School of Public Health, Boston, MA, USA

²Department of Biostatistics, Harvard T.H. Chan School of Public Health, Boston, MA, USA

³HIV Prevention Science Branch, National Institutes of Mental Health, NIH, Rockville, MD, USA

⁴Department of Pediatrics, Stony Brook University School of Medicine, Stony Brook, NY, USA

Abstract

Brief psychiatric assessment tools are needed for evaluating children affected by HIV for emotional and behavioral problems. We compared a self-administered symptom rating scale (CASI-4R) to a semi-structured diagnostic interview (DICA-P) in 136 U.S. children affected by HIV. Agreement and performance measures for the two instruments were computed for attention deficit hyperactivity disorder, depression, anxiety and disruptive behavior. Correlations and regression analyses were conducted to compare the two instruments, and to evaluate their associations with social, academic and global function. Higher CASI-4R symptom severity scores were associated with DICA diagnoses ($p < 0.02$ for all disorders). Agreement (κ) between DICA diagnoses and CASI-4R Clinical Cutoffs (which incorporated symptoms and impairment) was low to moderate (0.19–0.40 for all disorders). Thirty-two percent of cases with a DICA diagnosis were identified by the CASI-4R Clinical Cutoff (sensitivity), yet over 90% of DICA-negative cases were negative by the CASI-4R (specificity). Sensitivity was higher using CASI-4R Severity Score thresholds based on median scores compared to the DICA diagnoses. Presence and severity of psychiatric symptoms and impairment were associated with poorer academic, social, and global function. The CASI-4R symptom checklist can be used to inexpensively screen youth

Corresponding Author: Miriam Chernoff, Center for Biostatistics in AIDS Research, Harvard T. H. Chan School of Public Health, 651 Huntington Avenue, Boston, MA 02115, Phone: 617-432-0358, Fax: 617-432-2832, mchernoff@sdac.harvard.edu.

Control of Data

The authors have full control of the primary data and agree to allow the journal to review the anonymized data if requested.

Compliance with Ethical Standards

Human and Animal Rights and Informed Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

Conflict of Interest The authors declare that they have no conflicts of interest.

affected by HIV for emotional and behavioral problems, although it is important that there be appropriate mental health evaluation follow-up.

Keywords

Children and adolescents; HIV; mental health; psychiatric status rating scales; validity

INTRODUCTION

In the United States (U.S.), large numbers of children and youth living in families affected by human immunodeficiency virus (HIV) are aging up through childhood and adolescence. These youth have higher prevalence rates of emotional and behavior problems when compared to the general U.S. youth population (Chernoff et al., 2009; Gadow et al., 2010; Malee et al., 2011; Mellins et al., 2012; Mellins & Malee, 2013; Rutstein et al., 2007).

Both structured psychiatric interviews (Angold et al., 2012; Sheehan et al., 2010) and behavior rating scales (Myers & Winters, 2002) have been used to assess emotional and behavioral problems in the general youth population and among those with pediatric HIV (Mellins & Malee, 2013). However, few studies in the U.S. or elsewhere have compared the predictive validity of rating scales versus structured interviews in youth affected by HIV. The primary objective of this study was to compare the prevalence of psychiatric disorders using both semi-structured diagnostic interviews and self-administered rating scales, explore agreement between the two types of assessments, and examine whether the two instruments predicted academic, social and global function. We hypothesized that the sensitivity of the rating scales in predicting the diagnostic interview outcomes would be high and that both would have similar predictive validity with regards to academic, social and global function.

METHODS

The International Maternal Pediatric Adolescent AIDS Clinical Trials Network (IMPAACT) P1055 study was a large multi-site, two-year observational study of psychological function in U.S. children affected by HIV, with a primary aim to estimate the prevalence of psychiatric conditions and symptomatology in the pediatric/adolescent U.S. population affected by HIV (Gadow et al., 2010). P1055 opened to accrual in June 2005 at 29 sites in the U.S. and Puerto Rico and closed to accrual in September 2006, with follow-up continuing through December 2008. It enrolled 575 youth, 319 of whom had perinatally-acquired HIV (PHIV) infection. The study was approved by the Institutional Review Board (IRB) at each IMPAACT site, and appropriate measures were taken to protect the identity of the participants. Informed consent was obtained from the primary caregiver and assent was obtained for youth 12 years or older.

