

USE OF THE CAREGIVER REPORTED EARLY DEVELOPMENT INSTRUMENTS (CREDI) TOOL TO EVALUATE INFANT DEVELOPMENT IN MAYA GUATEMALAN CHILDREN: THE SAQMOLÓ' STUDY

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Introduction

- Policy makers and stakeholders need to prioritize early child development (ECD) during the first 1000 days. [1]
- Limited access to readily available, reliable, and valid instruments for assessing children's ECD outcomes is a barrier to prioritizing ECD. The Caregiver Reported Early Development Instruments (CREDI) are assessment tools for measuring the development of children under age three in global contexts (validated in 17 countries) and may be a solution. [1,2]
- Guatemala has a high prevalence of chronic malnutrition (stunting; low length/height-for-age) among children under five years (47%), which may negatively impact child development; rural Maya children are disproportionately affected (~70%). [3]
- We assessed the feasibility of using the CREDI long form to measure differences in global development scores in a large randomized-controlled, comparative effectiveness trial of an egg intervention for rural Maya children (Saqmolo' Project; ClinicalTrials.gov Identifier: NCT04316221).

Aims

- We conducted a feasibility study to test administration of the CREDI tool with Maya caregivers in rural Guatemala and evaluate field worker perceptions of barriers and solutions for implementing the instrument.
- We examined the distribution of overall and ECD domain Z-scores for children from the feasibility study and the first 279 children enrolled in the Saqmolo' study.

Methods

CREDI long form

- Provides domain-specific information on children's ECD (**Figure 1**).
- Includes 108 items and uses start and stop rules based on children's age.
- Takes ~20 minutes to complete

Feasibility Study (April-May 2021)

- Two bilingual (Spanish-Kaqchikel) interviewers were trained for 5 days on the CREDI by an expert in child development.
- CREDI administered to caregivers of n=37 Kaqchikel Maya children ages 6-19 months [median age 11.8 months (IQR: 8.4, 15.2)] (**Figure 2**).
- Z-scores for overall and individual CREDI domains were estimated (https://credi.shinyapps.io/Scoring_App/) and graphed using R statistical software.
- Field worker perceptions of barriers/solutions were collected via interview.

Saqmolo' Study (May 26-October 21, 2021)

- The Baseline CREDI was completed with caregivers of n=279 Kaqchikel Maya children.
- *Caregiver characteristics:* preferred language: Kaqchikel (12%), Spanish (88%); education level: none (4%), elementary school or less (63%), high school (33%)
- *Child characteristics:* 47% girls (n=135) with median age of 6.8 months (IQR: 6.3, 8.0); median of length-for-age Z-score -2.0 (IQR: -2.8, -1.4); median of weight-for-length Z-score 1.0 (0.4, 1.6) ; head circumference mean ± SD 42.5±1.3 mm.
- Distributions of normed CREDI overall and domain z-scores were graphed using R statistical software.

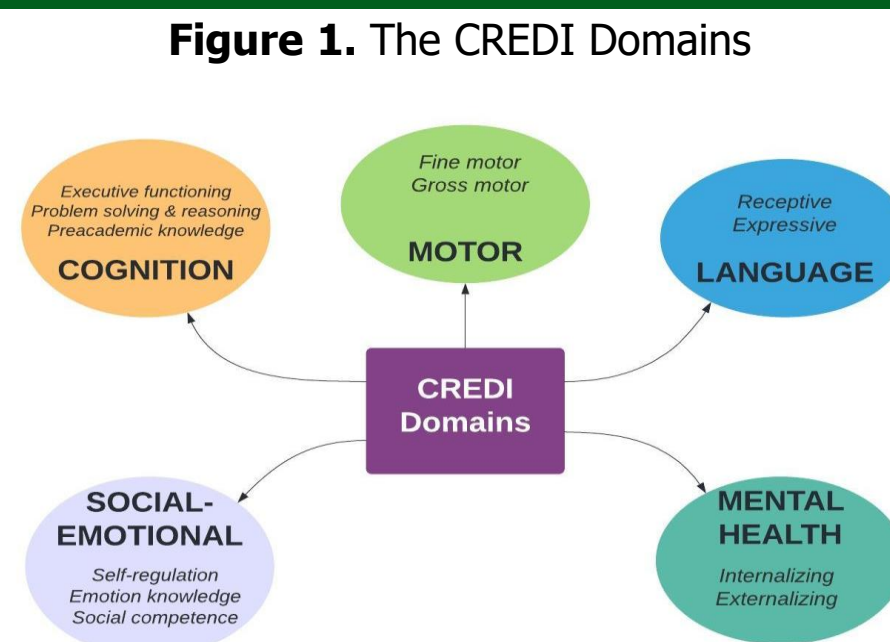


Figure 1. The CREDI Domains

Results

Feasibility Study

Table 1. Z-scores for CREDI domains for 6–19-month-old children from feasibility study (n=37)

