



# Caregiver depression and child neuropsychological outcomes in an observational study carried out in four sub-Saharan countries



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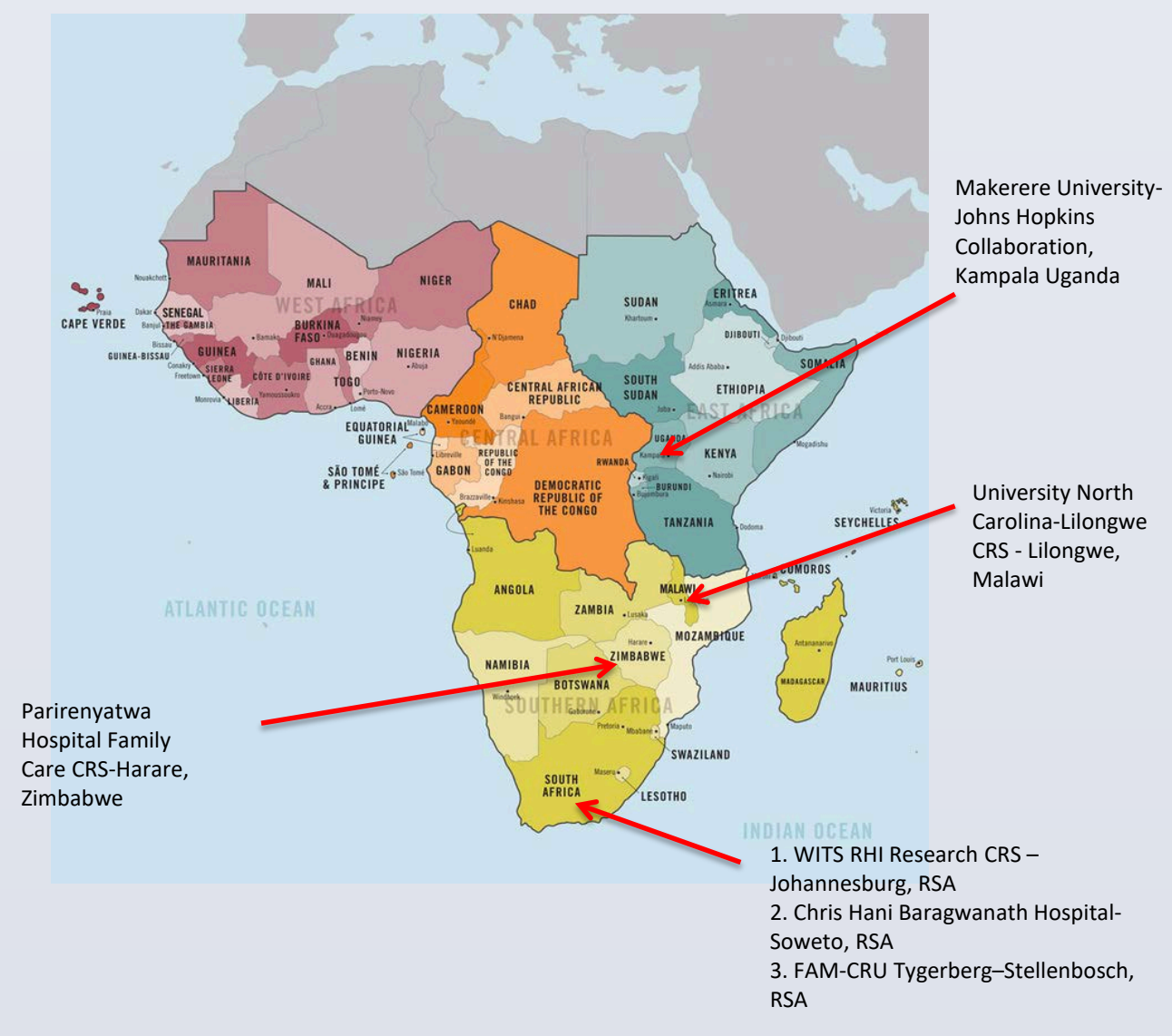
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## BACKGROUND

- Depressive symptoms are frequent among HIV+ women, negatively impacting their health and possibly that of their young children through diminished caregiving (Surkan, 2011)
- Depressed caregivers provide less quantity and poorer quality of stimulation to infants
- Quality of caregiving can moderate the association between poverty and school readiness (McCartney, Dearing, Taylor, & Bub, 2007)
- Scant literature has examined how depressive symptoms in caregivers are linked to negative health-related behaviors and adverse neurodevelopmental outcomes in school age children in the context of HIV/AIDS.