Study Population

Details of the parent study design and procedures can be found in previous P1055 publications (Gadow et al., 2010; Williams et al., 2013). Children were between 6 to < 18 years of age at entry with equal target accruals for age (<12 and ≥ 12 years) and gender

subgroups. Youth were either PHIV or HIV-uninfected, the latter either perinatally HIV-exposed but uninfected or presumed uninfected and living in a household with an HIV-infected member. Youth were excluded from the study if developmentally disabled, due to the need to be able to complete self-administered rating scales.

Participants and their caregivers completed a battery of psychological, personal and family assessment instruments. When necessary, site staff read the questionnaires out loud. Lifetime psychiatric diagnoses were collected and coded using the Medical Dictionary for Regulatory Activities (MedDRA) terminology, version 13.0, a multi-axial and hierarchical system of clinically validated international medical terminology (Maintenance-and-Support-Services-Organization, 2016).

Because of budget and training requirements, only the six largest P1055 research sites (among 29 total) participated in the semi-structured diagnostic interview and are included in the analyses presented here. Only English speaking participants and caregivers were eligible for a diagnostic interview. These restrictions yielded 155 eligible participants, among which 136 (88%) were interviewed. Clinicians at these six sites were centrally trained. The interview was administered within 90 days of study entry. Sites were asked to administer the primary caregiver version prior to administering the youth version. Approximately 20% of interviews were audio-taped (destroyed after review), in order to verify administration and scoring procedures. The interview was scored centrally.

INSTRUMENTS

We assessed psychological problems through both *Diagnostic and Statistical Manual of Mental Disorders; Fourth Edition (DSM-IV)*-referenced rating scales and semi-structured diagnostic interviews (American Psychiatric Association, 2000).

Diagnostic Interview for Children and Adolescents

The Missouri Assessment of Genetics Interview for Children (MAGIC) is a version of the *Diagnostic Interview for Children and Adolescents (DICA)*, a semi-structured interview designed to assess *DSM-IV* psychiatric diagnoses, with an expanded section on attention deficit hyperactivity disorder (ADHD) (Reich, 2000; Reich & Todd, 2002a, 2002b, 2002c; Welner et al., 1987). Studies have shown adequate test-retest reliability and acceptable validity of both caregiver (DICA-P) and youth (DICA-C) versions in comparison to clinician judgment (Ezpeleta et al., 1997; Reich, 2000; Todd et al., 2003).

We focused on conditions of greatest interest to the community of families with children affected by HIV, including ADHD, depression, anxiety, and disruptive behavior. Only current symptoms were considered in our analyses. The DICA-P was administered to caregivers of children ranging from 6 to 18 years old, and the DICA-C was administered to children ranging from 11 to 18 years old.

Symptom rating scales

Caregivers evaluated youth psychiatric symptoms with the *Child and Adolescent Symptom Inventory-4R* (CASI-4R) a 147-item *DSM-IV*-referenced rating scale that assesses the

symptoms of many child and adolescent (ages 5–18 years) psychiatric disorders (Gadow, Perlman, Ramdhany, & de Ruiter, 2015; Gadow & Sprafkin, 2005; Gadow & Sprafkin, 2015). Following each group of symptoms, the rater was asked one question about symptom-related functional impairment: “How often do the behaviors in [symptom category] interfere with your child’s ability to do school work or get along with other people?” Most items were scored on a four-point Likert scale: 0 = *never*, 1 = *sometimes*, 2 = *often*, 3 = *very often*, with questions considered to be clinically significant if the response was *often* or *very often*. A Symptom Severity score was defined as the sum of item points; higher scores indicated more and/or more severe symptoms. The Impairment Cutoff was defined as positive if the impairment question responses were clinically significant; the Symptom Cutoffs were derived in parallel with the *DSM-IV*, where certain numbers of positive (clinically significant) symptoms in specified categories must be met. Clinical Cutoffs were considered positive when both Symptom Cutoff and Impairment Cutoff were positive. The CASI-4R has demonstrated satisfactory psychometric properties (Gadow & Sprafkin, 2015; Sprafkin et al., 2002; Sprafkin et al., 2016).

