



# THE EARLY LEARNING PROGRAMME OUTCOMES STUDY

## TECHNICAL REPORT

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([www.innovationedge.org.za](http://www.innovationedge.org.za)) and Ilifa Labantwana  
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## FOREWARD

The Early Learning Programme Outcomes study was commissioned by Innovation Edge and Ilifa Labantwana, to help inform the collective efforts of Government, NGOs, donors and business to support access to quality early learning programmes for young children in South Africa.

The research findings presented in this document point to factors found to be associated with quality programming and provide evidence of the extent to which well-designed and implemented interventions can improve child outcomes. It is important to note that other studies with different designs and different populations might reach different conclusions. One study is not sufficient to make definitive claims.

This report is a lengthy and technical document. We have produced shorter and more accessible General Research Brief as well as Insights Briefs for each participating partner organisation. As with any research of this kind, the data raise as many questions as the answers they provide. We plan to explore these additional questions and will share further learnings as they emerge.

We welcome your input and invite you to engage with our team on this document as we work together to improve the early life experiences of South Africa's children.

## ABSTRACT

**Background:** South Africa has a well-developed Early Childhood Development Policy. A number of channels of delivery are in place for early learning programmes for three- to five-year-old children. The current study is the first to examine the relative effectiveness of different programmes in improving early learning outcomes for young children. **Design:** Three playgroup and two centre-development models targeting economic quintile 1-3 children are compared using a quasi-experimental pre-test post-test field study design. **Samples:** The sample comprised 369 children (average age 54 months at baseline and 62 months at endline) attending five day per week centre-based programmes (n= 195) or playgroups (n= 174) on either one two or three mornings per week. Children were assessed on the Early Learning Outcomes Measure (ELOM) at baseline (March 2018) and endline (October 2018). ECD practitioners were interviewed to capture programme variables likely to affect early learning outcomes and 327 caregivers were interviewed to obtain data on each child's home learning environment. **Analytical approach:** Descriptive analyses were undertaken for all programmes. Two of the playgroups and both centre-development programmes had the necessary data for multilevel modelling. This was undertaken to investigate their relative effectiveness, as well as the contributions of practitioner, child and home background variables to change in ELOM performance over the course of the interventions. **Key Findings:** Statistically significant improvements in Total ELOM scores were observed for all four programmes included in multi-level modelling with the extent of change ranging from 13 to 20 ELOM standard score points. One playgroup programme offering either two or three sessions / per week and one five session / per week centre-based programme experienced the greatest improvement (1.34 SD and 1.41 SD respectively). Those who attended more sessions showed most improvement in ELOM scores. Other factors that contributed to improvement included practitioners' reported support from their organisations, children's height for age, and their baseline ELOM scores (those with lower baseline scores made the greatest gains). Changes in ELOM scores are largely attributable to programme participation rather than to opportunities for stimulation at home. However, children with more books and toys at home performed significantly better on the Fine Motor Coordination and Visual Motor Integration, and Cognition and Executive Functioning domains of the ELOM. The limited influence of the home environment is likely due to the restricted time caregivers had for activities with (more than two thirds of the sample reported having two hours or less during the week and weekends). Also, significant proportions never engaged in activities likely to improve early learning outcomes (reading, telling stories, or singing to children). **Conclusion:** The findings have implications for the design of programmes targeting low income children. Well designed and closely monitored playgroup programmes can perform as well as more expensive centre-based models. The limited time and resources low income parents have to devote to early stimulation suggests that children's direct participation in a group programme may be a more effective vehicle for improving developmental outcomes than interventions that target parents.

## ACKNOWLEDGEMENTS

We are most grateful to Innovation Edge and Ilifa Labantwana for the opportunity to conduct this important study, the first of its kind in South Africa. We trust that this work can form the basis of ongoing research to establish 'what works' best to improve the quality of early learning programmes so that children may arrive in school ready to benefit from what is offered.