## The P1104s STUDY

Figure 2. Participating P1060 Study Sites for P1104s sub-study



- Data come from the P1104s Study, an observational cohort across six sites in four countries
- Participants (n=611 dyads) were primary caregivers and their 5-11 year old child who was HIV+, HEU, or HUU.
- Children from the P1060 were included in the HIV+ group, with age and environment-matched HEU and HUU controls

## METHODS

Caregivers of children who were enrolled in the P1104s study were assessed for depression. Children enrolled in the study had a number of neuropsychological evaluations.

**Depression assessment:** Hopkins Symptom Checklist-25 (HSCL). Depressive symptoms were used as continuous score and categorized as high or low based on established cut-off of 1.75.

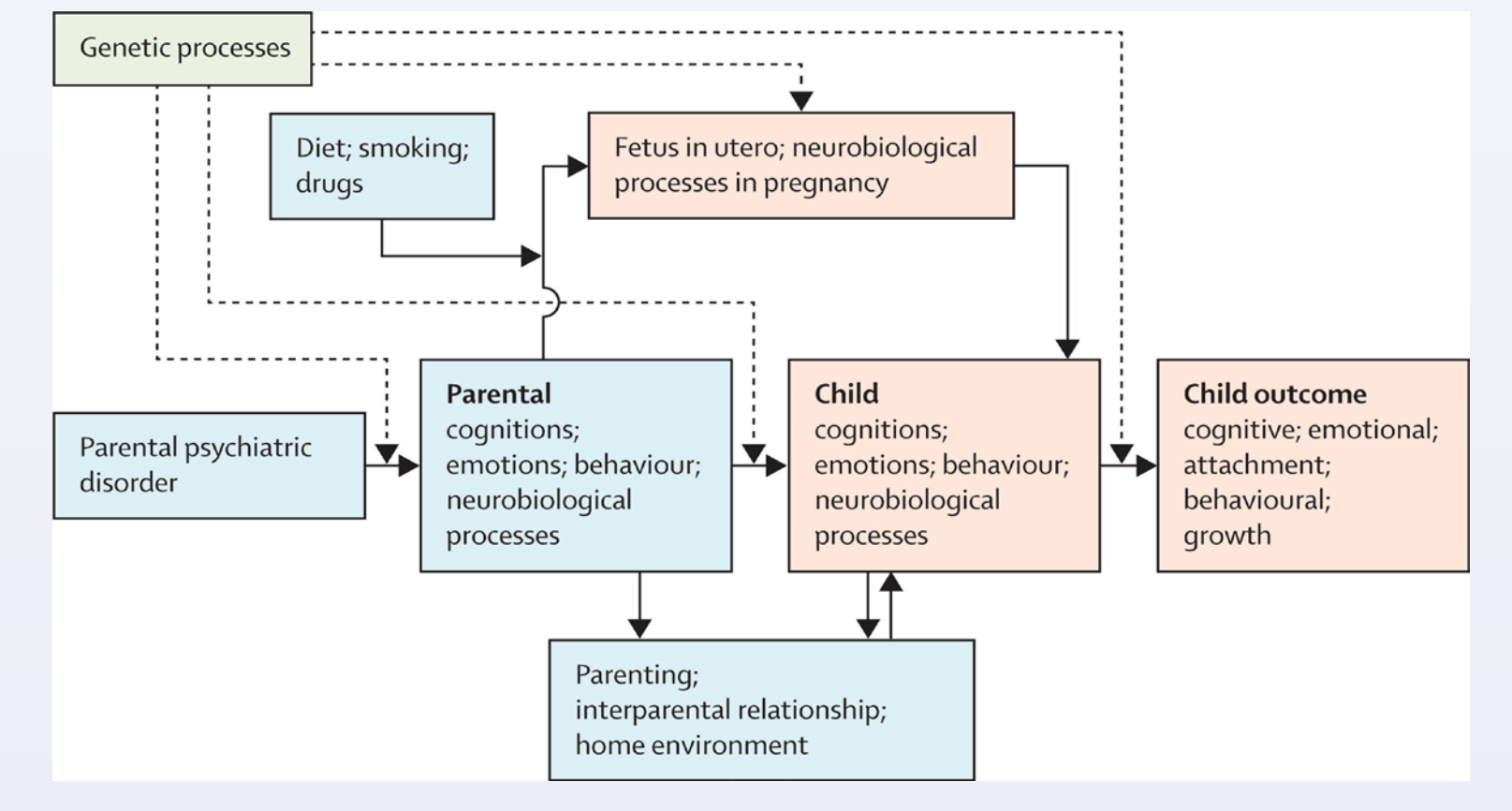
### Child assessments:

