The relationship between caregiver emotional wellbeing and functionality, and developmental outcomes in preschool-age Ugandan children perinatally exposed to HIV

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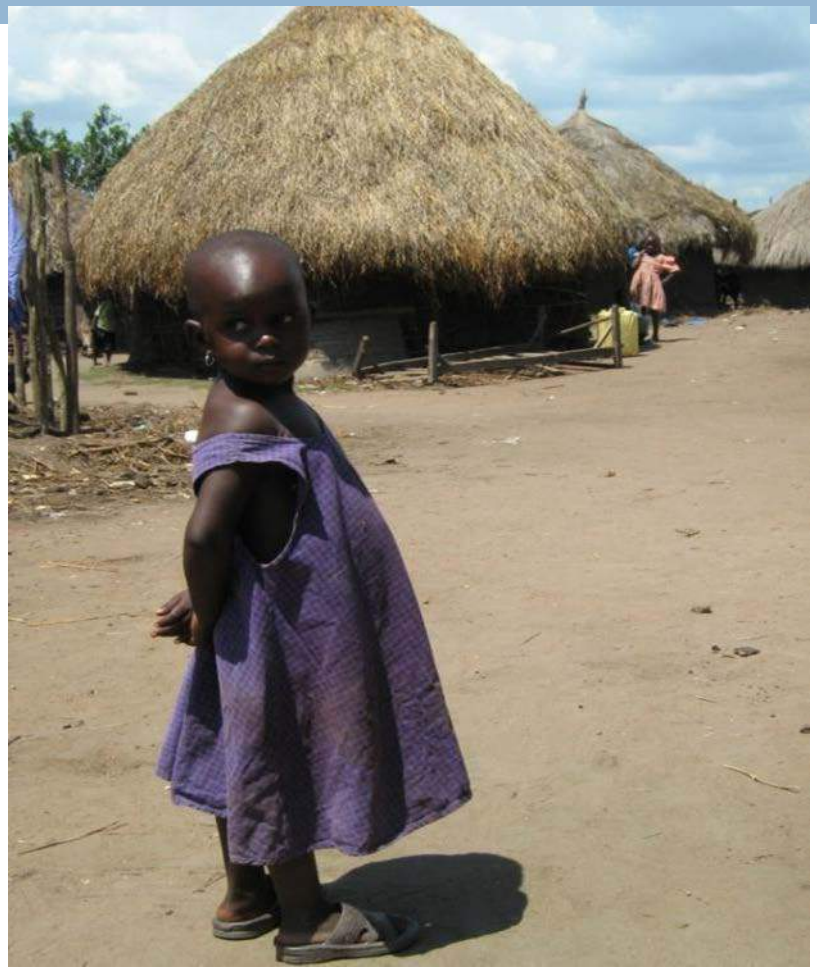
Presented to the 15th Annual Congress of the International Federation of Psychiatric Epidemiology (IFPE), 8-October-2015, Bergen, Norway

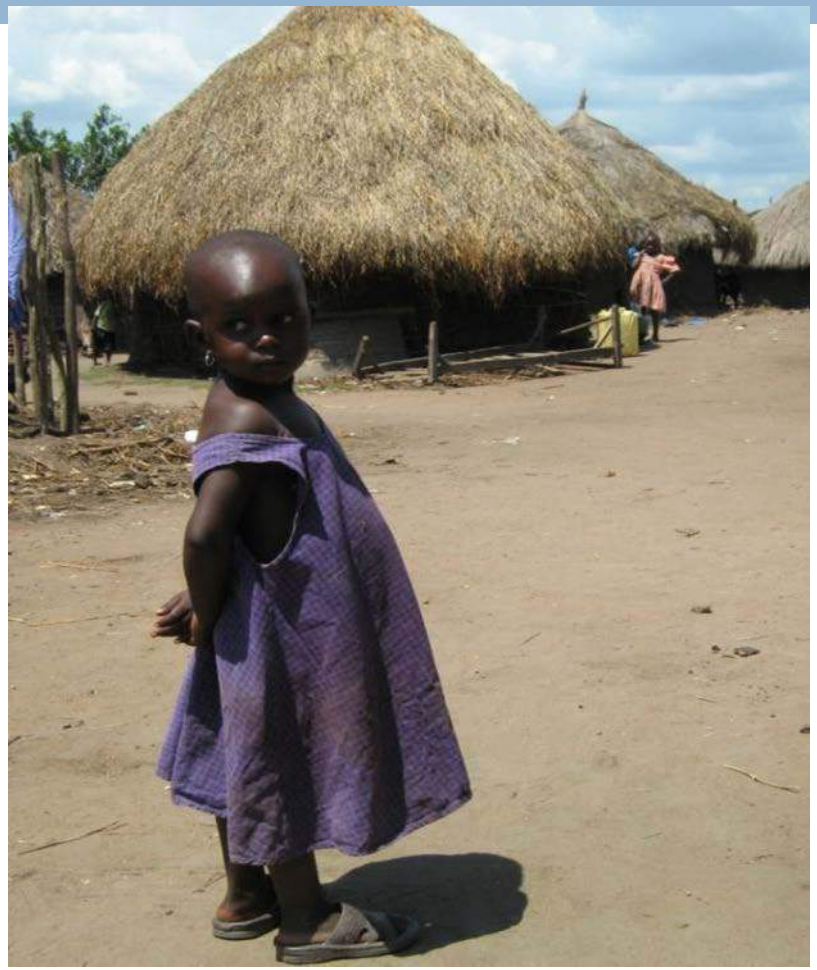
Background

- More than 90% of pediatric HIV infections and AIDS deaths occur in Africa[1]
- More than 11 million children have lost at least 1 parent to AIDS[1]



Background

- Ugandan HIV statistics[2]
  - Children aged 0 to 14 living with HIV
    - **190,000** [170,000 - 220,000]
  - Orphans due to AIDS aged 0 to 17
    - **1,000,000** [920,000 - 1,100,000]



Background

- Pediatric HIV
  - Developmental lag
  - Neurocognitive impairment[3,4]
- Effects on mother
  - Potential for compromised caregiving

Background

- HIV-exposed but uninfected (HEU) children
  - Also at significant risk in terms of psychosocial and behavioral adjustment.

Study Rationale

"Plasticity is a double-edged sword that leads to both adaptation and vulnerability"

From Neurons to Neighborhoods

Shonkoff, J. P. & Phillips, D. A. (Eds.), 2000

Professor Pnina Klein: 1945 - 2014

INTERNATIONAL JOURNAL OF PSYCHOLOGY, 1997, 32 (4), 270–272

Final Report on the Advanced Research Training Seminar (ARTS) on Mediational Intervention for Sensitizing Caregivers (MISC) Programme in Sherbrooke, Quebec, 21–26 August 1996

Pnina S. Klein
Bar-Ilan University, Ramat-Gan, Israel

Michael J. Boivin
Indiana Wesleyan University, Marion, USA

Israel Prize-Winning Prof. Pnina Klein, of Bar-Ilan University, Has Strongly Impacted America's Education and Healthcare Establishments

Ramat Gan, Israel - April 2011

Prof. Pnina Klein

This year's Israel Prize winner, Bar-Ilan University (BIU) Prof. Pnina Klein, is among a select group of academics in Israel's history who have made an important impact on the American education and healthcare establishments. Her research is being used by U.S. educators and medical professionals to create models of early intervention in education that have proven to help children at risk better cope with their social and emotional needs, both in the classroom and the outside world.

In awarding the honor to Prof. Klein, director of the Baker Center for the Study of Development Disorders in Infants and Young Children in the Churgin School of Education at BIU in Ramat Gan, Israel, the Israel Prize Committee hailed her as one of the world's most prominent researchers in the field of early childhood education, The Committee acknowledged her important research contributions to the field, which have been used as models of intervention with hundreds of thousands of children worldwide.