Youth 12 years or older completed the parallel *Youth’s (Self Report) Inventory-4R* (YI-4R; 128 items) and younger children completed the *Child (Self Report) Inventory-4* (CI-4; 34-items). The *Child (Self Report) Inventory-4* (CI-4) rating scale excluded adolescent onset disorders, such as ADHD, Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) as well as impairment questions (Gadow et al., 2010).

Columbia Impairment Scale of Global Impairment

The Columbia Impairment Scale (CIS) is a 13-item scale that provides a global measure of impairment and is completed by the caregiver. Four major areas of youth function were assessed: interpersonal relations, broad psychopathological domains, functioning in job or school work, and use of leisure time. The CIS has good reliability and validity (Bird et al., 1993). Responses were scored on a 5-point Likert scale ranging from 0 = *No problem* to 4 = *Very big problem*. We used the mean of the 13 item scores, with a higher score indicating more impairment.

Social and Academic Function

Social and academic function were assessed by the caregivers of children from 6 to 18 years old through summing item scores for a series of questions about performance at school (four items: behavior problems at school, evaluated for special education, held back a grade, and overall school performance) and performance in social situations (three items: with whom child plays, number of friends, problems getting along with other children). Scores were scaled to a 0 to 10 range, with higher scores indicating poorer function. Individual questions have been previously used in research studies.

STATISTICAL METHODS

We summarized design (HIV status, age group, and sex), personal, family and psychiatric characteristics among participants with at least one DICA-P or DICA-C assessment at study entry. Psychiatric status was assessed by the DICA-P and the symptom inventory ratings

(CASI-4R; Clinical Cutoff and Symptom Severity scores). We focused on four target conditions shown to have high prevalence in prior P1055 research, namely ADHD (inattentive, hyperactive or combined), disruptive behaviors (CD or ODD), depression (major depression or dysthymia) and anxiety (separation or general anxiety). We also defined an indicator of “any disorder” when at least one condition was present with impairment (positive Clinical Cutoff). The Symptom Severity scores for the four target conditions were summed to yield a Total Severity score.

We fit unadjusted logistic regression models to explore whether the CASI-4R Symptom Severity scores predicted DICA-P psychiatric outcomes; odds ratios were expressed in terms of one half standard deviations of the predictors for ease of interpretation. Generalized R-square statistics assessed proportion of explained variability. We estimated the sensitivity, specificity and positive and negative predictive values for the caregiver-assessed CASI-4R Clinical Cutoff score as compared to the caregiver-assessed DICA-P (referent), along with their exact 95% confidence intervals (Hennekens & Buring, 1987). We computed accuracy (proportion agreement between test and referent) and Cohen’s *kappa*, a measure of the strength of agreement (Agresti, 1996). For conditions with prevalence 5% or higher by the DICA-P, we evaluated the association of DICA-P outcomes and CASI-4R Clinical Cutoff scores separately and together with each academic, social and global function outcomes, using general linear regression models. Spearman rank correlations between the CASI-4R severity scores and each of three measures of function were computed. We conducted two additional sets of sensitivity/specificity analysis: 1) comparing CASI-4R Symptom Severity thresholds (e.g., cutoffs above the median) to DICA-P outcomes; 2) comparing each CASI-4R Clinical Cutoff score and DICA-P outcome to the presence of a clinical diagnosis as defined by a keyword search of the MedDRA Preferred Term code names.

Two-tailed *p*-values less than 0.05 were considered significant. All analyses were conducted using SAS statistical software (SAS Institute, Cary, NC, Version 9.2).

RESULTS

Seventy-eight children completed a DICA-C interview and 130 caregivers completed a DICA-P interview. Overall, 136 youth (90 PHIV, 46 HIV-uninfected) had at least one DICA-C or DICA-P assessment (49% male, 53% black non-Hispanic, 31% Hispanic; Table 1). Although over half of the PHIV youth had peak HIV RNA copy numbers or nadir CD4 percentages indicative of severe past disease, the majority (>60%) had well-controlled HIV disease at study entry. Only 27% had a prior AIDS defining condition (CDC class C).

Psychiatric status

According to caregiver DICA-P reports, prevalence rates for specific disorders among the youth ranged from 2% for depression to 12% for ADHD, with 19% having at least one of the four target conditions. Caregivers reported lower rates of youth problems on the CASI-4R (Table 2), with 11% having at least one target condition. Based on youth surveyed, in contrast, only 8% with DICA-C interviews self-reported at least one of the four target disorders by the YI-4R Clinical Cutoff (data not shown). As a result of very low youth-

reported DICA-C prevalence rates, e.g., 2 of 78 (3%) with disruptive disorder, we focus on the caregiver-reported results in subsequent analyses.