- Bruininks-Oseretsky Tests of Motor Proficiency 2 (BOT-2 total score)
- Kaufman Assessment Battery for Children II (KABC-II mental processing index –MPI)
- Test of Variables of Attention (TOVA)
- Behavior Rating Inventory of Executive Function (BRIEF)

**3 Assessment time points:** baseline, 48, and 96-weeks after study intake

Cross-sectional and longitudinal linear regression models were built adjusted for potential confounders (child's HIV status, age, gender, caregiver's age, and socioeconomic index).

Figure 1. Model of mechanisms linking maternal depression and child outcomes (Herba et al, 2016)



## OBJECTIVE

To evaluate how depression symptoms and severity of depression in caregivers relates to neurocognitive development of their HIV affected and un-affected children across four sub-Saharan countries.

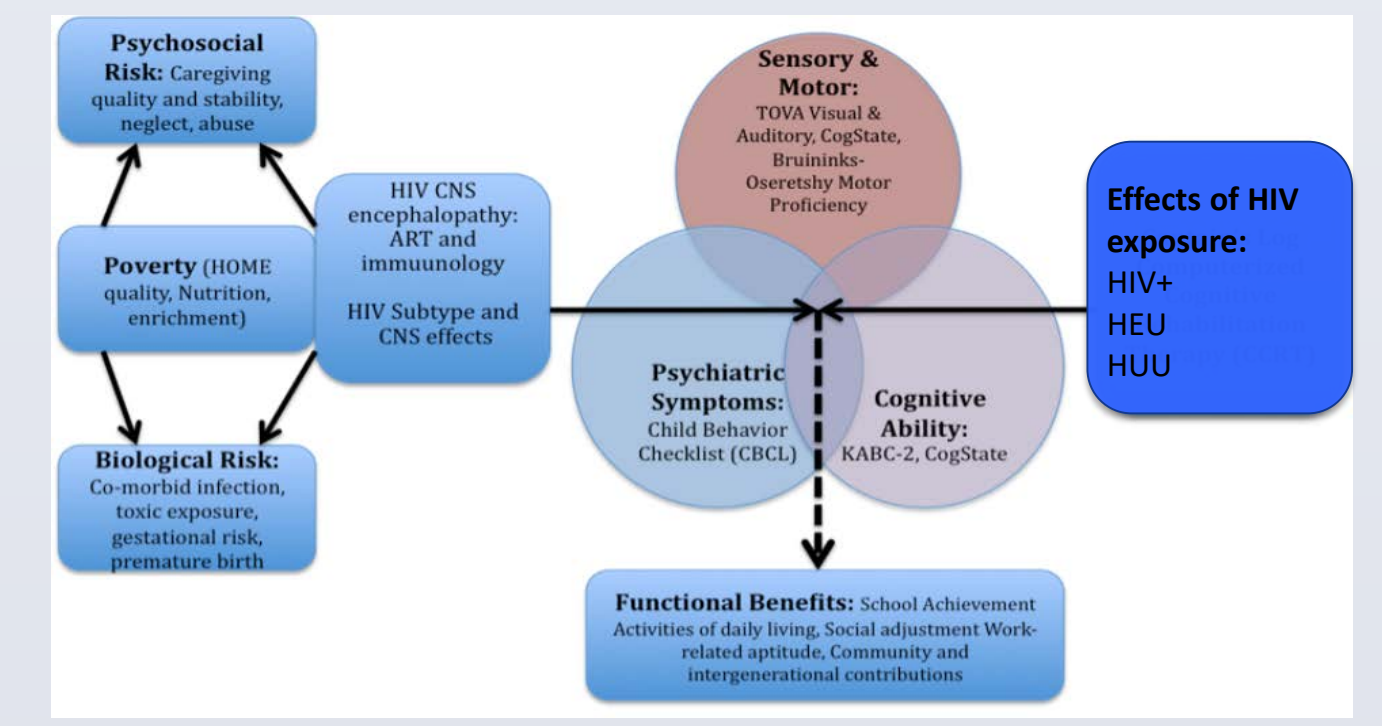


Figure 3. Observational Study Design for P1104s: Neuropsychological domains (center), risk factor domains (Left), HIV exposure groups (right)

Table 1. Child and caregiver characteristics at study entry, by child HIV status

	HIV (N=246)	HEU (N=183)	HUU (N=182)	P-value
Male (%)	45	52	46	0.35
Black, African (%)	98	96	82	
Age, years (mean (SD))	7.1 (1.2)	7.3 (1.6)	7.3 (1.5)	0.46
Age group				0.87
< 6 (%)	17	20	19	
6-7 (%)	34	35	35	
≥ 7 (%)	50	45	46	
Biological mother (%)	85	99	100	<0.001
Caregiver with HIV (%)	96	99	0	n/a
High caregiver depression level (HSCL >1.75) (%)	43	43	40	0.79

## RESULTS

Table 2. Mean neuropsychological test scores (standardized) by child HIV status at study entry. HIV+ children had significantly lower scores

