

# Roles of medication responsibility, executive and adaptive functioning in adherence for youth with perinatal HIV

## **Patricia A. Garvie, PhD**

Susannah Allison, PhD, Sean S. Brummel, PhD, Kathleen Malee, PhD, Megan L. Wilkins, PhD, Lynnette L. Harris, PhD, Miriam Chernoff, PhD, Sharon L. Nichols, PhD for the Pediatric HIV/AIDS Cohort Study

9<sup>th</sup> Annual Conference on Treatment & Prevention Adherence

June 10, 2014



# Background

- ▣ Assuming responsibility for medication adherence is a critical but challenging developmental task for youth with perinatally acquired HIV (PHIV)
- ▣ To help prepare youth for transition to adulthood, it is essential to understand how:
  - Medication responsibility
  - Executive functions (EF), and
  - Adaptive functioning (AF)

contribute to adherence and successful medication management among youth with PHIV prior to adulthood

# Background (cont.)

## ▣ Executive Functions (EF):

- Abilities involved in successful independent and purposive behavior such as the ability to initiate behavior, inhibit competing actions, select relevant task goals, plan, organize, flexibly shift mental set, problem-solve, evaluate consequences, and self-monitor (Lezak, Howieson, & Loring, 2004; Gioia et al., 2000)

## ▣ Adaptive Behavioral Functioning (AF):

- abilities involved in independently managing activities of daily living (Sparrow, Balla, & Cicchetti, 1984)

- ▣ EF have predicted adherence in adults and may, along with AF, inform adherence interventions for youth with PHIV

# Objectives

- To examine the relationships among measures of AF, EF, and adherence among youth with PHIV
- To determine whether AF and EF are associated with adherence outcomes among youth with PHIV

# Methods

- ▣ Youth with PHIV aged 7-16 years enrolled in the Pediatric HIV/AIDS Cohort Study (PHACS) Adolescent Master Protocol (AMP)
  - a prospective longitudinal cohort study designed to define the impact of HIV infection and antiretroviral (ARV) therapy on pre-adolescents and adolescents with perinatal HIV infection conducted at 15 sites in the US and Puerto Rico
- ▣ on ARV medication
- ▣ with completed measures of...

# Measures

- Caregiver and youth reported responsibility for adherence (youth, caregiver or shared)
  - Caregiver and youth-reported 7-day recall adherence
  - Adaptive Behavior Assessment System, 2<sup>nd</sup> Edition (ABAS-2), Caregiver report, General Adaptive Composite (GAC)
  - Behavior Rating Inventory of Executive Function (BRIEF), Youth ( $\geq 11$  yrs) and Caregiver reports, General Executive Composite (GEC), Behavioral Regulation Index (BRI), and Metacognition Index (MI)
  - Children's Color Trails Test (CCTT), Parts 1 and 2
  - Demographic and health characteristics
- ❖ ***Adherence defined as: No reported missed doses in past 7 days*** (used worst of CG or youth report)

# Analyses

- ▣ Descriptive statistics
- ▣ Multivariable Logistic Regression
- ▣ p-values  $<0.05$  were considered statistically significant

# Results: Youth Participant Characteristics

Characteristic	Adherent N=187	Non-Adherent N=72	p-value
Age, m(SD)	12.1 (2.47)	12.1 (2.41)	0.847
Gender, n(%)			0.427
Male	96(51.3)	33 (45.8)	
Female	91(48.7)	39 (51.2)	
Race, n(%)			0.150
Black	138 (73.8)	59 (81.9)	
White	37 (19.8)	10 (13.9)	
Ethnicity, n (%)			0.551
Hispanic	40 (21.4)	13 (18.1)	
FSIQ, m(SD)	84.65 (15.45)	86.38 (15.05)	0.762
Word Reading, m(SD)	85.00 (17.91)	87.61 (19.18)	0.380