In recognition of her expertise in this field, the Maryland-based National Institute of Mental Health (NIMH), through Michigan State University (MSU), chose Prof. Klein's approach - the More Intelligent and Sensitive Child (MISC) Program - to complement medical treatment for children in Uganda who are HIV positive or suffering from malaria. The professor conducting the study in Uganda is Prof. Michael Boivin, of MSU. His goal is to use MISC as a model that gives healthcare workers and educators throughout Africa the tools to assess and promote the education of children at risk.

What is MISC?

- Mediational Intervention for Sensitizing Caregivers
  - Not a "program", but a method for sensitizing mothers in their daily interactions with their children.
  - It raises their awareness of their children's emotional and cognitive needs, of the importance of parental/caregiver interactive behavior (Feuerstein, 1980).
- Advantages of MISC
  - Facilitative, culturally flexible, practical, sustainable, able to be scaled-up
  - It can be implemented in a variety of contexts where caregiver/child interactions naturally take place.

MISC

To have Successful Experiences & to complete tasks

To search Meaning & Excitement

To Seek Information Beyond Sensory To Explore, To Ask To Seek Adult Help

To Seek Clarity of Perception

NEEDS

To Think Before Doing To Organize & plan

Regulating
Rewarding
Expanding
Affecting
Focusing

It's worthwhile to act / I can do
I'm with you / I'm safe
I love you / I'm loved

Basic Elements Of Mediation

Basic Messages

Mutual Engagement

Mutual Attention

Touch
Smiles
Turn-Taking
Vocalizations
Physical Closeness
Sharing of Joy
Eye Contact

ABC of Love

Reciprocity

Emotional Development

MISC Components

Goal of MISC: enhance child cognitive, emotional, and social development through caregiver interactions focusing on

- Regulating
- Rewarding
- Expanding
- Affecting
- Focusing

Pnina and Kayunga Study Team

Kayunga MISC mobilization: Explaining the Study

MISC asks caregiver what outcomes they hope to achieve.

What are your dreams for your children and how can they be achieved?

Study Questions

1) Does a year-long program of biweekly MISC caregiver training improve quality of child caregiving, compared to treatment-as-usual (TAU)?

2) Does improved caregiving enhance developmental outcomes in preschool Ugandan HIV-affected children?


UGANDA
TORORO
Kampala

Home Visit: Evaluating quality of home environment, caregiver knowledge and attitudes, and videotaping baseline caregiver/child interactions.

Neurocognitive Testing

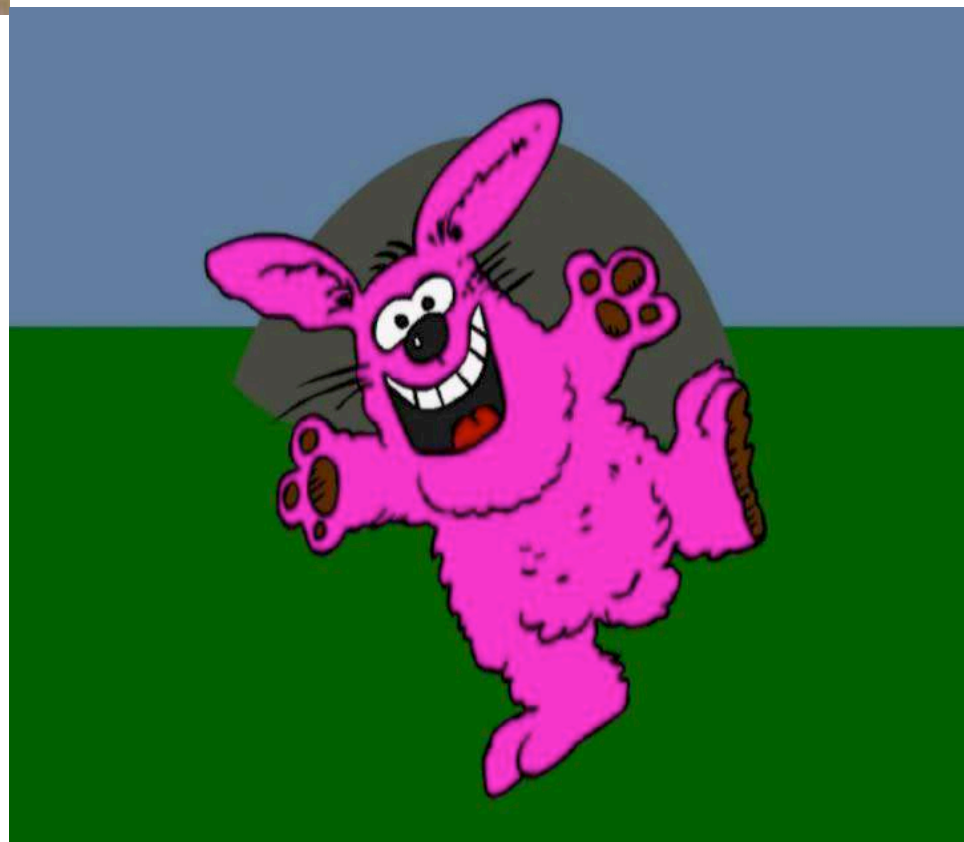
Color-Object Association Test (COAT)

Early Childhood Vigilance Test (ECVT)

Mullen Scales of Early Learning (MSEL)

Child gazing at cartoon bunny on screen during the Early Childhood Vigilance Test (ECVT)

Percent total time of 8 minute animation looking at the monitor as scored by use of PROCODER video scoring from Webcam movie file



Mullen Scales of Early Learning

J Acquir Immune Defic Syndr. 2014 November 1; 67(3): 316–322. doi:10.1097/QAI.0000000000000295.

Neurodevelopmental benefits of Anti-Retroviral Therapy in Ugandan children 0–6 Years of age with HIV

Heena Brahmbhatt, Phd.[1,2], **Michael Boivin, PhD.**[3], **Victor Ssempijja, MHS.**[2], **Godfrey Kigozi, MD**[2], **Joseph Kagaayi, MD**[2], **David Serwadda, MD**[2,4], and **Ronald H. Gray, MD**[1,2]

[1]Johns Hopkins Bloomberg School of Public Health, Baltimore, MD [2]Rakai Health Science Program, Entebbe, Uganda [3]Michigan State University, Lansing, Michigan [4]Makerere University, School of Public Health, Kampala, Uganda