Association between symptom severity and DICA diagnoses

Youth with more severe CASI-4R ratings in each domain had greater odds of having a positive DICA-P outcome. The increase in odds was between 80% and 90% for each half standard deviation increase in severity score for ADHD, disruptive behaviors and at least one of the four target conditions (Figure 1). Based on the generalized R-square, the logistic regression models explained between 30% and 36% of the total variation for the first three measures (data not shown).

Agreement between CASI-4R and DICA-P

CASI-4R Clinical Cutoff scores for ADHD, for disruptive behaviors, and for the composite outcome of at least one target condition each showed modest agreement with DICA-P cutoff scores, with *kappa* values ranging from 0.19 to 0.40 (Table 3). The CASI-4R identified about one third of the DICA-P positive conditions for at least one of the four target conditions (sensitivity=0.32) whereas almost 60% of the CASI-4R conditions were also DICA-P positive (positive predictive value=0.57). Sensitivity for the ADHD was slightly higher whereas it was lower for disruptive disorders. In contrast, specificity and negative predictive values were 85% or higher. Using a median split of the caregiver-reported CASI-4R severity scores compared to the DICA-P cutoffs yielded higher sensitivities (any condition: 72%, anxiety: 75%, ADHD: 80%, and 100% for both depression and disruptive behavior), but lower specificities, ranging between slightly less than 60% and 70%.

Agreement between CASI-4R, DICA-P and MedDRA diagnoses

Prevalence by MedDRA coding is shown in Table 2. Sensitivity for the DICA-P cutoff against the MedDRA diagnosis was 43.3% for any of the four target conditions (95% CI: 25.5, 62.6) and 40.9% (95% CI: 20.7, 63.6) for ADHD. Sensitivity for the CASI-4R Clinical Cutoff compared to MedDRA was 30.0% (95% CI: 14.7, 49.4) for any of the four target conditions and 38.1% (95% CI: 18.1, 61.6) for ADHD. Positive predictive values were 52% and 60% for the DICA-P comparison and 64% and 67% for the CASI-4R comparison for any of the four target conditions and ADHD, respectively. Specificities and negative predictive values for all these comparisons were over 80% (data not shown).

Association between caregiver-reported psychiatric ratings and function

Presence of a positive DICA-P diagnosis and CASI-4R Clinical Cutoff case for ADHD, for disruptive behaviors, and for the composite outcome of any target condition each showed a strong association with poorer social and academic function (higher scores) as well as poorer global function (higher CIS scores; Figure 2). Sensitivity analyses including CASI-4R Clinical Cutoffs and DICA-P cutoffs in the same regression models showed consistent results for global and academic function, while the results for social function were attenuated (data not shown).

Association between caregiver-reported symptom severity and function

Higher CASI-4R Total Severity scores for the four target conditions were significantly positively correlated with poorer social function ($r=0.34$, $p < 0.001$), poorer academic function ($r=0.38$, $p < 0.001$) and poorer global functioning ($r=0.64$, $p < 0.001$). Of the individual psychiatric conditions, the highest correlations were between ADHD and disruptive behaviors and each of the function measures. For the three function measures, correlations were strongest for global function (Table 4).

DISCUSSION

We compared a psychiatric symptom checklist and a semi-structured diagnostic interview in children affected by HIV disease. Sensitivity of the CASI-4R compared to the DICA-P was modest although positive predictive value was higher. When we compared each measure to MedDRA-coded diagnoses, CASI-4R Clinical Cutoffs and DICA-P cutoffs each identified less than half of those participants with reported clinical diagnoses.

Differences between outcomes determined by clinician judgment and by structured interview have been documented (Ezpeleta et al., 1997). In addition, over 60% of youth with false negatives in our study were receiving either behavioral or medical treatment for psychiatric problems, suggesting that symptoms leading to recorded diagnoses might have abated with treatment, which could explain why both interview and rating scale failed to identify clinical cases.