# Results: Youth Participant Characteristics

Characteristic	Adherent N=187	Non-Adherent N=72	p-value
Current CD4%, m(SD)	32.6 (9.2)	30.6 (10.5)	0.236
<b>Nadir CD4%, m(SD)</b>	16.77 (8.96)	19.73 (8.70)	<b>0.019</b>
Age at nadir CD4%, m(SD)	5.47 (4.18)	6.54 (4.51)	0.093
<b>Current Log RNA VL, m(SD)</b>	2.48 (0.87)	2.76 (1.00)	<b>0.025</b>
Peak Log RNA VL, m(SD)	5.47 (0.74)	5.36 (0.72)	0.490
Age at Peak VL, m(SD)	4.0 (3.9)	4.7 (4.4)	0.371
CDC Class C, n(%)	48 (25.7%)	21 (29.2%)	0.638
Hx of Encephalopathy, n(%)	25 (13.4%)	8 (11.1%)	0.684
HAART with PI, n(%)	135 (73.4%)	52 (73.2%)	0.978
HAART without PI	36 (19.6%)	15 (21.1%)	
Non-HAART ARV	12 (6.5%)	4 (5.6%)	

# Results: Caregiver Characteristics

Characteristic	Youth Adherent (n=187)	Youth Non-Adherent (n=72)	p-value
<b>Caregiver HIV Status, n(%)</b>			<b>0.045</b>
HIV+	59 (38.6%)	32 (54.2%)	
HIV-	94 (61.4%)	27 (45.8%)	
<b>Biological Parent, n(%)</b>			0.090
Yes	73 (39.5%)	37 (52.1%)	
No	112 (60.5%)	34 (47.9%)	
<b>Caregiver Education, n(%)</b>			0.059
≥HS Diploma	142 (76.8%)	46 (64.8%)	
<HS Diploma	43 (23.2%)	25 (35.2%)	
<b>Household Income, n(%)</b>			0.464
<\$20K/Yr	78 (41.7%)	31 (43.1%)	
≥\$20K/Yr	98 (52.4%)	34 (47.2%)	
<b>FSIQ Estimate (WASI), m(SD)</b>	89.27 (15.36)	87.83 (14.87)	0.486

# Results: Descriptive Statistics

## Adherence & Medication Responsibility

- ▣ 72% adherent (defined as having no reported missed doses in the prior 7 days)
  
- ▣ Per youth report:
  - 22% sole medication responsibility
  - 21% sole caregiver responsibility
  - 55% shared caregiver-youth medication responsibility
  
- ▣ Per caregiver report:
  - 15% sole youth responsibility
  - 34% sole caregiver responsibility
  - 47% shared caregiver-youth responsibility
  
- ▣ 73% youth-caregiver congruence re: medication responsibility

# Results: Multivariable Logistic Regression

- Using adjusted logistic regression models (*adjusting for demographic variables age, race, caregiver education, caregiver relationship*), there are significantly higher odds of adherence:
  - if caregiver vs. child solely responsible for medication (OR=4.10, CI[1.43,11.81], p=0.009)
  - if nadir CD4% <15% vs. >15% (OR=2.26, CI[1.15,4.43], p=0.005)

# Results:

## Adaptive & Executive Functioning

- ▣ Using adjusted logistic regression models (*adjusting for demographic variables age, race, caregiver education, caregiver relationship, and medication responsibility*), there is no significant relationship of global AF or EF with adherence:
  
- ▣ Adaptive Functioning (GAC):
  - OR=0.77, CI[0.57,1.05], p=0.10
  
- ▣ Executive Function (GEC):
  - By CG report: OR=1.28, CI[0.54,3.02], p=0.58
  - By Youth SR (>11 yrs) : OR=0.56, CI[0.18,1.81], p=0.335

# Results: Executive Function (cont.)

- ▣ **Behavioral Regulation Index (BRI):** ability to shift cognitive set and modulate emotions and behavior via appropriate inhibitory control (T-score >65 = impairment)
- ▣ **Metacognition Index (MI):** ability to initiate, plan, organize and sustain future-oriented problem solving in working memory (ability to self-manage tasks and monitor one's own performance; T-score >65 = impairment)
- ▣ Using adjusted logistic regression models (*adjusting for age, race, caregiver education, caregiver relationship, and medication responsibility*), significantly lower odds of adherence with higher youth SR:
  - BRI T-score (OR=0.65, CI[0.44,0.96], p=0.029)