Table 2

Prevalence Risk Ratio of Disability by Child and Maternal HIV Status at Baseline

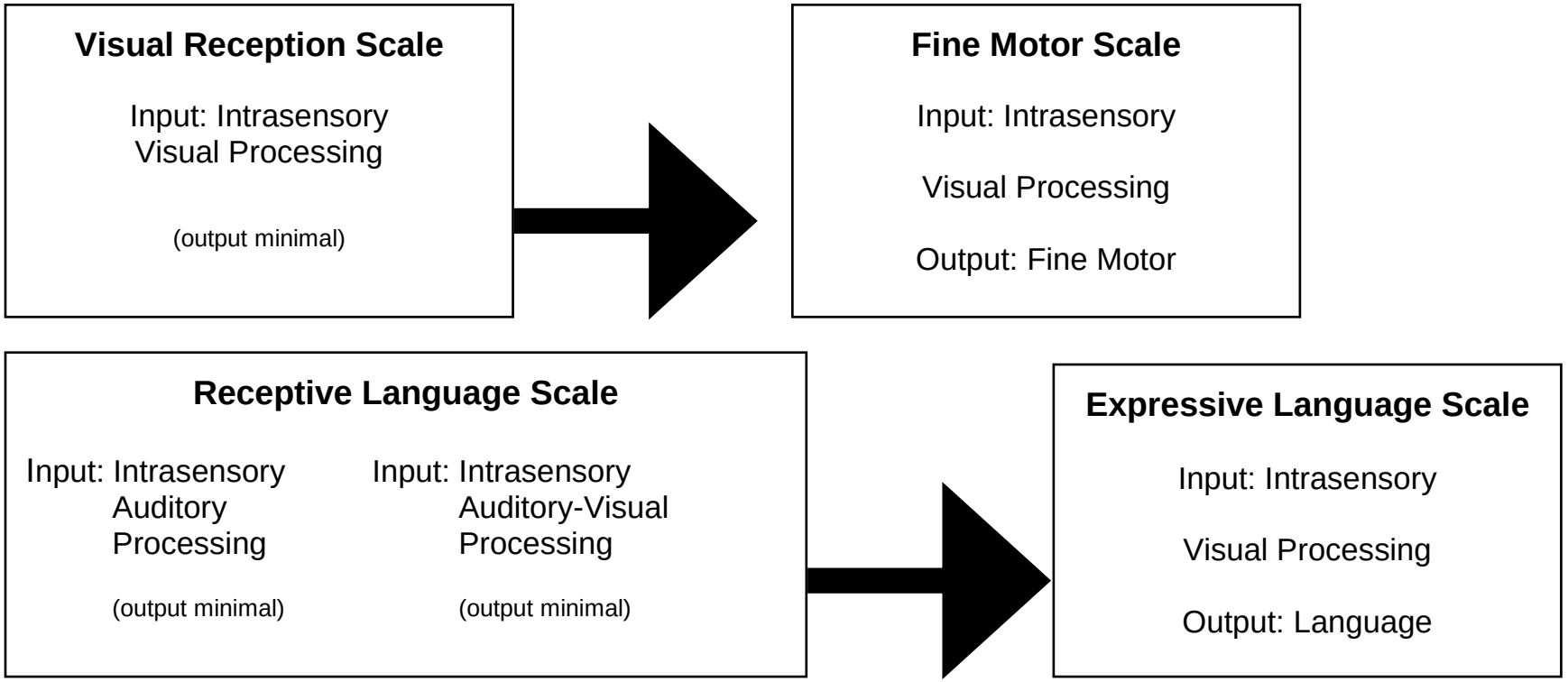
Disability Assessment (A) HIV−/M/HIV−C (N=168) (B)HIV+/M/HIV−C (N=105) (C)HIV+/M/HIV+C (N=116)	Bivariate PRR (CI)	Multivariate [#] PRR (CI)
Gross Motor Score		
B vs A	0.46 (0.24,0.86)	0.59(0.31,1.11)
C vs A	0.93(0.58,1.48)	0.87(0.55,1.39)
C vs B	2.04(1.09,3.82) ***	1.24(0.68,2.27)
Fine Motor Score		
B vs A	0.65(0.26,1.63)	1.00(0.36,2.79)
C vs A	1.95(1.00,3.81) **	2.39(1.15,4.95) **
C vs B	2.97(1.33,6.66) ***	1.99(0.90,4.41)
Visual Reception Score		
B vs A	0.88(0.31,2.54)	1.61(0.59,4.39)
C vs A	4.12(1.80,9.38) **	5.86(2.30,14.92) **
C vs B	4.68(2.05,10.78) ***	2.86(1.23,6.65) ***
Receptive Language Score		
B vs A	1.76(0.72,4.31)	2.67(1.08,6.60) *
C vs A	3.33(1.50,7.38) **	4.20(1.83,9.64) **
C vs B	1.89(1.00,3.57) ***	1.45(0.80,2.64)
Expressive Language Score		
B vs A	1.14 (0.48,2.71)	1.19(0.52,2.71)
C vs A	2.59(1.26,5.30) **	2.27(1.15,4.50) **
C vs B	2.26(1.14,4.48) ***	1.70(0.77,3.76)
ELC score		
B vs A	1.37(0.49,3.83)	2.94(1.11,7.82) *
C vs A	6.34(1.87,10.10) **	6.87(2.54,18.58) **
C vs B	3.17(1.51,6.65) ***	1.82(0.90,3.67)

Table 3

Neurodevelopment Disability Among HIV-Positive Children by Ever Initiation of ART

N=116	Gross motor PRR* (95% CI)	Fine motor PRR* (95% CI)	Visual Reception PRR* (95% CI)	Receptive language PRR* (95% CI)	Expressive language PRR* (95% CI)	Early Learning Composite score
ART USE						
Never Initiated (N=65)	1	1	1	1	1	1
Ever Initiated (N=51)	1.36(0.9,2.0)	1.45(0.9,2.3)	2.07(1.3,3.3)	2.47(1.6,3.8)	3.0 (1.9,4.9)	1.93 (1.3,3.0)
Current Age at study visit	1.44(1.2,1.8)	1.58(1.3,1.9)	1.55(1.3,1.9)	2.13(1.6,2.7)	1.32(1.1,1.6)	1.97(1.6,2.4)
HAZ	0.69(0.6,0.9)	0.87(0.7,1.1)	0.71(0.6,0.9)	1.03(0.9,1.1)	0.85(0.7,1.1)	0.76(0.6,0.9)
WAZ	0.87(0.7,1.2)	0.89(0.7,1.1)	0.95(0.7,1.2)	0.73(0.6,1.0)	0.76(0.6,1.0)	0.81(0.6,1.0)
Study visit	1.0(1.0,1.0)	1.0(1.0,1.0)	0.97(0.9,1.0)	0.97(1.0,1.0)	0.99(1.0,1.0)	0.98(1.0,1.0)

* adjusted for age, HAZ (Height for Age Z-Score), WAZ (Weight for Age Z-Score) and study visit


Visual Reception Scale
Input: Intrasensory
Visual Processing
(output minimal)
Fine Motor Scale
Input: Intrasensory
Visual Processing
Output: Fine Motor
Receptive Language Scale
Input: Intrasensory
Auditory
Processing
(output minimal)
Input: Intrasensory
Auditory-Visual
Processing
(output minimal)
Expressive Language Scale
Input: Intrasensory
Visual Processing
Output: Language

Methods: Assessments

- Mullen Scales of Early Learning
  - Gross motor
  - Fine motor
  - Visual reception
  - Receptive language
  - Expressive language
- Early Childhood Vigilance Test (ECVT)
  - Central executive attention
- Color Object Association Test (COAT)
  - Immediate memory
  - Total recall
- Behavior Rating Inventory of Executive Function (BRIEF)
  - Global Executive Composite Symptoms

Development Domain	Tonus	Cognition			Intellect/Achievement		Affect/Adjustment
Instrument	Motor Function	Visual Spatial Memory	Auditory Verbal Memory	Central Executive Attention	Executive Reasoning Planning	Language	Social/Emotional
Mullen Scales of Early Learning	Gross Motor Fine Motor	Visual Reception	Fine Motor		Early Learning Composite	Expressive Receptive Language	
Early Childhood Vigilance Test (ECVT)				% Time Looking At Screen			
Color Object Association Test (COAT)		Immediate Memory Total Recall					
Behavior Rating Inventory Executive Function (BRIEF)				Attention Problems	Planning, Behavior Regulation		Planning, Control, Impulsivity, Behavior Regulation

A Year-Long Caregiver Training Program Improves Cognition in Preschool Ugandan Children with Human Immunodeficiency Virus

Michael J. Boivin, PhD, MPH[1], Paul Bangirana, PhD[2], Noeline Nakasujja, PhD, MMed[2], Connie F. Page, PhD[3], Cilly Shohet, PhD[4], Deborah Givon, MS[4], Judith K. Bass, PhD[5], Robert O. Opoka, MMed, MPH[6], and Pnina S. Klein, PhD[4]