Negative cases identified using the CASI-4R Clinical Cutoff scores were generally negative on the DICA-P and specificity rates were also high when we compared each DICA and CASI-4R to the MedDRA-coded diagnoses. High specificity assures that there is agreement between instruments in identifying cases that do not need further screening, which is an important determination when the costs of screening are considered.

Higher CASI-4R severity scores and positive DICA-P and CASI-4R Clinical Cutoff cases were associated with poorer academic, social and global function. Although partly explained by the inclusion of impairment criteria in the cutoff score definitions, this result still points to the problems that youth with emotional and behavioral problems may have in the real world.

In this study, both CASI-4R and DICA-P assessments identified overlapping sets of children and youth who merit further mental health evaluation. Because it is easier to use, requires less time (10–30 minutes vs. an hour) and does not require trained professionals to administer, we prefer the use of a rating scale over the clinical or structured interview. Use of the rating scale as one potential screening instrument in primary care should go in tandem with appropriate mental health follow-up evaluations.

Although the time burden of the CASI-4R is relatively low, it still contains over 100 items. Further work to develop even shorter assessment tools to identify youth at risk for having emotional problems is ongoing. Some of these alternative approaches explore the use of

computerized and mobile health (mHealth) based technologies while others explore more dimensional approaches taking advantage of overlapping symptoms between diagnoses.

Limitations

In this study we chose to study CASI-4R Clinical Cutoff Scores, which included an impairment dimension, to more closely approximate the DICA and *DSM-IV* diagnostic outcomes. When this study was implemented *DSM-IV* criteria were the standard for psychiatric diagnosis. Since then, in May 2013, the *DSM-5* was published. For the targeted diagnoses of this study, symptom and impairment criteria were largely the same between versions (Gadow et al., 2015). We pooled PHIV and HIV-uninfected youth in this study. Future studies could explore whether each group of youth respond differently to questions about psychiatric status. We believe it is important to consider youth self-reports in assessing emotional and behavioral problems but found too few positive DICA-C cases to compare with youth-self-reported assessments. As our study population was relatively small and may be selective to research settings, it is important that these results are replicated with a larger, more heterogeneous sample in order to clearly establish the clinical utility of the CASI-4R as a screening tool for mental health issues in youth affected by HIV.

CONCLUSIONS

We have demonstrated that the CASI-4R, a brief caregiver self-administered rating scale, performed acceptably compared to the DICA-P, a semi-structured diagnostic interview, in identifying youth with *DSM-IV*-referenced psychiatric problems. It performed particularly well in screening out youth without psychiatric problems. Further research is required to understand why the various assessment methods differ. Contingent on further replication of these results, valid and reliable symptom checklists can be used in the U.S. clinic setting to inexpensively screen youth affected by HIV for emotional and behavioral problems.