	HIV (N=246)	HEU (N=183)	HUU (N=182)	Total (N=611)	P-value
KABC MPI	73.2 (10.5)	79.1 (11.4)	80.9 (11.7)	77.3 (11.6)	<0.001
BOT-2	48.3 (8.8)	52.5 (7.6)	52.6 (7.8)	50.8 (8.4)	<0.001
BRIEF MI	52.2 (13.0)	51.9 (12.1)	49.8 (10.5)	51.4 (12.1)	0.11
BRIEF BRI	53.1 (13.0)	51.2 (12.3)	51.9 (11.2)	52.2 (12.3)	0.27
BRIEF GEC	53.2 (13.3)	51.5 (12.0)	50.6 (10.5)	51.9 (12.2)	0.09
TOVA ADHD	-0.51 (3.13)	0.51 (2.63)	0.28 (2.59)	0.03 (2.86)	<0.001
TOVA D PRIME	82.5 (14.0)	88.3 (12.3)	87.9 (11.7)	85.9 (13.1)	<0.001

Table 3. Mean neuropsychological test scores (standardized) by caregiver's depression level at study entry. More executive problems were reported in children whose caregivers had higher depressive symptomatology

Test	HSCL Depression level Adjusted means (IC 95%)		P-value
	Low (0-1.75) (N=351)	High (>1.75) (N=259)	
KABC MPI	79.2 (77.4, 80.9)	78.7 (76.7, 80.6)	0.58
BOT-2	51.8 (50.3, 53.3)	51.2 (49.7, 52.8)	0.41
BRIEF MI	48.9 (46.7, 51.1)	56.0 (53.6, 58.5)	<0.001
BRIEF BRI	49.6 (47.0, 52.2)	55.3 (52.4, 58.1)	<0.001
BRIEF GEC	49.2 (46.7, 51.6)	55.9 (53.1, 58.7)	<0.001
TOVA ADHD	0.01 (-0.53-0.54)	0.08 (-0.48, 0.65)	0.76
TOVA D PRIME	87.5 (85.2, 89.8)	87.0 (84.5, 89.6)	0.70

Table 4. KABC-II Mental Processing Index means at study entry by caregiver depression level and child HIV status. In HIV+ children, the KABC MPI was marginally lower (Wald test p-value for interaction =0.05) with higher caregiver depression symptomatology compared to the non HIV-infected groups.