Objective To evaluate mediational intervention for sensitizing caregivers (MISC). MISC biweekly caregiver training significantly enhanced child development compared with biweekly training on health and nutrition (active control) and to evaluate whether MISC training improved the emotional well-being of the caregivers compared with controls.
Study design Sixty of 120 rural Ugandan preschool child/caregiver dyads with HIV were assigned by randomized clusters to biweekly MISC training, alternating between home and clinic for 1 year. Control dyads received a health and nutrition curriculum. Children were evaluated at baseline, 6 months, and 1 year with the Mullen Early Learning Scales and the Color-Object Association Test for memory. Caldwell Home Observation for Measurement of the Environment and videotaped child/caregiver MISC interactions also were evaluated. Caregivers were evaluated for depression and anxiety with the Hopkins Symptoms Checklist.
Results Between-group repeated-measures ANCOVA comparisons were made with age, sex, CD4 levels, viral load, material socioeconomic status, physical development, and highly active anti-retroviral therapy treatment status as covariates. The children given MISC had significantly greater gains compared with controls on the Mullen Visual Reception scale (visual-spatial memory) and on Color-Object Association Test memory. MISC caregivers significantly improved on Caldwell Home Observation for Measurement of the Environment scale and total frequency of MISC videotaped interactions. MISC caregivers also were less depressed. Mortality was less for children given MISC compared with controls during the training year.
Conclusions MISC was effective in teaching Ugandan caregivers to enhance their children's cognitive development through practical and sustainable techniques applied during daily interactions in the home. *(J Pediatr 2013;163:1409-16).*

NIMH grant R34 MH082663 (PI: Boivin)

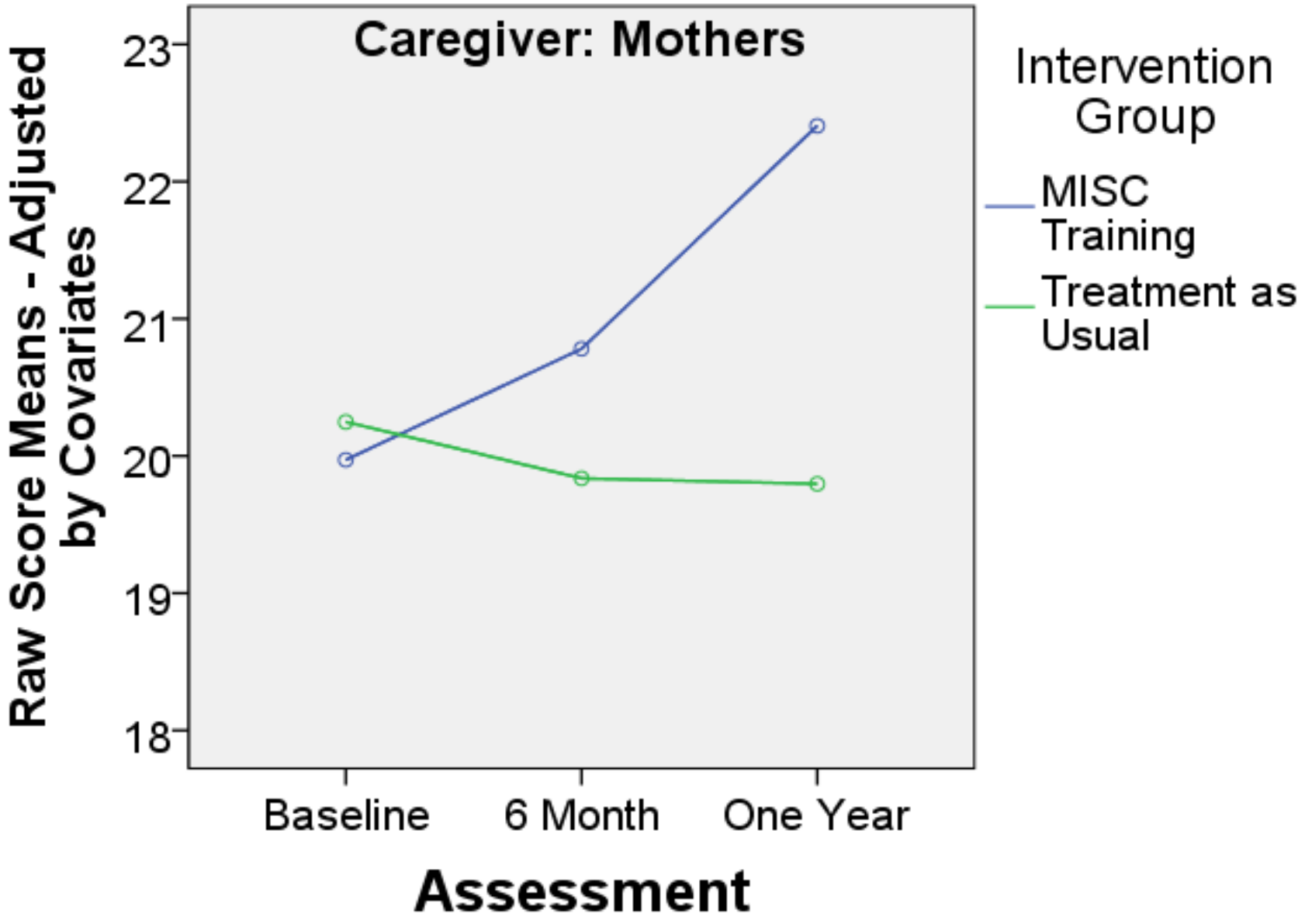
A Year-long Caregiver Training Program to Improve Neurocognition in Preschool Ugandan HIV-exposed Children

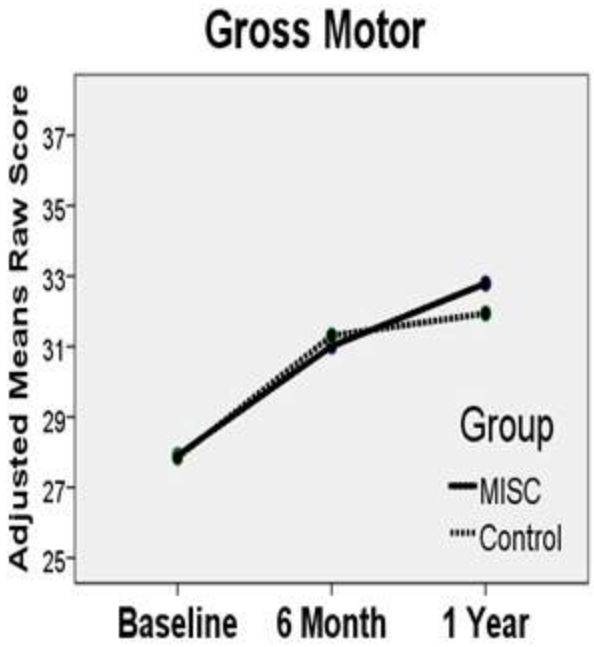
Michael J. Boivin, PhD, MPH,* Paul Bangirana, PhD,† Noeline Nakasujja, PhD, MMed,† Connie F. Page, PhD,‡ Cilly Shohet, PhD,§ Deborah Givon, MS,§ Judith K. Bass, PhD,‖ Robert O. Opoka, MMed, MPH,¶ Pnina S. Klein, PhD§