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References

- Agresti A. An introduction to categorical data analysis. New York: John Wiley and Sons, Inc; 1996.
- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Fourth edition, Text Revision. Washington, D.C.: American Psychiatric Association; 2000.
- Angold A, Erkanli A, Copeland W, Goodman R, Fisher PW, Costello EJ. Psychiatric diagnostic interviews for children and adolescents: a comparative study. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2012; 51(5):506–517. [PubMed: 22525957]
- Bird HR, Shaffer D, Fisher P, Gould MS, Staghezza B, Chen JY, Hoven C. The Columbia Impairment Scale (CIS): pilot findings on a measure of global impairment for children and adolescents. *International Journal of Methods in Psychiatric Research*. 1993; 3:167–176.
- Chernoff M, Nachman S, Williams P, Brouwers P, Heston J, Hodge J, Poalo VD, Deygoo NS, Gadow KD, Team IPS. Mental health treatment patterns in perinatally HIV-infected youth and controls. *Pediatrics*. 2009; 124:627–636. [PubMed: 19596734]
- Ezpeleta L, de la Osa N, Domenech JM, Navarro JB, Losilla JM, Judez J. Diagnostic agreement between clinicians and the Diagnostic Interview for Children and Adolescents--DICA-R--in an outpatient sample. *Journal of Child Psychology and Psychiatry*. 1997; 38(4):431–440. [PubMed: 9232488]
- Gadow KD, Chernoff M, Williams PL, Brouwers P, Morse E, Heston J, Hodge J, Di Poalo V, Deygoo NS, Nachman S. Co-occurring psychiatric symptoms in children perinatally infected with HIV and peer comparison sample. *Journal of Developmental and Behavioral Pediatrics*. 2010; 31:116–128. [PubMed: 20110828]
- Gadow KD, Perlman G, Ramdhany L, de Ruiter J. Clinical Correlates of Co-occurring Psychiatric and Autism Spectrum Disorder (ASD) Symptom-Induced Impairment in Children with ASD. *Journal of Abnormal Child Psychology*. 2015; doi: 10.1007/s10802-015-9979-9
- Gadow KD, Sprafkin J. Child and Adolescent Symptom Inventory-4R. Stony Brook, NY: Checkmate Plus; 2005.
- Gadow KD, Sprafkin J. [Retrieved 4/25/2016] The Symptom Inventories: An annotated bibliography. 2015. 2016, from http://www.checkmateplus.com/research/research_univ.htm
- Hennekens CH, Buring JE. Epidemiology in medicine. Boston: Little, Brown and Company; 1987.
- Maintenance and Support Services Organization. [Retrieved 7/13/2016] Welcome to MedDRA. 2016. 2016, from <http://www.meddra.org/>
- Malee KM, Tassiopoulos K, Huo Y, Siberry G, Williams PL, Hazra R, Smith RA, Allison SM, Garvie PA, Kammerer B, Kapetanovic S, Nichols S, Van Dyke R, Seage GR 3rd, Mellins CA. Mental health functioning among children and adolescents with perinatal HIV infection and perinatal HIV exposure. *AIDS Care*. 2011; 23(12):1533–1544. [PubMed: 21702707]
- Mellins CA, Elkington KS, Leu CS, Santamaria EK, Dolezal C, Wiznia A, Bamji M, McKay MM, Abrams EJ. Prevalence and change in psychiatric disorders among perinatally HIV-infected and HIV-exposed youth. *AIDS Care*. 2012; 24(8):953–962. DOI: 10.1080/09540121.2012.668174 [PubMed: 22519762]
- Mellins CA, Malee KM. Understanding the mental health of youth living with perinatal HIV infection: lessons learned and current challenges. *Journal of the International AIDS Society*. 2013; 16:18593. [PubMed: 23782478]
- Myers K, Winters NC. Ten-year review of rating scales. I: Overview of scale functioning, psychometric properties and selection. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2002; 41(2):114–122. [PubMed: 11837400]
- Reich W. Diagnostic interview for children and adolescents (DICA). *Journal of the American Academy of Child and Adolescent Psychiatry*. 2000; 39(1):59–66. [PubMed: 10638068]

- Reich W, Todd RD. MAGIC: Missouri Assessment of Genetics Interview for Children, Adolescent. St. Louis, MO: Washington University School of Medicine; 2002a.
- Reich W, Todd RD. MAGIC: Missouri Assessment of Genetics Interview for Children, Parent. St. Louis, MO: Washington University School of Medicine; 2002b.
- Reich W, Todd RD. MAGIC: Missouri Assessment of Genetics Interview for Children, Specifications Manual. St. Louis, MO: Washington University School of Medicine; 2002c.
- Rutstein R, Josephs J, Guar A, Flynn P, Spector S, Gebo K. for the HIV Research network. Mental health and special education issues in a cohort of HIV infected children: Results from a multisite survey; Paper presented at the 14th Annual Conference on Retroviruses and Opportunistic Infections; February 25–28, 2007; Los Angeles, CA. 2007.
- Sheehan DV, Sheehan KH, Shytle RD, Juris Janavs, Bannon Y, Rogers JE, Milo KM, Stock SL, Wilkinson B. Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). *Journal of Clinical Psychiatry*. 2010; 71(3):313–326. [PubMed: 20331933]
- Sprafkin J, Gadow KD, Salisbury H, Schneider J, Loney J. Further evidence of reliability and validity of the Child Symptom Inventory-4: parent checklist in clinically referred boys. *Journal of Clinical Child and Adolescent Psychology*. 2002; 31(4):513–524. [PubMed: 12402570]
- Sprafkin J, Steinberg EA, Gadow KD, Drabick DAG. Agreement Among Categorical, Dimensional, and Impairment Criteria for ADHD and Common Comorbidities. *Journal of Attention Disorders*. 2016; 20(8):665–673. [PubMed: 23400215]
- Todd RD, Joyner CA, Heath AC, Neuman RJ, Reich W. Reliability and stability of a semistructured DSM-IV interview designed for family studies. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2003; 42(12):1460–1468. [PubMed: 14627881]
- Welner Z, Reich W, Herjanic B, Jung KG, Amado H. Reliability, validity, and parent-child agreement studies of the Diagnostic Interview for Children and Adolescents (DICA). *Journal of the American Academy of Child and Adolescent Psychiatry*. 1987; 26(5):649–653. DOI: 10.1097/00004583-198709000-00007 [PubMed: 3667494]
- Williams PL, Chernoff M, Angelidou K, Brouwers P, Kacanek D, Deygoo NS, Nachman S, Gadow KD. Participation and Retention of Youth With Perinatal HIV Infection in Mental Health Research Studies: The IMPAACT P1055 Psychiatric Comorbidity Study. *Journal of Acquired Immune Deficiency Syndromes*. 2013; 63(3):401–409. [PubMed: 23714737]