Depression level	HIV		HEU		HUU	
	Unadjusted mean (95% CI)	Adjusted mean (95% CI)	Unadjusted mean (95% CI)	Adjusted mean (95% CI)	Unadjusted mean (95% CI)	Adjusted mean (95% CI)
Low (0-1.75)	74.8 (73.0, 76.7)	76.0 (74.1, 77.9)	79.6 (77.4, 81.8)	80.2 (77.7, 82.7)	80.3 (78.1, 82.6)	81.3 (78.7, 83.9)
High (>1.75)	71.1 (69.3, 72.8)	73.4 (71.2, 75.5)	78.5 (76.1, 80.9)	80.3 (77.5, 83.0)	81.9 (79.3, 84.4)	82.4 (79.6, 85.1)

## CONCLUSIONS

- HIV+ children had lower cognitive performance scores than their non-infected peers
  - Caregivers with higher depression symptoms reported more executive function problems in their children, regardless of HIV status
  - Caregivers depressive symptoms may have a more pronounced, negative effect on the neurodevelopment of HIV+ children
- Implications**
- Identifying mothers in need of support and addressing their psychosocial challenges could help reduce the burden of early behavioral and cognitive problems in children
  - Overlap between maternal mental health and child development calls for integrating programs within existing health infrastructure that can benefit both children and mothers
    - For example: Use the PMCT program structure for HIV+ women to deliver early childhood development interventions

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**ACKNOWLEDGMENTS:** We thank the P1104s Leadership: Sonia Lee, Pim Brouwers, and the staff at each research site

