KUHeS RDC

RESEARCH DISSEMINATION CONFERENCE

Implementation of a scalable tablet-based assessment tool to detect children at risk of developmental delay in Malawi

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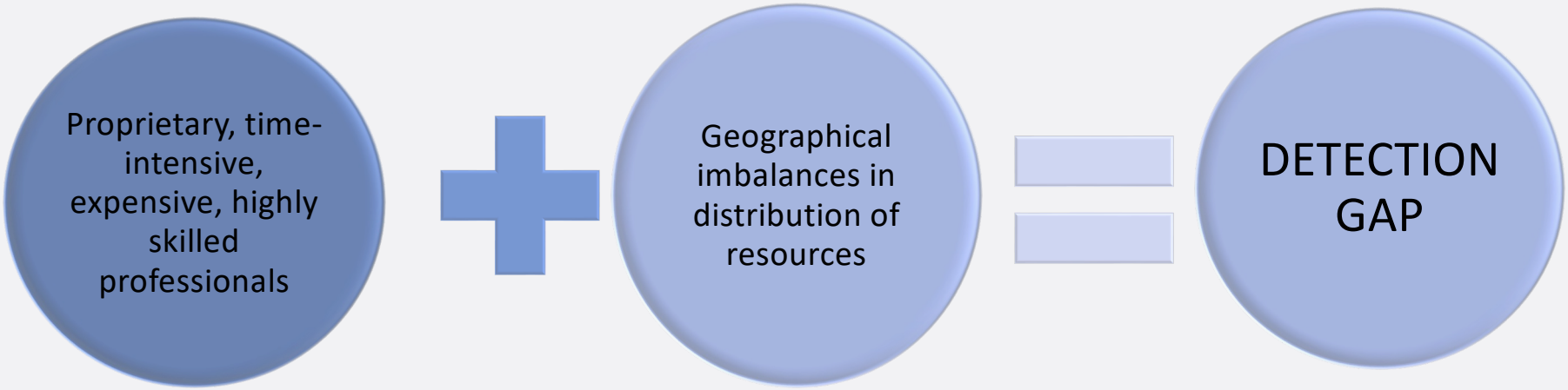
INTRODUCTION

How common are neurodevelopmental disorders in LMIC settings?

- 10-20% of children are estimated to have mental health (neurodevelopmental) disorders in LMIC

- Evidence for this figure is poor as there are few tools which can identify children with mental health disorders – it is only an estimate

Presently we have limited tools…



How can we overcome the detection gap?

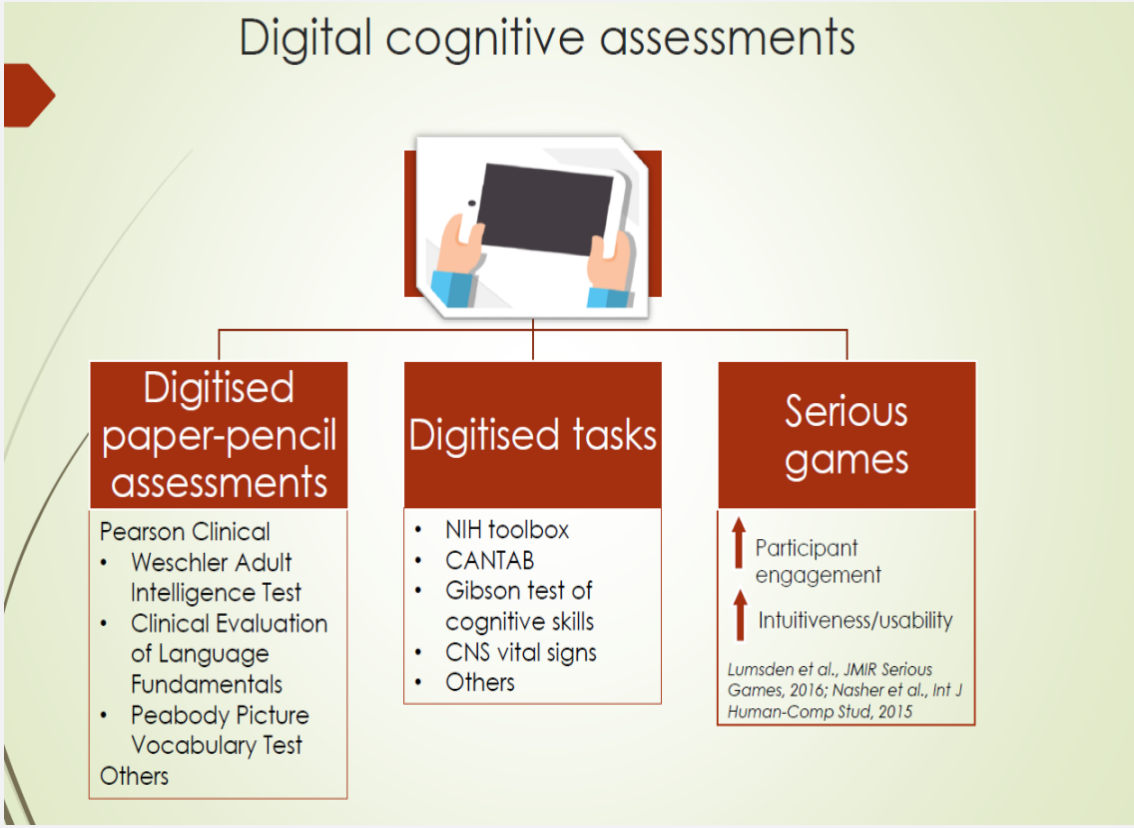
Could the use of mobile technology be a solution?