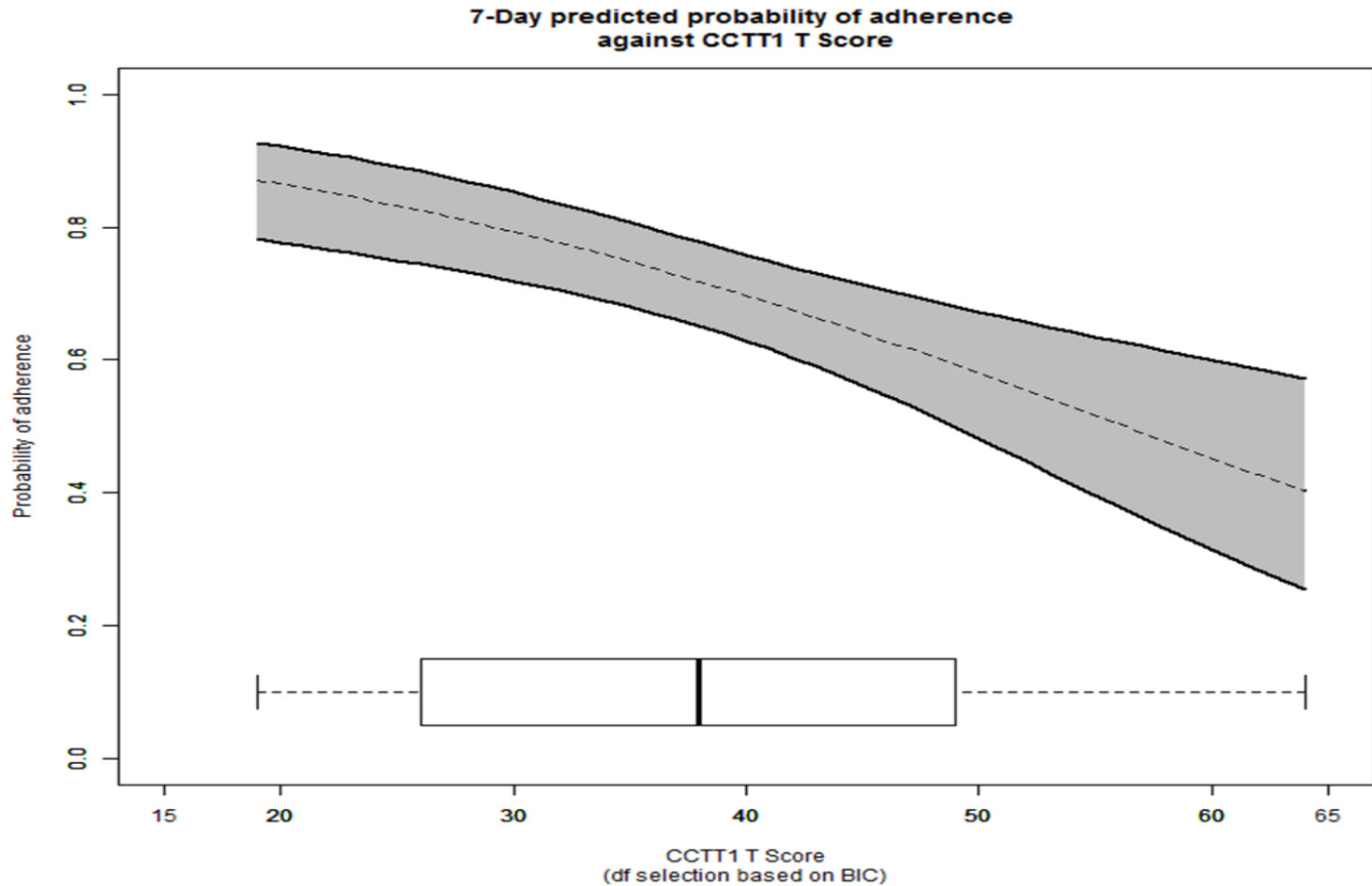
However, relationship of adherence with MI was nonsignificant