Figure 1.

The association between DICA-P diagnoses and CASI-4R symptom severity ratings expressed as odds ratios of DICA-P diagnoses for each one half standard deviation increase in CASI-4R severity scores for each of four target psychiatric conditions and for any condition.

Figure 2.

Mean social, academic and global functioning scores by psychiatric condition status, as identified by the caregiver administered DICA-P and CASI-4R

Panel A. Social functioning.

Panel B. Academic functioning

Panel C. Global functioning

Notes for Figure 2: DICA= DICA-P assessment; CASI-4R= CASIR-4R Clinical Cutoff Score; Case=scored positive on condition; Non-case=scored negative on condition; Any Disorder: At least one of the four target disorders, depression, ADHD, anxiety, disruptive behavior; Global functioning is assessed by the Columbia Impairment Score (CIS)

Table 1

Personal and family characteristics at study entry for those children and youth with a DICA-P or DICA-C assessment or both

	Total (N=136)
Type of interview ^a	
Both DICA-P and DICA-C	72 (53%)
DICA-P only	58 (43%)
DICA-C only	6 (4%)
Cohort	
PHIV	90 (66%)
HIV-uninfected	46 (34%)
Personal characteristics	
Male (<i>n</i> ,%)	66 (49%)
Race, ethnicity (<i>n</i> ,%)	
White Non-Hispanic, Asian or other	22 (16%)
Black Non-Hispanic	72 (53%)
Hispanic (Regardless of Race)	42 (31%)
Age at registration (Median; Q1, Q3)	13.1 (9.4, 15.6)
Age < 12 years (<i>n</i> ,%)	57 (42%)
Functioning (Caregiver ratings)	
Social functioning (mean, <i>SD</i>)	1.63 (1.35)
Academic functioning (mean, <i>SD</i>)	2.18 (2.15)
Columbia impairment scale (median, Q1, Q3)	0.38 (0.15, 0.92)
Emotional and behavioral problems (Clinician diagnoses) ^b	
Any of four target disorders	31 (23%)
ADHD	22 (16%)
Disruptive behaviors	1 (1%)
Depression	10 (7%)
Anxiety	4 (3%)
Treatment for emotional and behavioral problems ^c	
Ever received psychiatric treatment	48 (36%)
Family characteristics ^c	
Caregiver is biological parent	70 (52%)
Number of prior year family life stressors (median, Q1, Q3)	1 (0, 2)
1 or more stressors	85 (64%)
Caregiver had 1 psychiatric disorders	18 (14%)
Household income < \$20,000	61 (49%)
Caregiver is high school graduate	104 (77%)

Q1=25th percentile, Q3=75th percentile; SD=standard deviation

^a**PHIV** Both DICA-P and DICA-C (52%), DICA-P only (41%), DICA-C only (7%). **HIV-uninfected** Both DICA-P and DICA-C (54%); DICA-P only (46%) Fisher's Exact Test p-value= 0.23.

^b MedDRA-coded diagnoses present at study entry and collected by chart review. Disruptive behavior includes preferred terms: oppositional defiant disorder (there were no cases of conduct disorder). Depression includes the preferred terms: depression and major depression. Anxiety includes the preferred terms: generalized anxiety disorder, anxiety and anxiety disorder. ADHD includes the term attention deficit hyperactivity disorder. Any of the four target diagnoses includes any of these noted preferred terms.