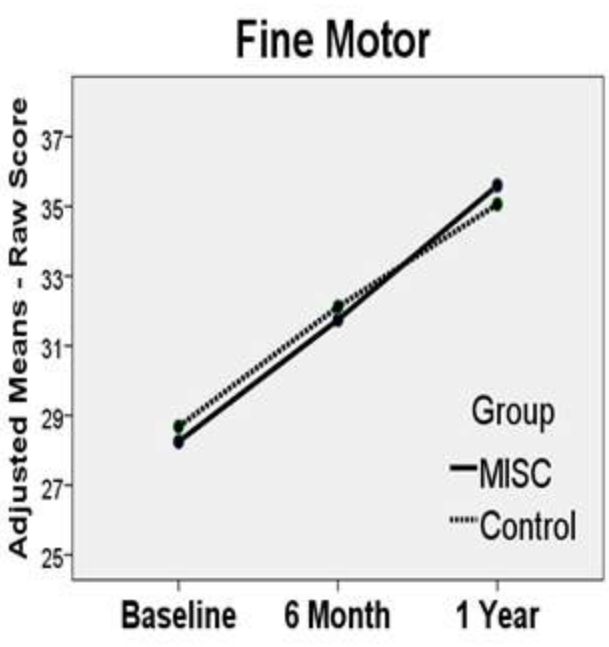
ABSTRACT: *Objective:* Mediational intervention for sensitizing caregivers (MISC) is a structured program enabling caregivers to enhance their child's cognitive and emotional development through daily interactions. The principal aim was to evaluate if a year-long MISC caregiver training program produced greater improvement in child cognitive and emotional development compared with a control program. *Methods:* One hundred and nineteen uninfected HIV-exposed preschool children and their caregivers were randomly assigned to 1 of 2 treatment arms: biweekly MISC training alternating between home and clinic for 1 year or a health and nutrition curriculum. All children were evaluated at baseline, 6 months, and 1 year with the Mullen Early Learning Scales, Color-Object Association Test for memory, and Achenbach Child Behavior Checklist for psychiatric symptoms. Caregivers were evaluated on the same schedule with the Hopkins Symptoms Checklist-25 for depression and anxiety. *Results:* The treatment arms were compared using repeated-measures analysis of covariance with child age, gender, weight, socioeconomic status, caregiving quality, caregiver anxiety, and caregiver education as covariates. The MISC children had significantly greater gains compared to controls on the Mullen Receptive and Expressive Language development, and on the Mullen composite score of cognitive ability. Color-Object Association Test total memory for MISC children was marginally better than controls. No Achenbach Child Behavior Checklist differences between the groups were noted. Caldwell Home Observation for Measurement of the Environment scores and observed mediational interaction scores from videotapes measuring caregiving quality also improved significantly more for the MISC group. *Conclusions:* The MISC enhanced cognitive performance, especially in language development. These benefits were possibly mediated by improved caregiving and positive emotional benefit to the caregiver.

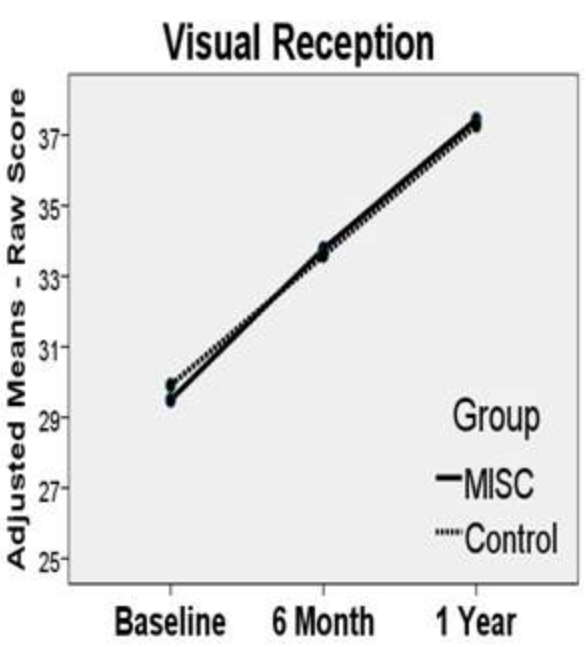
(J Dev Behav Pediatr 34:269–278, 2013) **Index terms:** child development, HIV, caregiver, training, Uganda, language, cognition, nutrition.

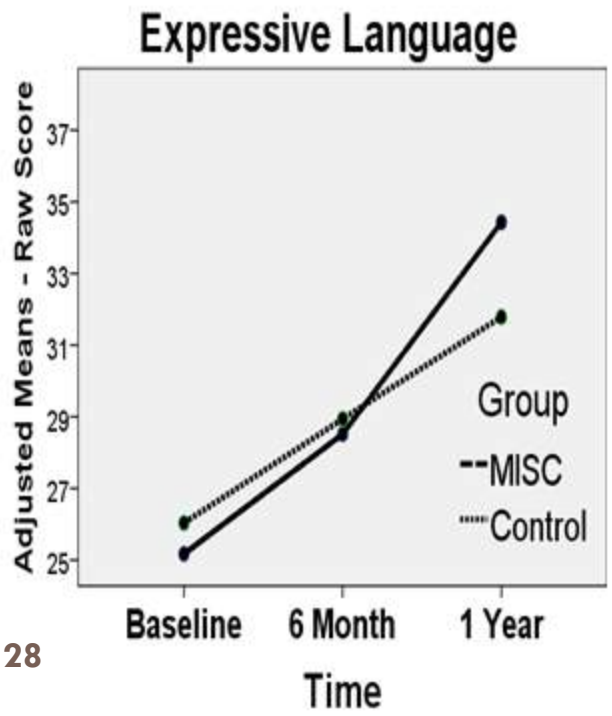
Caldwell HOME Scale - MISC Intervention

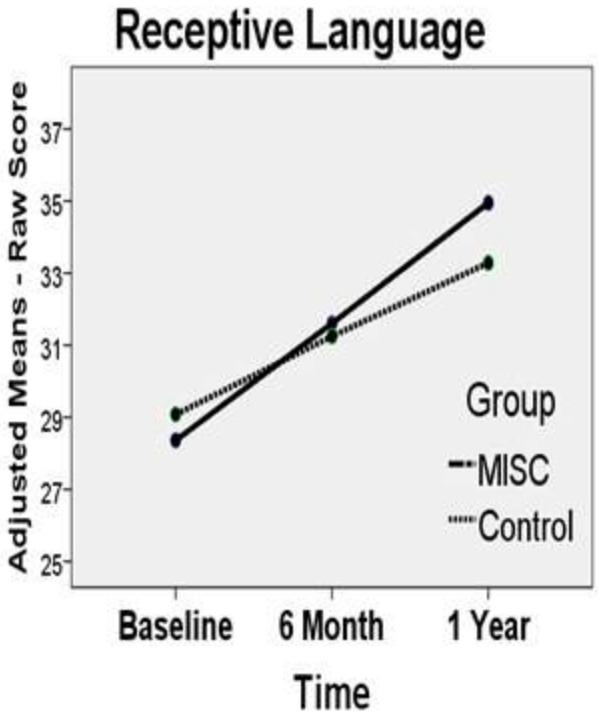


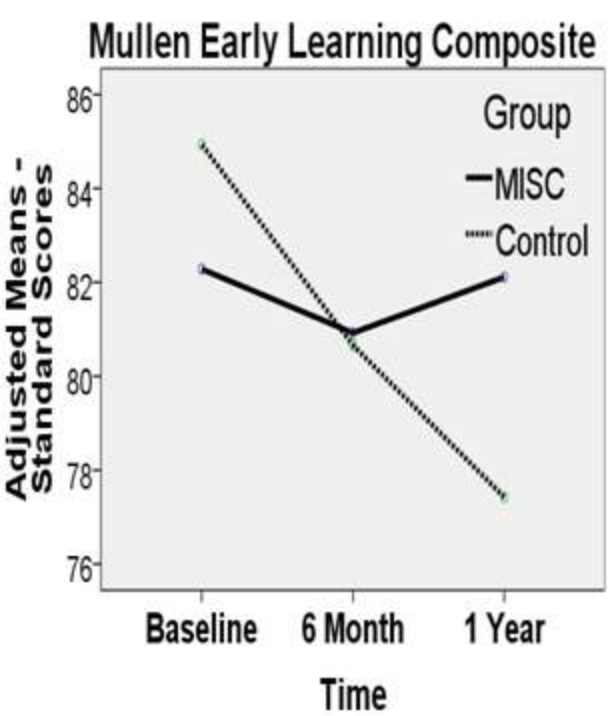

Gross Motor
Adjusted Means Raw Score
37
35
33
31
29
27
25
Group
MISC
Control
Baseline
6 Month
1 Year