- MI T-score (OR=0.83, CI[0.56,1.23], p=0.363)

# Results: Processing Speed & Adherence

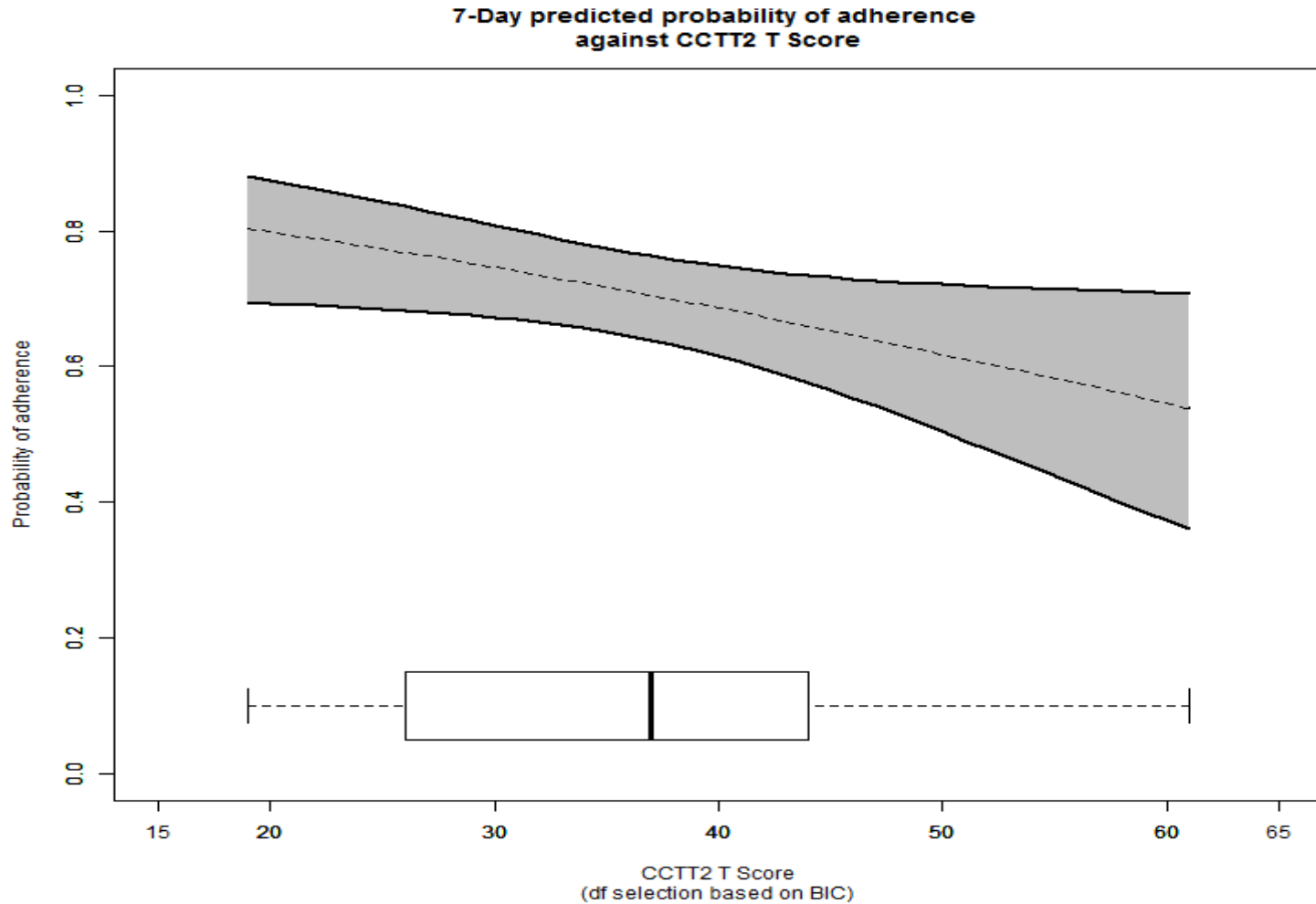
- **Children's Color Trails Test:** assesses alternating/sustained visual attention, sequencing, psychomotor speed, cognitive flexibility, and inhibition-disinhibition
  