Emerging literature suggests:

1. More accurate and finely grained data
2. More standardized procedures for all children
3. Reduction of measurement errors
4. Use of advanced analytics such as machine learning

These advantages can be further strengthened

by the **GAMIFICATION** of the tools

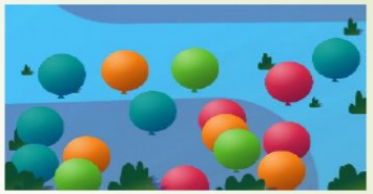


START and DEEP tools to be used in assessments alongside MDAT + on tablets

Starting animation

Single Tap (ST)

Alternate Tap (AT)



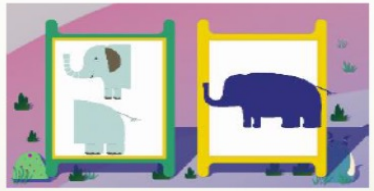
Popping bubbles (PB)

Grow Your Garden (GYG)

Hidden Objects (HO)

Odd One Out (OOO)

Matching Shapes (MS)



Jigsaw (JIG)

Location Recall (LR)

Ending animation

AIM AND OBJECTIVES

AIM: To validate the STREAM tool

Specific objectives:

1. To establish the *criterion validity* of STREAM against a gold-standard clinical assessment
2. To establish the *convergent validity* of STREAM against SES, anthropometric scores, hair cortisol levels, EEG metrics and other risk factor measures
3. To establish STREAM's ability to *discriminate* between children who show indicators of NDD-risk and those who do not
4. To establish the *internal consistency* and *test-retest reliability* of STREAM

METHODOLOGY

STUDY POPULATION

- N of 2000 children, equal number of boys and girls:
  - 1850 randomly sampled from population (**normative sample**)
  - 150 sampled from children with confirmed NDD diagnosis or at risk (**NDD-risk sample**)

- **Age range**: 0-6 years
- **Recruitment area**: Ndirande and Limbe

NDD-risk sample

	0-2 yrs	2-4 yrs	4-6 yrs	Total
M	25	25	25	75
F	25	25	25	75
Total	50	50	50	150

Normative sample

	0-3 mths	3-6 mths	6-9 mths	9-12 mths	1-1.5 yrs
M	38	39	38	39	77
F	39	38	39	38	77
Total	77	77	77	77	154

(...)

4.5-5 yrs	5-5.5 yrs	5.5-6 yrs	Total
77	77	77	924
77	77	77	924
154	154	154	1848

RECRUITMENT STRATEGY

For the **normative/ community sample**:

- 0-3 years: Antenatal, immunization and weighing clinics
- 3-6 years:
  - ✓ Antenatal, immunization and weighing clinics
  - ✓ Primary schools and community-based childcare centers
- We will exclude children with severe hearing, vision and motor impairments which prevent the use of the tablet

For the **NDD-risk/ enriched sample**:

- 0-3 years: Pediatric neurology clinic, physiotherapy clinic, occupational therapy clinic and malaria follow up clinic in QECH
- 3-6 years:
  - ✓Clinics in QECH (same as above)
  - ✓Centers for children with special needs
- We will include any children with syndromic/ dysmorphic features, general developmental delays (GDD), autism spectrum disorder (ASD), intellectual disability (ID), attention deficit hyperactivity disorder (ADHD), epilepsy, cerebral malaria, hydrocephalus, and spina bifida.