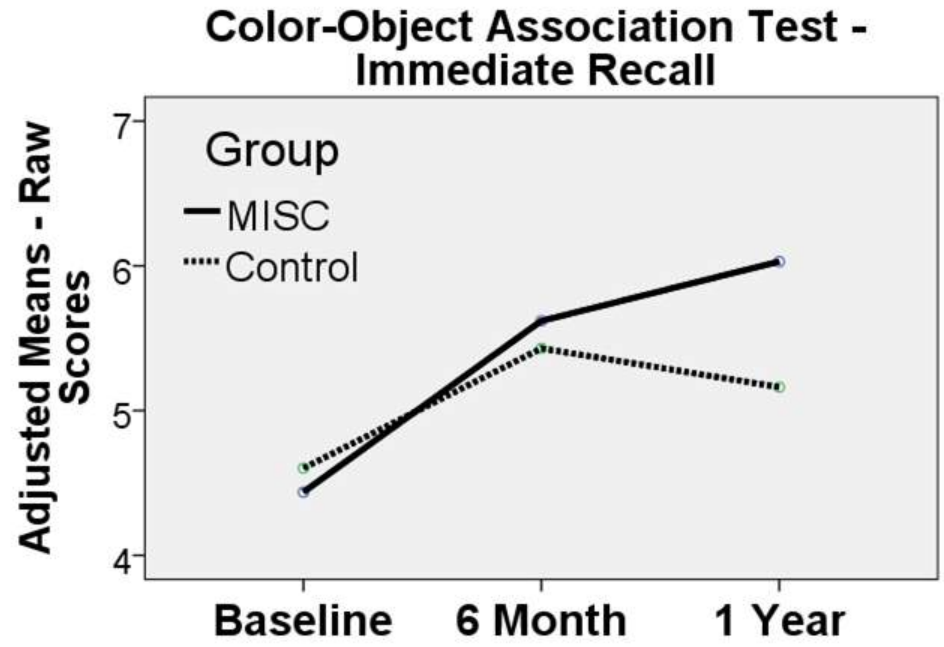

Fine Motor
Adjusted Means - Raw Score
37
35
33
31
29
27
25
Group
MISC
Control
Baseline
6 Month
1 Year

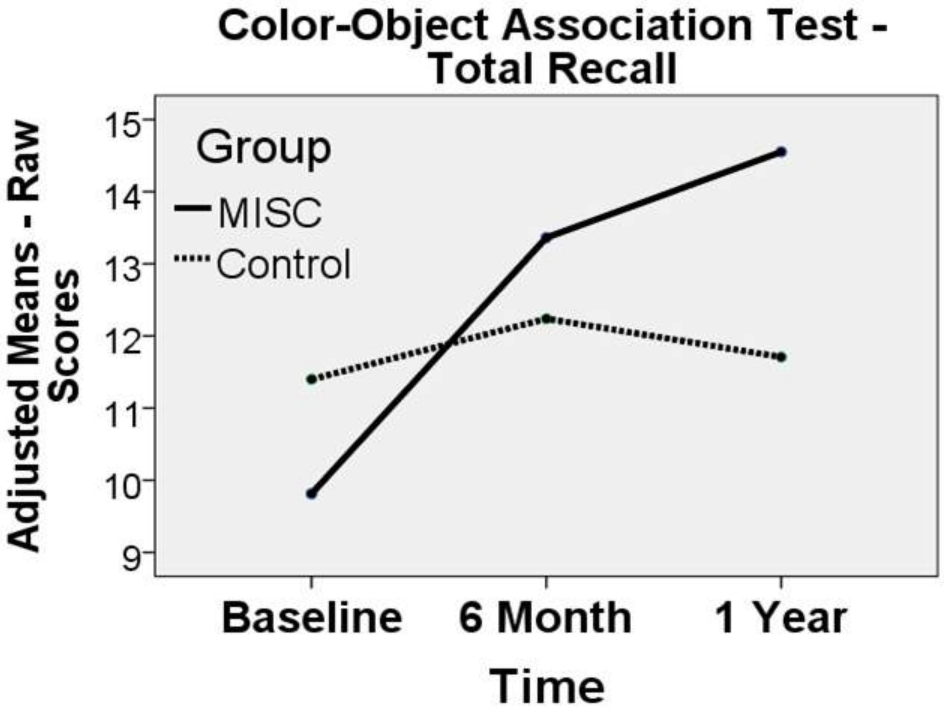

Visual Reception
Adjusted Means - Raw Score
37
35
33
31
29
27
25
Group
MISC
Control
Baseline
6 Month
1 Year


Expressive Language
Adjusted Means - Raw Score
37
35
33
31
29
27
25
Group
MISC
Control
Baseline
6 Month
1 Year
Time


Receptive Language
Adjusted Means - Raw Score
37
35
33
31
29
27
25
Group
MISC
Control
Baseline
6 Month
1 Year
Time


Mullen Early Learning Composite
Adjusted Means - Standard Scores
86
84
82
80
78
76
Group
MISC
Control
Baseline
6 Month
1 Year
Time


Color-Object Association Test - Immediate Recall
Adjusted Means - Raw Scores
7
6
5
4
Group
MISC
Control
Baseline
6 Month
1 Year


Color-Object Association Test - Total Recall
Adjusted Means - Raw Scores
15
14
13
12
11
10
9
Group
MISC
Control
Baseline
6 Month
1 Year
Time

MISC benefits for HIV-infected children

- Positive MISC effect on Mullen Early Learning Composite Score (Global Cognitive Ability)
  - Due mostly to difference on Mullen Visual Reception (predictive of cognitive ability)
- Positive MISC effect on Caldwell HOME scale and observed caregiver interactions with child
- Positive MISC effect on COAT immediate memory

MISC vs TAU: Tororo HIV-infected and exposed children

Objective

- The purpose of the present study is to evaluate the relationship between emotional wellbeing of the principal caregiver, quality of the home environment, and developmental outcomes in rural eastern Ugandan children infected with HIV and born to mothers with HIV but not infected (HEU).

Design/Methods

- 118 HIV infected children
- 164 HIV exposed but uninfected (HEU) children
- Ages 2 to 5 years
- Caregivers
  - 76% biological mothers in the HIV infected children
  - 93% biological mothers in the HEU children

Methods: Subjects and Randomization

- 119 HIV-exposed children
  - 64 boys, 55 girls
  - Aged 2 to 4 yrs (*mean*= 2.8 yrs *SD* = 0.34)
- Caregiver-child dyads were randomized by geographic clusters to
  - Year long biweekly MISC training alternating between home and clinic
  - Or a home-based healthcare program health and nutrition curriculum (TAU)