Domain	Mean (SD)	Min	Max
Motor	-1.17 (1.03)	-3.07	1.38
Cognitive	-0.57 (0.96)	-2.37	1.18
Socio-emotional	-0.42 (0.87)	-2.47	1.81
Language	-0.86 (1.09)	-3.23	1.16
Overall	-0.91 (0.87)	-2.79	1.18

Figure 2. Age distribution of children in feasibility study

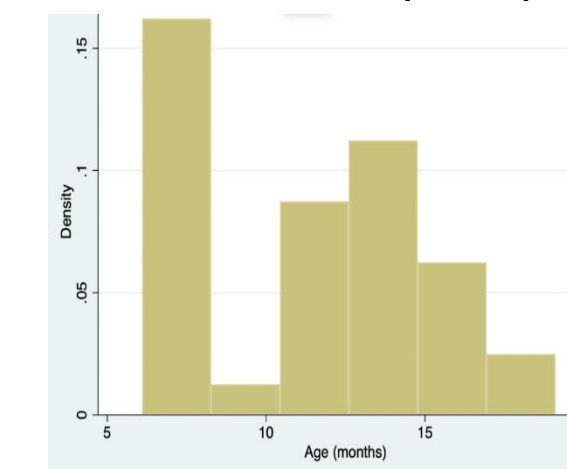
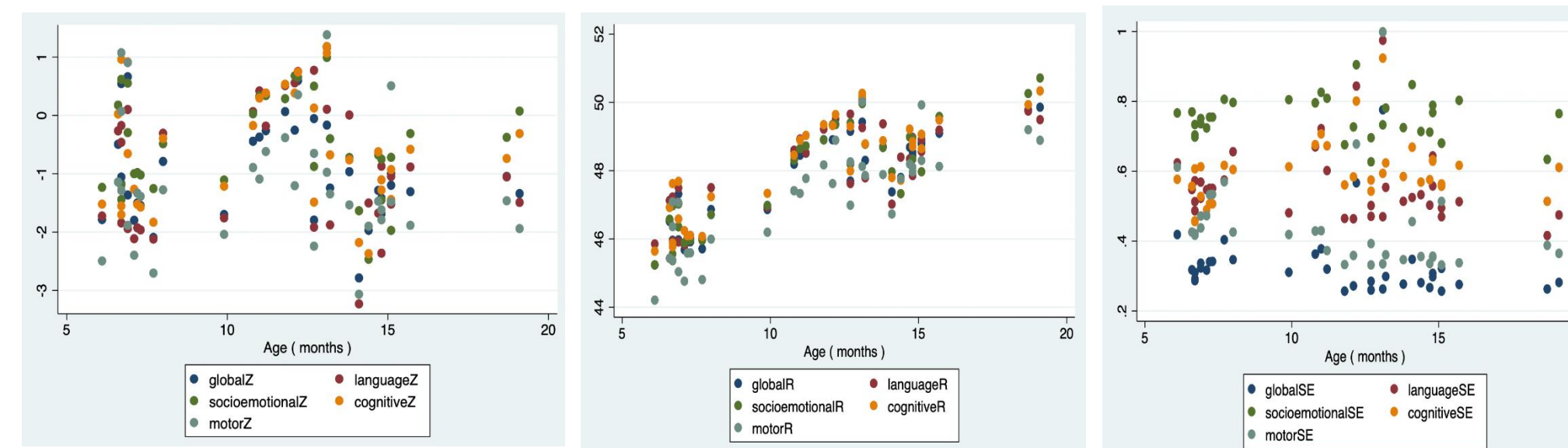


Figure 3. Distributions of CREDI Z-scores for feasibility study



A. Domain specific Z-scores by age in months. B. Correlation of the CREDI-specific domain score by age-group. C. Standard error showing the homogeneity of the CREDI-specific domain score by age-group.

