

Centre for Global Child Health

Predictors of neurodevelopmental stimulation frequency at 12-months postnatal age after provision of an early cognitive stimulation package in Kwale County, Kenya



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Objective

• To investigate household, caregiver, and child characteristics that predict the number of caregiver reported caregiver-child interactions after cognitive stimulation training during the first year of life in Kwale, Kenya.

Background

• Over 200 million children fail to meet their neurodevelopmental

Results

Effect	Crude analysis	Multivariable analysis (N=344)								
	Reference	n/N	Unadjusted β Estimate	95% Cl (unadjusted)	p-value ^a	Reference	n/N	Adjusted β Estimate	95% CI (adjusted)	p-value
Household characteristics										
Middle SES ^b quintiles	Richest SES quintile n=89	248/413 (60%)	0.94	0.14 – 1.74	0.02	Richest SES quintile n=75	204/344 (59%)	1.30	0.36 – 2.25	0.007
Poorest SES quintile		76/413 (18%)	-1.27	-2.190.36	0.006		65/344 (19%)	-0.47	-1.53 – 0.60	0.39
No toilet access ^c	Toilet access n=217	208/425 (49%)	-1.36	-1.94 – -0.77	<0.001	Toilet access n=173	171/344 (50%)	-1.02	-1.700.33	0.004
Number of cognitive stimulation trainings by CHWs		N=424; Mdn=1 (0 - 2)	0.31	0.02 – 0.59	0.03		Mdn=1 (0 – 2)	0.33	0.009 – 0.65	0.04
Unimproved water	Improved water n=171	254/425 (60%)	-0.56	-1.18 - 8.10	0.07					
Number of people in household		N=427; Mdn=6 (4 - 7)	0.05	-0.07 - 0.18	0.39					
Caregiver characteristics										
Pregnancy complications [complications]	No pregnancy complications n=291	135/426 (32%)	0.88	0.25 – 1.52	0.006	No pregnancy complications n=235	109/344 (32%)	1.12	0.38 – 1.87	0.003
Depression during pregnancy [depression]	No depression during pregnancy n=322	109/431 (25%)	-0.46	-1.03 – 0.12	0.12	No depression during pregnancy n=250	94/344 (27%)	-0.93	-1.61 – -0.26	0.007
Maternal education		N=368; Mdn=0 (0 - 7)	-0.08	-0.160.01	0.03		Mdn=0 (0 – 7.25)	-0.08	-0.160.005	0.04
Paternal education		N=377; Mdn=6 (0 - 8)	0.004	-0.07 - 0.07	0.91		-	-	-	-
Complications during labor and delivery	No complications during labor and delivery n=344	82/426 (19%)	0.75	-0.11 - 1.62	0.09					
Complications after delivery	No complications after delivery n=349	77/426 (18%)	-0.26	-1.01 – 0.49	0.50					
No maternal mental health ^d	Maternal mental health n=102	328/430 (76%)	-0.26	-1.04 – 0.51	0.50					
Child characteristics										
Sex [male]	Sex [female] n=194	236/430 (55%)	-0.35	-0.94 - 0.25	0.25					
Gestational age ^e [premature]	Gestational age [full term] n=314	61/375 (16%)	0.30	-0.47 – 1.06	0.45					
Injury or seizures ^f [injured]	Injury or seizures [not injured] n=404	26/430 (6%)	-0.10	-1.16 – 0.95	0.85					
Development ^g [typically developing]	Development [delayed] n=40	391/431 (91%)	-0.47	-1.48 - 0.54	0.36					
^a The threshold for inclusion in the mult	ivariable analysis was n<0.05									

potential; most of whom are living in LMICs¹

- Caregiver-child interactions are positively associated with neurodevelopmental outcomes²
- Intervention programs that focus on increasing caregiver-child interactions demonstrate positive developmental outcomes³
- The larger trial related to this sub-analysis found an association between neurodevelopmental outcomes in intention-to-treat stimulation intervention clusters and singing interactions but not with interactions in other modalities in the first month of life. No associations were found at 12 months postnatal age
- Sociodemographic factors also influence caregiver-child interactions²