- In adjusted logistic regression analyses (*adjusting for age, race, caregiver education, caregiver relationship, and medication responsibility*), there were significantly increased odds of adherence with slower psychomotor speed
  - CCTT1 T-score: OR=0.54, CI[0.38,0.77],  $p < 0.001$
  - CCTT2 T-score: OR=0.75, CI[0.54,1.05],  $p = 0.095$
  
- Which was confirmed by:
  - WISC-IV Processing Speed: OR=0.63, CI[0.44,0.89],  $p=0.009$

# Results: Processing Speed, CCTT1 T-score





# Results: Processing Speed, CCTT2 T-score



# Discussion

- ❑ Self-report of primary caregiver responsibility for medication most significantly related to youth adherence
- ❑ Contrary to the adult literature, no significant difference of global AF or EF on adherence was observed; additionally, processing speed was in the opposite direction of that expected
- ❑ Executive functions include a number of skills (goal formation, planning, carrying out goal-directed plans and effective performance). Performance on EF measures rely on other skills such as speed (which is not an EF). Global indices include skills beyond those that may influence performance on a specific task (thus, may not be sensitive enough)
- ❑ Adherence, as reported by youth and their caregivers, was poorer among youth with faster CCTT speed, suggesting potential impulsivity which was partially supported by the behavioral regulation finding

# Discussion (cont.)

- Behavioral regulation may contribute independently to adherence, but does not tell the whole story. Further investigation of EF and EF subdomains is needed as these skills continue to emerge and evolve throughout young adulthood
- Was the lack of global EF finding a result of CG responsibility for medication adherence? BRI finding suggests not
- Adherence as a behavior is comprised of a complex set of skills that require interacting/overlapping component processes that cannot be explained by the presence or absence of any single component process

# Conclusions

- Among youth with PHIV, continued caregiver involvement in medication management during adolescence is essential, despite youths' emerging expectations of autonomy
- Global ratings of AF and EF were not significantly associated with medication adherence, but behavioral regulation was; therefore, individual scales of AF and EF should be explored further as youth continue to develop and age into adulthood
- Slower processing speed associated with better adherence
- Given that AF and EF continue to develop throughout adolescence, relationships with adherence should be evaluated longitudinally, especially as youth transition to adulthood, shared caregiver responsibility diminishes, and autonomy increases

# Acknowledgements

PHACS is funded by:



under cooperative agreements HD052104 (PHACS Coordinating Center, Tulane University School of Medicine) and HD052102 (PHACS Data and Operations Center, Harvard School of Public Health).

**We thank the study participants, clinical sites, PHACS Community Advisory Board, Frontier Science & Technology Research Foundation, and Westat.**

**Children's Diagnostic & Treatment Center**

**Doyle Patton, PhD**



# PHACS US Clinical Sites

- Ann & Robert Lurie Children's Hospital of Chicago
- Baylor College of Medicine
- Bronx Lebanon Hospital Center
- Children's Diagnostic & Treatment Center
- Children's Hospital, Boston
- Children's Hospital of Philadelphia
- Jacobi Medical Center
- New York University School of Medicine
- St. Christopher's Hospital for Children
- St. Jude Children's Research Hospital
- San Juan Hospital/Department of Pediatrics
- SUNY Downstate Medical Center
- SUNY Stony Brook
- Tulane University Health Sciences Center
- University of Alabama, Birmingham
- University of California, San Diego
- University of Colorado Health Sciences Center
- University of Florida/Jacksonville
- University of Illinois, Chicago
- University of Maryland, Baltimore
- Rutgers- New Jersey Medical School
- University of Miami
- University of Southern California
- University of Puerto Rico Medical Center

# OUR SITES



# Questions?

▣ Thank you for your time and interest

[pgarvie@browardhealth.org](mailto:pgarvie@browardhealth.org)