Table 2. Common barriers/solutions identified by field workers during feasibility study

Identified Barrier in CREDI field application	Iterative changes – Ongoing Challenges
Bilingual delivery/distributed performance	The technician asks the preferred language and has a written copy with questions in Kaqchikel
Problem words/phrases: "a menuda" "se aferra" "frecuentemente" "retraído" "wachināq"	We identified the most problematic words /phrases and adapted to the common language used in the context
Problem questions: when the caregiver does not understand the question and figure explanation is not enough	Questions were modified with description of when to exemplify. Example: clapping- do the movement and sound and not just the movement. (Figure 4)
Not knowing when to stop as is common for children going beyond their age-group	General rule: interview continues until there are five consecutive "no" answers.

Figure 4. Examples of the CREDI adaptation

LF28	Does the child clap his/her hands together? ¿El niño/la niña aplaude con sus manos? Se ejemplificará aplaudiendo (haciendo el sonido y no solo el movimiento) ¿Ri ak'wal nupaq'ij ruq'a'?		1= Yes, Si 0= No 9 = Don't know, No sé
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References

- [1] Waldman M, McCoy DC, Seiden J, Cuartas J, Fink G. Validation of motor, cognitive, language, and socio-emotional subscales using the Caregiver Reported Early Development Instruments: An application of multidimensional item factor analysis. *International Journal of Behavioral Development*. 2021; 45 :368-377.
- [2] McCoy DC, Seiden J, Waldman M, Fink G. Measuring early childhood development: considerations and evidence regarding the Caregiver Reported Early Development Instruments. *Ann N Y Acad Sci*. 2021 1492:3-10.
- [3] Ministerio de Salud Pública y Asistencia Social (MSPAS), Instituto Nacional de Estadística (INE), ICF. (2017). *Encuesta Nacional de Salud Materno Infantil 2014-2015. Informe Final*

Results

Baseline CREDI from Saqmolo' Study

Figure 5. Distribution of normed CREDI baseline overall and domain specific Z-scores for n=279 children