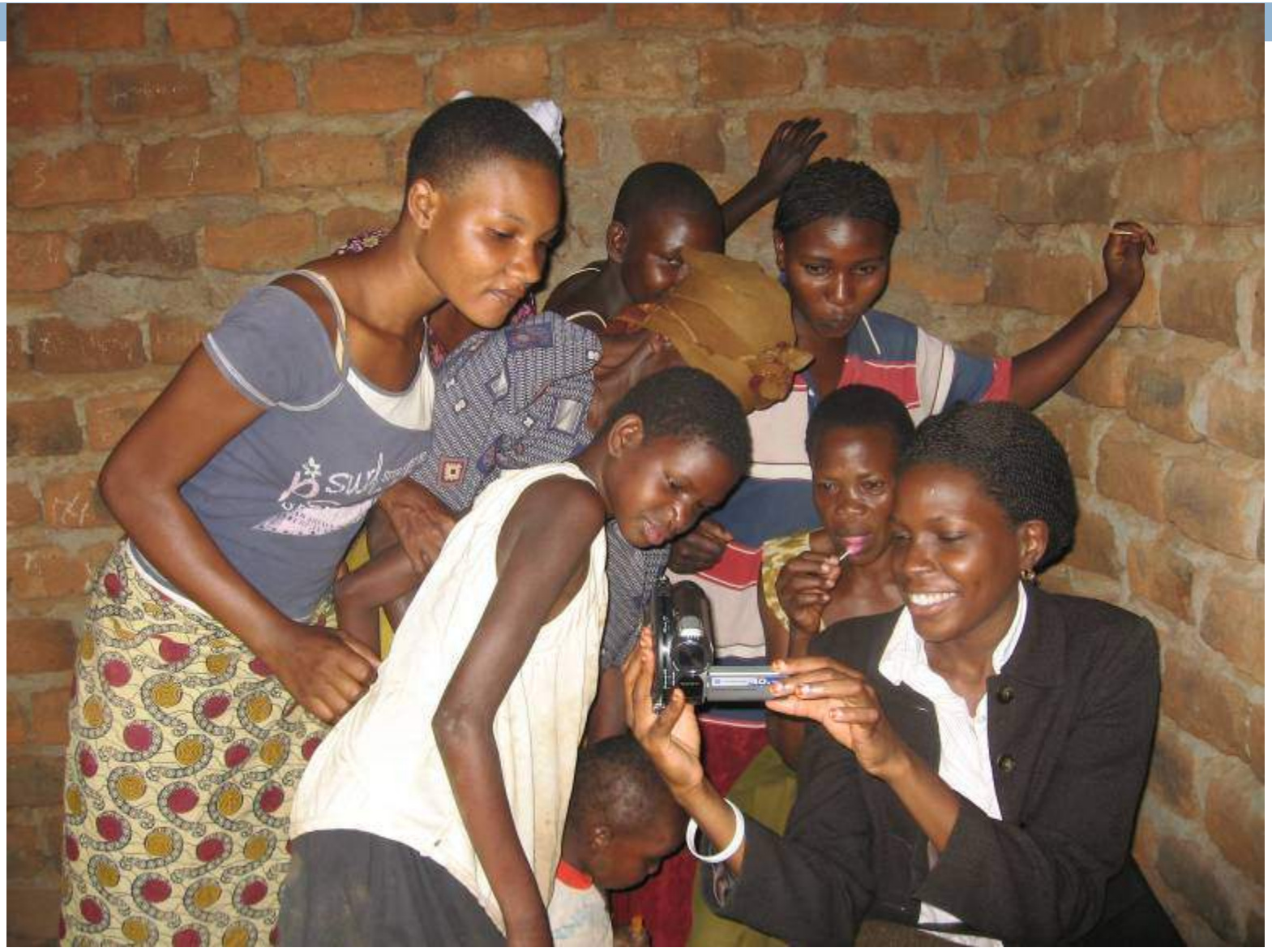
Design/Methods

- Quality of home environment
  - Modified Caldwell HOME scale
- Socio-economic status (SES)

Design/Methods

- Caregivers' wellbeing
  - Hopkins Symptoms Checklist (HSCL-25)
  - Functionality
  - social support
  - negative coping tendencies
- BRIEF Questionnaire

Agatha showing home video of caregiver/child interactions to the family



MISC data management back at Mulago Pediatric Office, Kampala

Tororo MISC RO1 HIV-Infected Cohort		MISC (1) LS Mean (SE)	TAU (0) LS Mean (SE)	P-value for comparison by arm
HOME score (total)	Time 2	22.45 (0.47)	20.36 (0.45)	0.0011
	Time 3	23.60 (0.46)	20.38 (0.46)	<.0001
	Time 4	24.00 (0.46)	19.89 (0.46)	<.0001
Mullen composite (standard)				
	Time 2	69.21 (1.63)	71.28 (1.62)	0.34
	Time 3	68.29 (1.65)	67.41 (1.60)	0.69
	Time 4	67.29 (1.65)	65.05 (1.59)	0.31
Mullen gross motor (gmt)				
	Time 2	29.43 (0.52)	29.81 (0.53)	0.59
	Time 3	30.02 (0.53)	30.39 (0.52)	0.60
	Time 4	33.29 (0.53)	32.98 (0.52)	0.66
Mullen fine motor (fmt)				
	Time 2	34.28 (1.41)	34.33 (1.42)	0.98
	Time 3	33.64 (1.43)	34.11 (1.40)	0.80
	Time 4	33.88 (1.43)	32.59 (1.39)	0.50
Mullen visual reception (vrt)				
	Time 2	27.95 (1.17)	29.49 (1.17)	0.33
	Time 3	27.37 (1.19)	28.03 (1.15)	0.67
	Time 4	28.59 (1.18)	26.23 (1.15)	0.14
Mullen receptive language (rlt)				
	Time 2	36.07 (1.16)	34.04 (1.16)	0.19
	Time 3	35.09 (1.18)	31.49 (1.14)	0.02
	Time 4	31.77 (1.17)	29.42 (1.14)	0.13

Tororo MISC HIV-Infected Cohort		MISC LS Mean (SE)	TAU LS Mean (SE)	P-value for comparison by arm
BRIEF global executive composite	Time 2	63.73 (1.79)	62.41 (1.82)	0.59
	Time 3	63.64 (1.82)	58.59 (1.82)	0.04
	Time 4	58.29 (1.81)	58.42 (1.79)	0.96
COAT immediate recall	Time 2	5.02 (0.95)	4.79 (0.96)	0.86
	Time 3	5.76 (0.96)	5.77 (0.95)	0.99
	Time 4	9.09 (0.96)	9.58 (0.94)	0.71
COAT total recall	Time 2	14.05 (2.04)	11.64 (2.06)	0.38
	Time 3	16.30 (2.07)	14.66 (2.03)	0.56
	Time 4	20.19 (2.06)	15.90 (2.02)	0.12
Caregiver Depression	Time 2	0.96 (0.06)	0.86 (0.06)	0.26
	Time 3	0.73 (0.06)	0.77 (0.06)	0.68
	Time 4	0.75 (0.06)	0.92 (0.06)	0.06
Caregiver lack of functionality	Time 2	0.32 (0.05)	0.49 (0.05)	0.02
	Time 3	0.24 (0.05)	0.39 (0.05)	0.04
	Time 4	0.22 (0.05)	0.34 (0.05)	0.08
Viral load (log)	Time 2	8.62 (0.37)	8.81 (0.37)	0.71
	Time 3	8.03 (0.37)	8.71 (0.37)	0.19
	Time 4	7.83 (0.43)	7.16 (0.45)	0.27

Tororo HIV-exposed cohort	MISC LS Mean (SE)	TAU LS Mean (SE)	P-value for comparison by arm
Home score (IT total)			
Time 2	22.91 (0.30)	20.67 (0.29)	**<.0001**
Time 3	23.74 (0.31)	21.43 (0.29)	**<.0001**
Mullen composite (standard)			
Time 2	70.60 (0.97)	68.89 (0.95)	0.21
Time 3	71.21 (0.99)	69.05 (0.96))	0.13
Mullen gross motor (gmt)			
Time 2	28.77 (0.31)	29.08 (0.30)	0.48
Time 3	30.97 (0.32)	31.14 (0.31)	0.70
Mullen fine motor (fmt)			
Time 2	32.99 (0.85)	30.93 (0.83)	0.09
Time 3	31.85 (0.87)	30.86 (0.84)	0.42
Mullen visual reception (vrt)			
Time 2	30.7 (0.88)	29.22 (0.86)	0.24
Time 3	32.28 (0.90)	30.65 (0.88)	0.20
Mullen receptive language (rlt)			
Time 2	38.20 (0.71)	36.18 (0.70)	**0.05**
Time 3	35.98 (0.73)	34.05 (0.71)	**0.06**
Mullen expressive language (elt)			
Time 2	34.66 (0.94)	35.49 (0.92)	0.53
Time 3	38.23 (0.96)	36.55 (0.93)	0.22
BRIEF emt_tsc			
Time 2	61.44 (1.21)	58.38 (1.19)	0.08