MEASURES

Data will be collected using:

- ✓STREAM tool (MDAT, START & DEEP), parent child interactions, demographics and anthropometry
- ✓Risk factors tools known to impact neurocognitive development and child functioning
- ✓EEG (Electroencephalogram)
- ✓Hair cortisol
- ✓GMDS (Griffiths Mental Developmental Scales)
- ✓Clinical tools (INCLEN & diagnosis proforma)

DATA COLLECTION

Primary assessment (N = 2000)

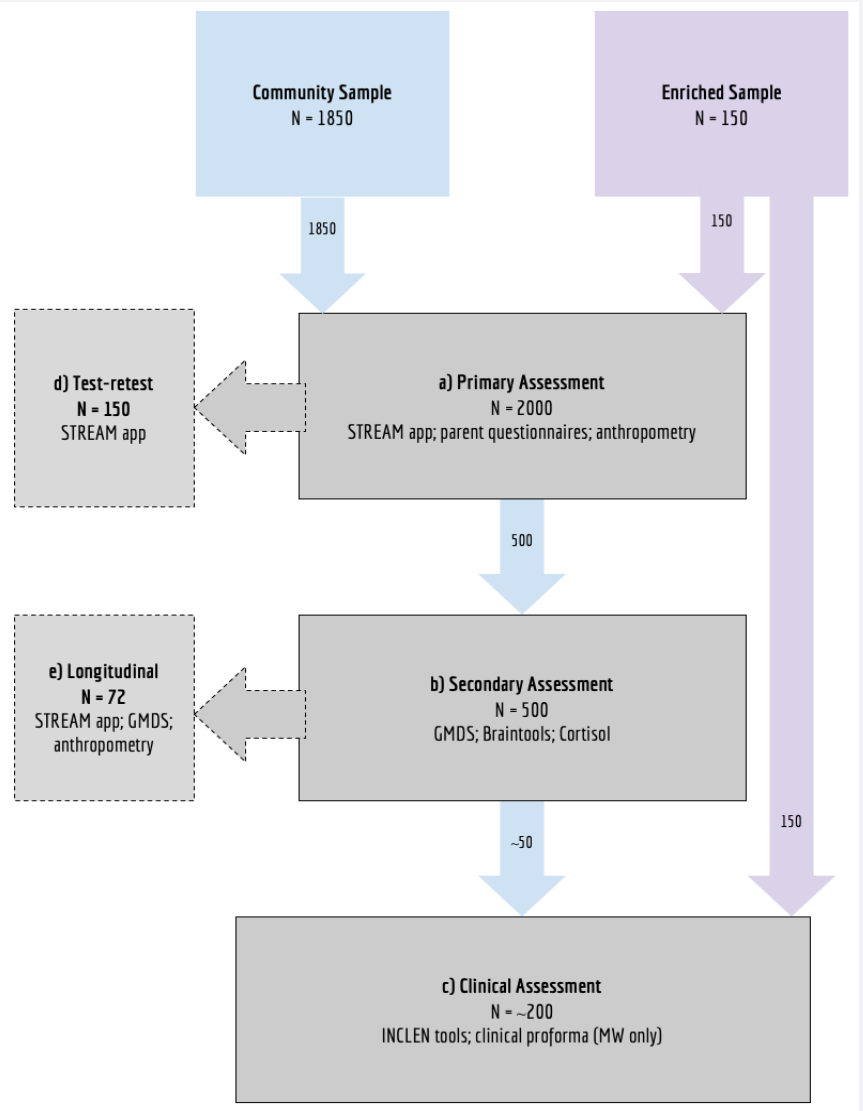
- STREAM (MDAT, DEEP, START & PCI)
- Parental report on risk factors
- Parental report on neurodevelopment and child functioning
- General demographics
- Anthropometry