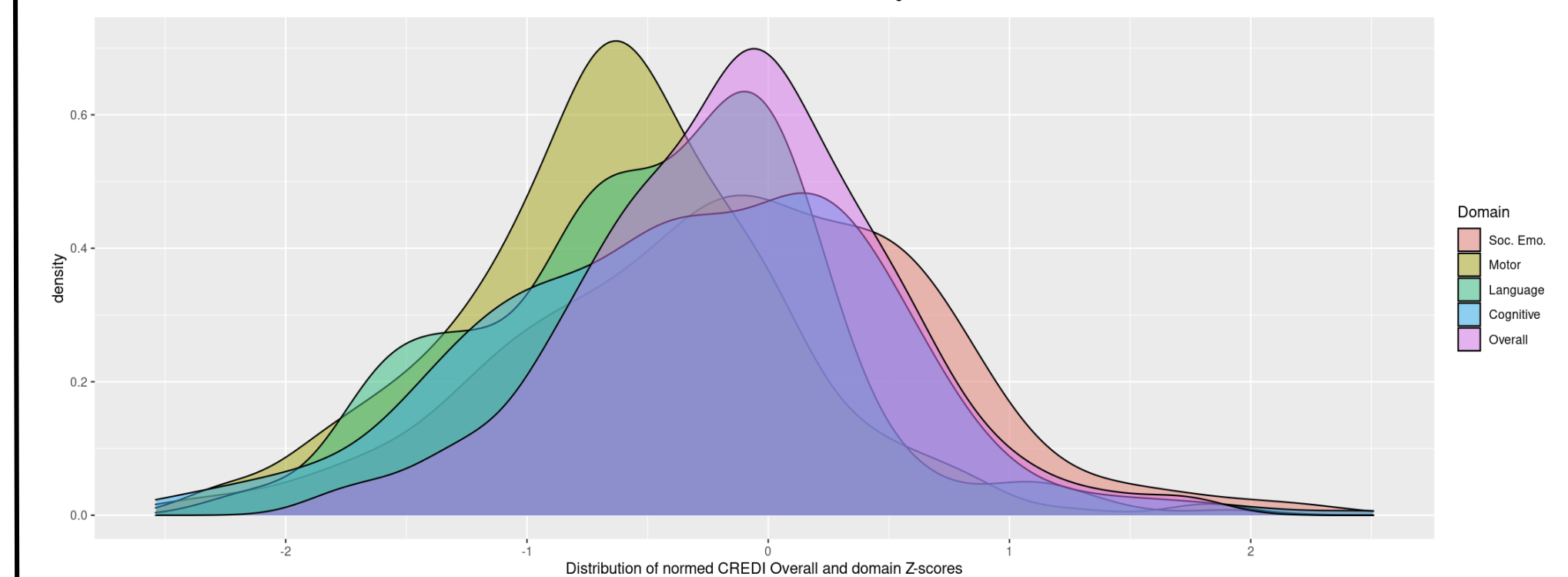
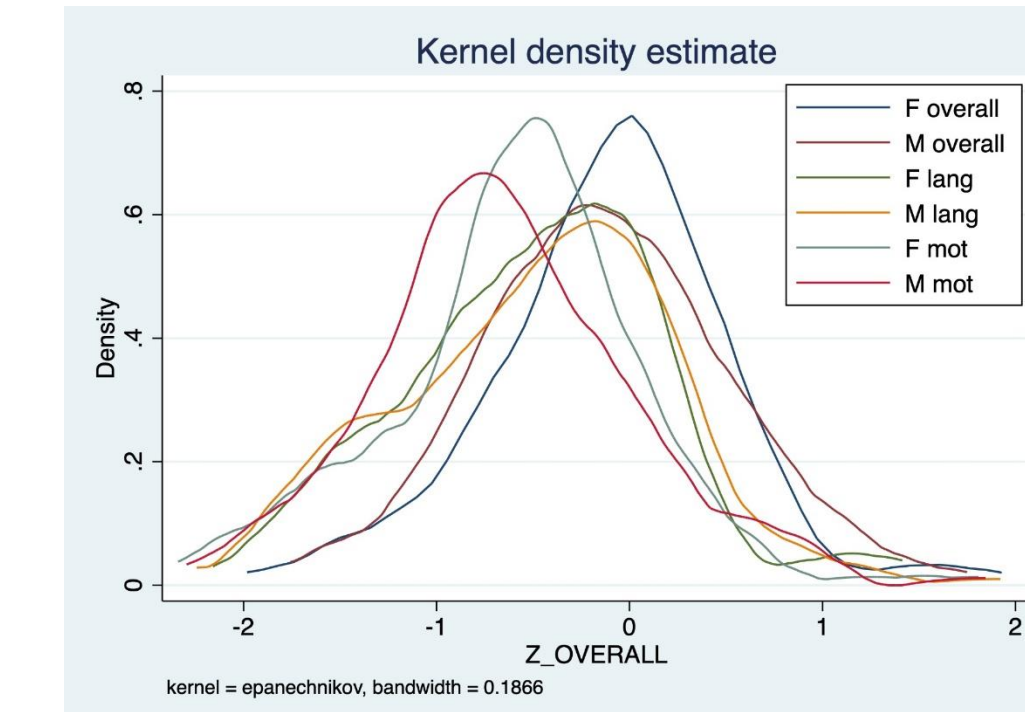


Figure 6. Kernel density estimate for the CREDI language and motor specific Z-scores for n=279 children



Discussion

- During the feasibility study, we determined that the language for some of the questions on the Spanish version of the CREDI needed to be adapted for Guatemala. Administering the CREDI in Kaqchikel required translation and training and practice among field workers.
- With some adaptation, the CREDI is a feasible tool for use with rural Maya caregivers.
- Our feasibility study and baseline, cross-sectional analysis of Saqmolo' study data provide insight on early development patterns of Guatemalan Maya children using the CREDI tool.
- In our feasibility study (n=37), the Z-scores for all specific domains were below the same-age average of the reference population. Baseline analysis of the CREDI for children in the Saqmolo' study (n=279) demonstrated similar score distributions, especially for the motor and language domains.
- We believe that multivariable analyses that include covariates known to influence child development (i.e education, wealth, nutritional status) are particularly relevant for this context. Covariates were not included in these initial analyses.

Trial registration: NCT04316221

Funding Disclosure: Supported by the Academy of Nutrition and Dietetics Foundation via a grant from the Egg Nutrition Center.