Results – HIV Infected Children

- **Positive coping attitudes** in caregivers were associated with **better cognitive development** as assessed by the Mullen

Results – HIV Exposed (un-infected) Children

- **Better functional scores** in the caregiver and **higher home quality** were associated with **better cognitive development** as assessed by the Mullen

Results – HIV Infected Children

- Caregivers with **higher depression** scores and those in the **lower 20% of the wealth** reported more executive **behavioral problems** in their children in the BRIEF questionnaire

Results – HIV Exposed (un-infected) Children

- **Home quality** was significantly associated with **overall child memory** assessed by the COAT

Results – HIV Infected Children

- **Caregivers of HIV infected children reported more negative behaviors** in those children as compared to caregivers of HIV exposed but uninfected children

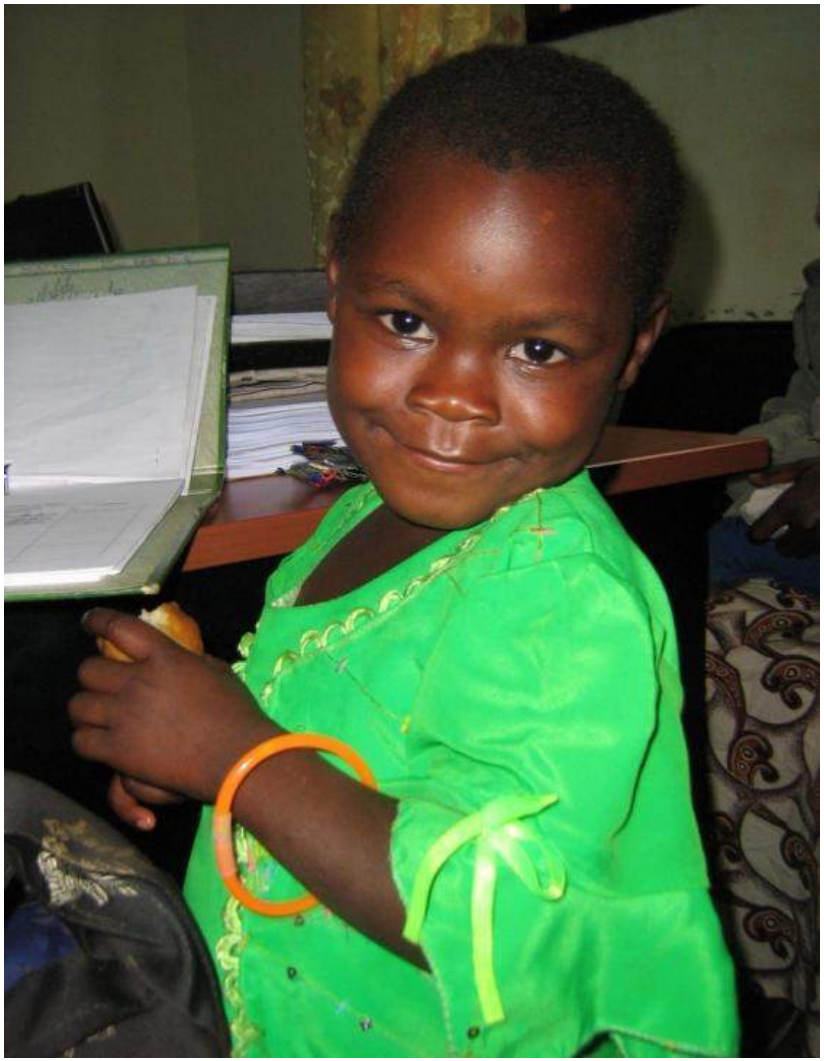
Conclusions

- Caregiver functionality in the face of HIV disease
  - An important predictor of cognitive development
- Caregiver depression
  - Related to behavioral problems indicative of poorer executive function in the child

Conclusions

- Training program to improve caregiving provided to both HIV and HEU children in these settings.
- Goal:
  - Improve emotional wellbeing and functionality of the mother
  - Enhance developmental outcomes for their children

Conclusions



- MISC improves
  - Overall quality of caregiving
  - This may mediate improved developmental outcomes in HIV-affected children
- Both MISC and TAU may improve caregiver emotional well-being, and therefore, maternal attachment and subsequent child emotional well-being.

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Specialty Topics in Pediatric Neuropsychology

Michael J. Boivin · Bruno Giordani *Editors*

Neuropsychology of Children in Africa

Perspectives on Risk and Resilience

Increasingly, global humanitarian efforts are focusing on improving the lives of children. And among the developing world, the African nations are particularly affected by extreme weather conditions, devastating pandemics, and armed conflict. Neurocognitive science offers significant avenues toward bringing needed aid to the continent while creating a template for helping children worldwide.

The studies in *Neuropsychology of Children in Africa* clearly illustrate how the brain develops and adjusts in the face of adversity. Contributors span assessment approaches and public health risk factors, and represent established topics and emerging lines of research, including biocultural constructs and genomic technologies. Together, these chapters argue for methodology that is culturally sensitive, scientifically rigorous, consistent, and sustainable. And although the focus is pediatric, the book takes a lifespan approach to prevention and intervention, modeling a universal framework for understanding neurocognitive development. Included in the coverage:

- Assessment of very young children in Africa in the context of HIV.
- Psychosocial aspects of malnutrition among African children.
- Assessment of neuropsychological outcomes in pediatric severe malaria.
- Neurodisability screening using the Ten Questions questionnaire.
- The neuropsychology of sickle cell disease in West African children.
- Computerized Cognitive Rehabilitation Therapy for African children.

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Bruno Giordani *Editors*

Neuropsychology of Children in Africa

Perspectives on Risk and Resilience

Springer

REVIEW OPEN

Reducing neurodevelopmental disorders and disability through research and interventions

Michael J. Boivin[1,2], Angelina M. Kakooza[3], Benjamin C. Warf[4], Leslie L. Davidson[5,6] & Elena L. Grigorenko[7]

We define neurodevelopment as the dynamic inter-relationship between genetic, brain, cognitive, emotional and behavioural processes across the developmental lifespan. Significant and persistent disruption to this dynamic process through environmental and genetic risk can lead to neurodevelopmental disorders and disability. Research designed to ameliorate neurodevelopmental disorders in low- and middle-income countries, as well as globally, will benefit enormously from the ongoing advances in understanding their genetic and epigenetic causes, as modified by environment and culture. We provide examples of advances in the prevention and treatment of, and the rehabilitation of those with, neurodevelopment disorders in low- and middle-income countries, along with opportunities for further strategic research initiatives. Our examples are not the only possibilities for strategic research, but they illustrate problems that, when solved, could have a considerable impact in low-resource settings. In each instance, research in low- and middle-income countries led to innovations in identification, surveillance and treatment of a neurodevelopmental disorder. These innovations have also been integrated with genotypic mapping of neurodevelopmental disorders, forming important preventative and rehabilitative interventions with the potential for high impact. These advances will ultimately allow us to understand how epigenetic influences shape neurodevelopmental risk and resilience over time and across populations. Clearly, the most strategic areas of research opportunity involve cross-disciplinary integration at the intersection between the environment, brain or behaviour neurodevelopment, and genetic and epigenetic science. At these junctions a robust integrative cross-disciplinary scientific approach is catalysing the creation of technologies and interventions for old problems. Such approaches will enable us to achieve and sustain the United Nations moral and legal mandate for child health and full development as a basic global human right.

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Thank you!

Questions?