^c Missing observations: Psychiatric treatment (4); Caregiver relationship (1), Family life stressors (4); Caregiver psychiatric status (5), Household income (12), Caregiver education (1)

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Table 2

Prevalence of MedDRA coded and caregiver-reported psychiatric problems and median symptom severity by study instrument for participants with completed caregiver DICA-P interviews (n=130)

Condition	MedDRA ^a n (%)	DICA-P ^b n (%)	CASI-4R ^b Clinical Cutoff n (%)	CASI-4R Symptom Severity. Median (Q1,Q3; Max)
Any disorder ^c	30 (23%)	25 (19%)	14 (11%)	23.5 (14,38; 114.5)
ADHD	22 (17%)	15 (12%)	12 (9%)	10 (5,17.5; 48)
Disruptive behavior	0 (0%)	13 (10%)	4 (3%)	4 (1,8; 34)
Depression	10 (8%)	3 (2%)	0 (0%)	4.5 (3.5,8; 27.5)
Anxiety	4 (3%)	4 (3%)	1 (1%)	3 (1,6; 22)

Q1=25th percentile, Q3=75th percentile, Max=Maximum

^a MedDRA-coded diagnoses present at study entry and collected by chart review. Disruptive behavior includes preferred terms: oppositional defiant disorder (there were no cases of conduct disorder). Depression includes the preferred terms: depression and major depression. Anxiety includes the preferred terms: generalized anxiety disorder, anxiety and anxiety disorder. ADHD includes the term attention deficit hyperactivity disorder. Any of the four target diagnoses includes any of these noted preferred terms.

^b CASI-4R Clinical Cutoff Scores, 3 missing observations for ADHD and 2 each missing for Depression, Anxiety and Disruptive behavior. CASI-4R severity scores, 4 missing for each measure; DICA-P; 1 missing for each measure.

^c At least one of the four target disorders, ADHD, depression, anxiety, disruptive behavior. For Symptom Severity, the measure is the sum of all item scores for the component conditions.

A comparison of caregiver-reported CASI-4R Clinical Cutoff Score with DICA-P outcomes (as referent) for conditions and summary scores with 5% or higher prevalence rates^a

Table 3

Psychiatric Disorder	N ^c	TP ^c	FP ^c	FN ^c	TN ^c	Kappa (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)	Positive Predictive Value (95% CI)	Negative Predictive Value (95% CI)	Accuracy (95% CI)
Any disorder ^b	129	8	6	17	98	.31 (.10, .52)	.32 (.14, .53)	.94 (.87, .97)	.57 (.28, .82)	.85 (.77, .91)	.82 (.74, .88)
ADHD	127	6	6	8	107	.40 (.14, .65)	.43 (.17, .71)	.95 (.88, .98)	.50 (.21, .78)	.93 (.86, .96)	.89 (.82, .93)
Disruptive Behavior	128	2	2	11	113	.19 (-.06, .46)	.15 (.01, .45)	.98 (.93, .99)	.50 (.06, .93)	.91 (.84, .95)	.90 (.83, .94)

^aIn these analyses, the DICA-P is considered as the referent. Depression and anxiety analyses are not presented in the table for the following reasons: No cases of depression were identified by the CASI-4R Clinical Cutoff score and only three were identified by the DICA-P. There was no overlap between the cases of anxiety identified by the two instruments (one case was identified by CASI-4R Clinical Cutoff and four by the DICA-P).

^bAt least one of the four target disorders, depression, ADHD, anxiety, disruptive behavior

^cCounts; N=Total; TP=True positive; FP=False positive; FN=False negative; TN=True negative

Table 4

Correlations between caregiver-reported CASI-4R severity scores and social, academic and global functioning.

Severity score	Social Functioning		Academic Functioning		Global functioning ^b	
	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value
Any disorder ^a	.345	<.001	.380	<.001	.644	<.001
ADHD	.329	<.001	.412	<.001	.557	<.001
Disruptive behaviors	.336	<.001	.256	.004	.631	<.001
Depression	.173	.05	.248	.01	.313	<.001
Anxiety	.241	.01	.243	.01	.468	<.001

^aThe CASI-4R severity score for any disorder (Total Severity Score) is the sum of all item scores for the four target disorders, depression, ADHD, anxiety, disruptive behavior.

^bGlobal functioning is assessed by the Columbia Impairment Score