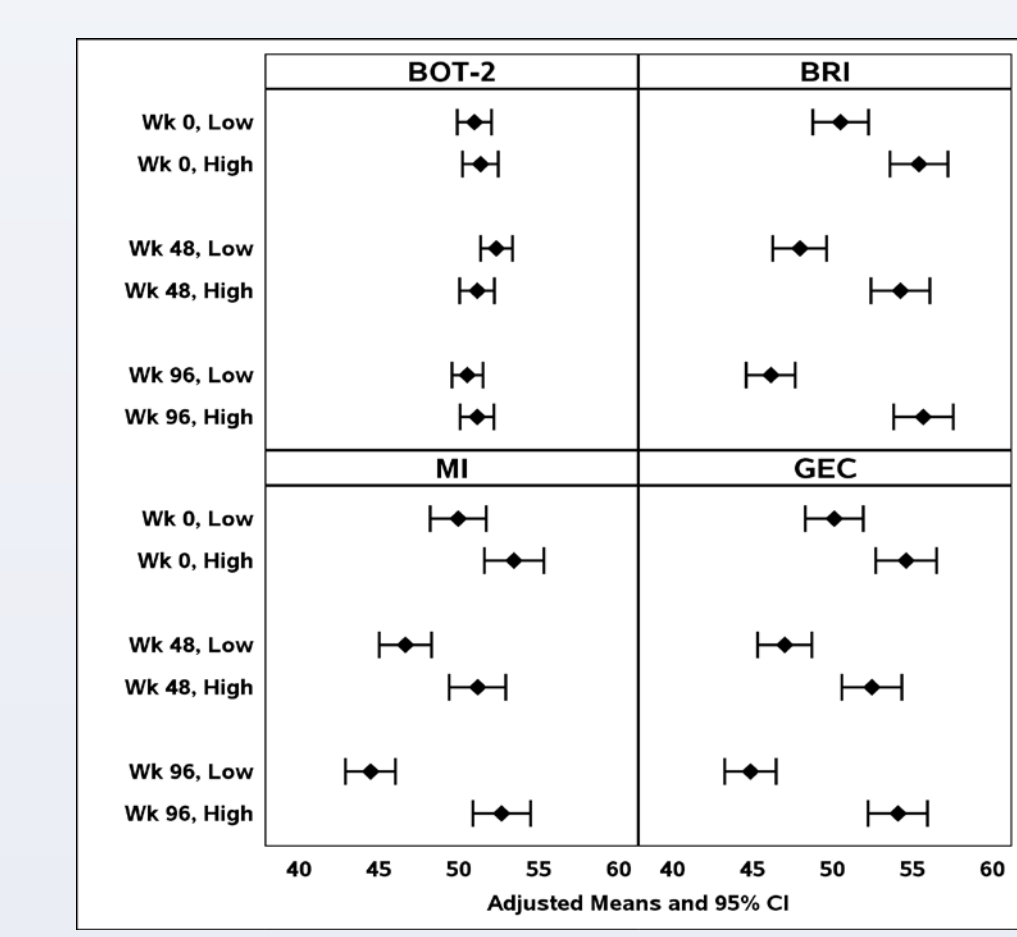


Figure 3. Adjusted means by caregiver depression level (High >1.75, Low ≤1.75) over time show that the BRI: Behavior Regulation Index, MI: Metacognition Index, and GEC: Global Executive Composite standard scores for the Behavior Rating Inventory of Executive Function are significantly higher (e.g. more psychopathology) among children from caregivers with high depression symptoms. By contrast, the BOT-2: Total point standard score for Bruininks-Oseretsky Test of Motor Proficiency was not.

Figure 4. Adjusted means by caregiver depression level (High >1.75, Low ≤1.75) over time showing the ADHD score slightly lower (e.g more inattention and impulsivity) among children with caregivers with high depression symptomatology