Hypotheses

• Specific sociodemographic variables will influence the number of caregiver-child interactions reported by caregivers after cognitive stimulation training at one year old

Methodology

- This post-hoc sub-analysis is part of a cluster randomized controlled trial of expectant mothers conducted in Kwale County, Kenya between November 2014 and May 2016
- Sociodemographic data was collected via participant interviews one

^aThe threshold for inclusion in the multivariable analysis was p<0.05

^bSocioeconomic status (SES) calculated using a household asset index and quintiles were derived from a principal components analysis in the style of Vyas & Kumaranayake (2006).

^cToilet access: participants reporting that they usually used a toilet facility, rather than open defecation (e.g. bush/field)

to three days after birth and at 12 months postnatal age

- Participants received between one and three visits from a Community Health Worker (CHW) who provided intervention
- Caregiver report of their number of interactions with the child was collected at 12 months postnatal age, interactions summed together included:

Speaking, Eye Contact, Singing, Gentle Touch

Interventions

<u>Cognitive Stimulation Training</u>: Presented verbally and with a pictorial brochure by a CHW in the 3rd trimester, 1st week of life, and in the 4th-6th week of life

Make eye contact and talk to their children	 Look in in baby's eyes, smile and talk/sing
Provide responsive feeding and caregiving	 Children learn to communicate through movements, sounds, and cries Emulate the child's sounds and movements
Sing songs, including those with gentle touch	 Use culturally appropriate songs with gentle touch Skin-to-skin contact through gentle soothing, stroking and holding is good

Based on UNICEF and WHO Care for Child Development ^{4,5}

^dMaternal mental health: evaluated with the Self Reporting Questionnaire 20 (SRQ-20)⁹ at 12-month postnatal age

^eGestational age: a child was considered premature if their caregiver reported they were born at <36 weeks gestation. Those born at >36 weeks gestation are considered full term ^fInjury or seizure: the child experienced any injury or seizures in their first year of life

^gDevelopment: evaluated with the Protocol for Child Monitoring - Infant/Toddler version (PCM-IT)⁵, a caregiver survey tool designed by the researchers. Children were considered delayed with a score one standard deviation below the mean in at least one of the tested areas: fine motor, gross motor, cognition, executive function, language, self-help, social skills, and emotional skills

Discussion

Household Characteristics

 In alignment with linguistic social stylistic stratification, middle SES quintiles participated in more interactions than the wealthiest quintiles, while the poorest quintiles were associated with the fewest interactions¹⁰

 Resources, like toilet access, may allow caregivers time to provide more cognitive stimulation. Clean water and number of people in the house did not have the same effect

 As planned, more cognitive stimulation training sessions resulted in more interactions

Limitations

 Missing data across the entire sample and for parental education levels and gestational age, in particular, may have affected the results

Caregiver Characteristics

- Unexpectedly, mothers with more education reported fewer interactions than those with less education.¹¹ Paternal education had no association
- Depression in pregnancy may have reduced mothers' ability to participate in interactions but maternal mental health had no association
- Interactions increased after complications during pregnancy, which may reflect more aid to the child who might have been affected by these complications.
 Complications at and after birth had no associations

Conclusions

 Household characteristics yielded more variables significantly associated with caregiver-child interactions than caregiver and child characteristics, which did not include any associations

Child Characteristics

- Although a female advantage in language stimulation has been found cross-culturally, the sex of the child did not affect caregiver reported interactions¹²
- Similarly, there were no associations between interactions and injury/seizure, prematurity, or developmental delays

Participants

- 344/481 infants followed for neurodevelopmental outcomes provided complete data
- 190 received at least one cognitive stimulation training

Analysis

 R and geepak were used to perform a multivariable linear regression with a general estimating equation (GEE) to account for study clustering^{6,7}

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- The number of interactions may have been affected by recall and self-reporting bias

References

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 Future studies should focus on more objective methods of collecting the amount of caregiver-child interactions

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