Secondary assessment (N = 500)*

- GMDS
- EEG evaluation
- Cortisol in hair samples

Longitudinal assessment (N = 72)*

- STREAM
- GMDS
- Anthropometry



DATA COLLECTION

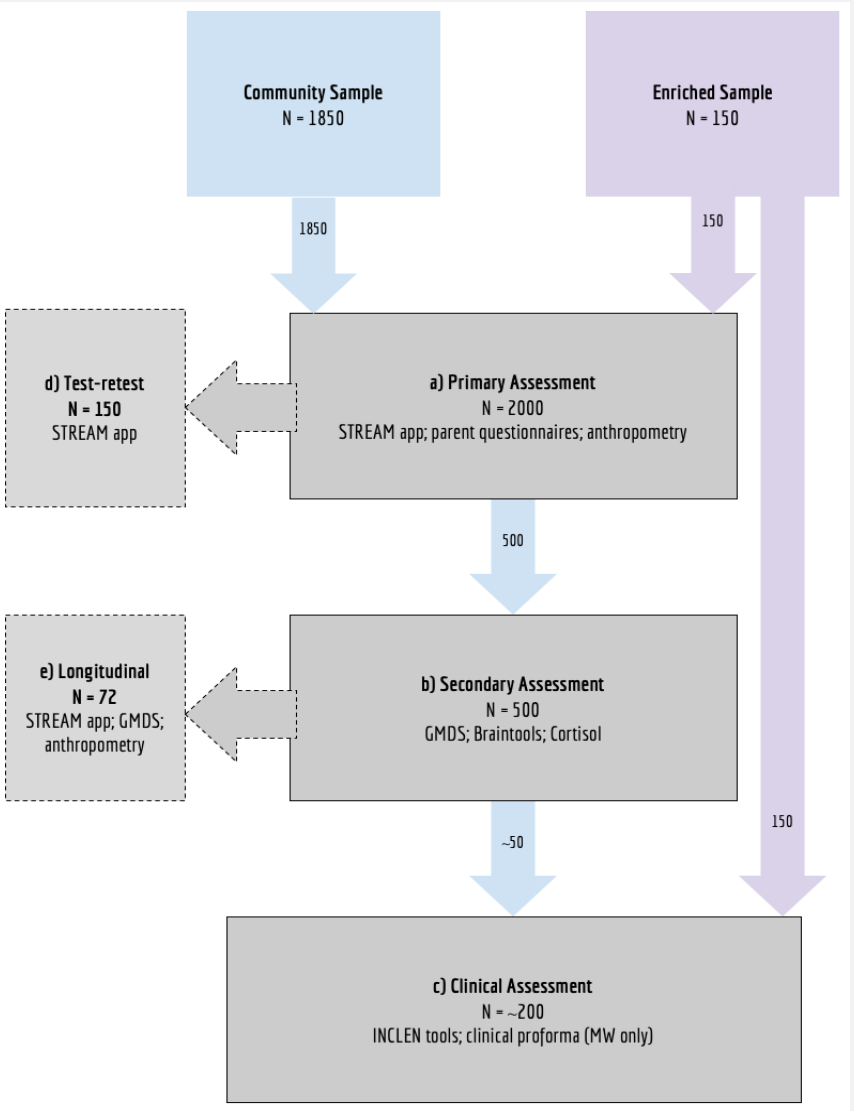
Test-retest assessment (N = 150)*:

STREAM (MDAT, DEEP, START & PCI)

Clinical assessment (N = 150 enriched; N = ~50 community):

INCLEN tools (ASD, ADHD, NMI, EPI)

Diagnosis proforma



* Only community sample

EXPECTED RESULTS

1. This study will deliver a scalable platform to assess key neurodevelopmental domains using mobile technology and machine learning across preschool years and across diverse settings. This study will provide:
    - Normative data on these domains across two low-resource settings (India and Malawi)
    - Evidence of its clinical utility in assessment of neurodevelopmental domains at a
    - population level in community settings.
    - Evidence of feasibility of use by non-specialist community health workers.
    - Evidence of the impact of possible underlying risk factors on behavior and brain function

2. We will conduct timely dissemination of the findings of this study at national and international conferences and through peer-reviewed publications.

3. The results will also be distributed and discussed with the local institutions involved in the study, KUHeS and College of Medicine Research Ethics Committee (COMREC)

DATA COLLECTED

From 2nd March 2022 to 22nd November 2022

Assessments	Completed	Target
Community sample		
Primary	562 (30.38%)	1850
Secondary	74 (14.8%)	500
Test-retest	48 (32%)	150
Longitudinal	0 (0%)	72
Enriched sample		
Primary	42 (28%)	150
Clinical	40 (26.67%)	150

CONCLUSION

- Data collection is currently smooth
- Greatly appreciate the support of partners
- There has been few challenges

ACKNOWLEDGEMENTS

- Participants in the study
- Dr Emmie Mbale
- Prof Melissa Gladstone
- Dr Maria M. Crespo-Llado
- BMP STREAM staff
- Management and staff of Blantyre DHO (limbe and Ndilande health centers)

Thank You

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