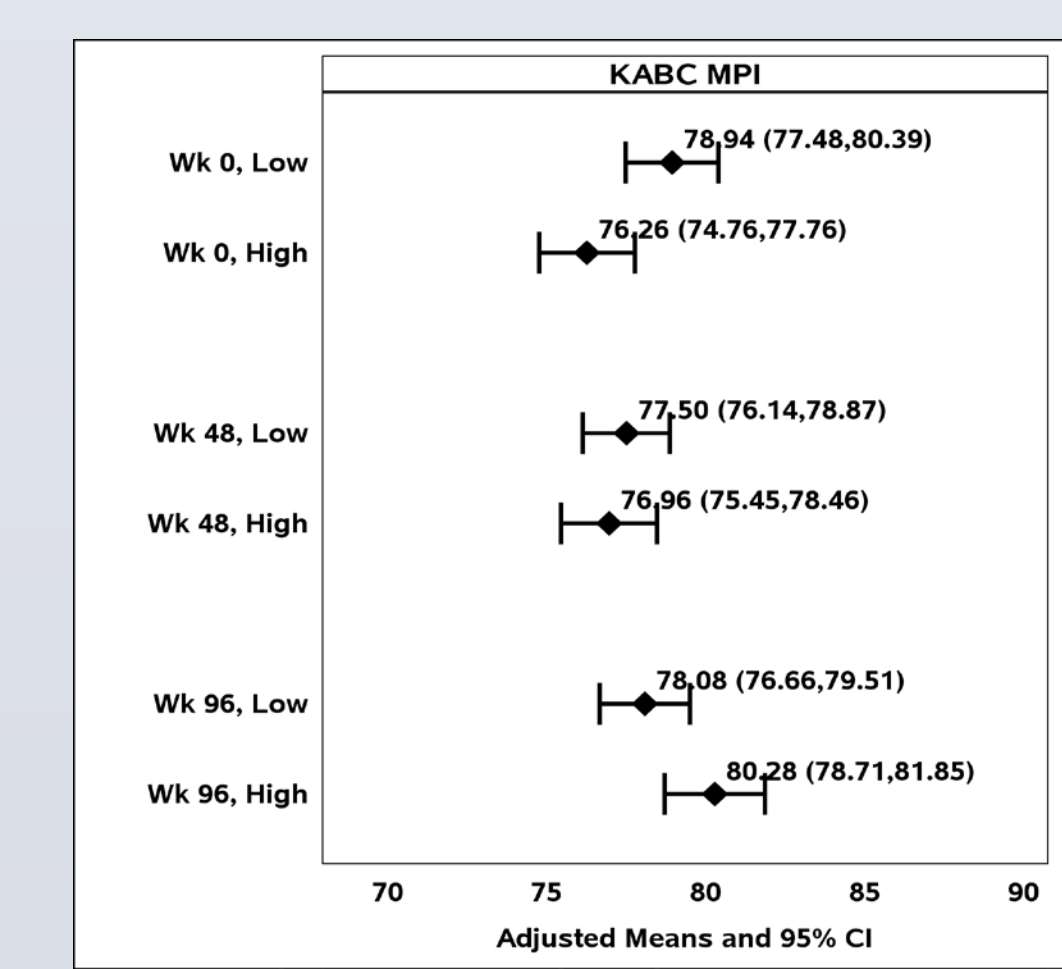
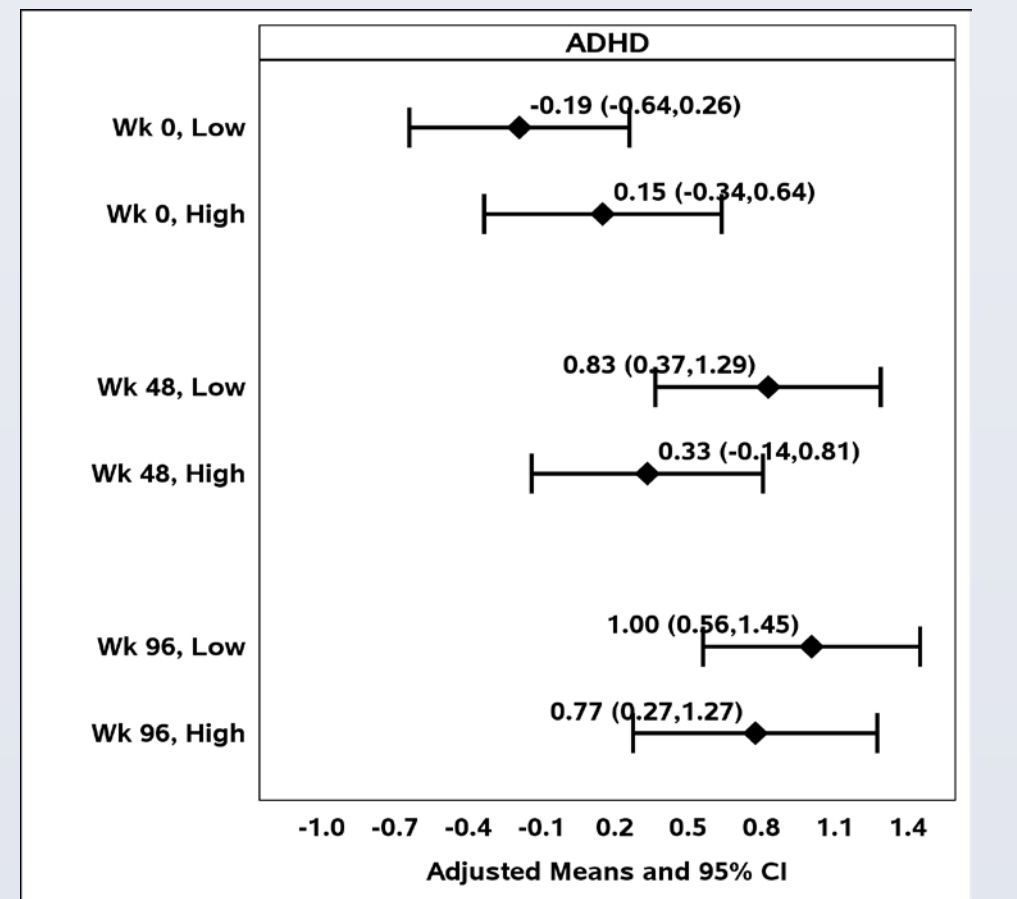


Figure 5. Adjusted means of the KABC MPI by caregiver depression level (High >1.75, Low ≤1.75) over time showing higher scores for children of caregivers with lower depression symptoms only at study entry (week 0).