We salute the organisations that agreed to collaborate with us. It takes considerable courage to be open to participation in a study during which your programme is under scrutiny. We trust that our findings will provide an opportunity for reflection and programme improvement as well as continued engagement with the research and evaluation community so as to advance the best interests of our young children.

We are particularly grateful to our ELOM Assessors who played a key role in producing the evidence generated for this report.

Guidance on statistical analyses was provided by Professor Colin Tredoux of the University of Cape Town Psychology Department, and by Ms Tamsyn Naylor.

A draft of this report was sent to the Executive Directors (ED) of Innovation Edge (IE) and Ilifa Labantwana, and to the five study programmes. The latter were asked to comment on their programme descriptions. Requests for changes were received from Cotlands, TUC, Lesedi and SmartStart. These and comments from the IE ED are addressed as far as possible in the final report. Dr Kate Isdale proof-read the report and Liesl Felix spent many hours on formatting. Thank you both.

We thank Professor Sarah Chapman of the University of Cape Town who peer-reviewed this report. She judged the method, statistical analyses and interpretation of the findings to be sound.

Finally, to the central contributors to this study: the children, their parents and practitioners, thank you. Without you the pages that follow would be blank.

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## EXECUTIVE SUMMARY

### BACKGROUND

To date, there has been no large-scale South African study on the extent to which the different channels of delivery for Early Learning Programmes (ELPs), described in policy, achieve developmental outcomes for children that enable their readiness to learn in school. The particular need is for studies of programmes targeting poor children who face multiple intersecting disadvantages and who are at significant risk for long-term developmental deficits. The present study addresses gaps in our knowledge that have implications for public policy and for the design, delivery and funding of South African ELPs targeting poor children.

### MAIN RESEARCH QUESTIONS

1. How do different ELP interventions, targeting three- to five-year-old children from low-income backgrounds, vary in their effectiveness in preparing children for Grade R (as measured by the ELOM)?
2. What programme, child, and home environment factors predict changes in ELOM scores following exposure to an early learning programme?

A statistical technique known as multi-level modelling was used to test both questions.

### DESIGN

A quasi-experimental pre-test post-test field study design (Cook & Campbell, 1979; Cook, Campbell, & Shadish, 2002) was used to compare the effects of three playgroup and two centre-development programmes on children's development, in areas relevant to readiness to learn. Only two of the playgroup models were included in modelling outcomes as one lacked child attendance data. It was however included in descriptive analyses (see below).

In addition to the measurement of change in children's performance on the ELOM, we explored predictors of change using child, home background, and programme variables. Children were assessed on the ELOM at baseline during March 2018 and again at endline in October or early November 2018. The child's Home Learning Environment (HLE) was assessed through caregiver / parent interviews at endline. Practitioners were interviewed at endline to obtain data on programme factors likely to influence programme quality and moderate programme outcomes.

Participating organisations provided programme descriptions and administrative data, including child attendance/programme exposure.

For outcome modelling purpose, study arms comprise two playgroup models in which trained facilitators provide activities designed to stimulate early learning and development to groups of children. These include: Cotlands (study sites: Macassar, Western Cape and Lydenburg, Mpumalanga), and Lesedi (study sites: Mangaung, Free State). Note that Cotlands Lydenburg conducted sessions three times per week while Macassar conducted two sessions per week. The two groups are combined for modelling purposes. The playgroup programmes are compared with two ECD centre development models, which focus on improving the quality of teaching and early learning in centres, largely through in-service staff training. They include The Unlimited Child (TUC) (study sites: Umlazi and KwaNyuswa, KwaZulu-Natal), and the Ntataise Centre of Excellence Enrichment Programme (study sites: Viljoenskroon and Bothaville, Free State). LETCEE (SmartStart) a playgroup model was not included in the modelling of programme, child and practitioner effects (study site: LETCEE Greytown, KwaZulu-Natal). Descriptive findings for this programme are provided.

Programme delivery sites were limited to those where practitioners were rated by their organisations as being of at least satisfactory quality or better. As is the case in many studies of school effectiveness (Goldstein, 1997), it was not possible to randomly assign children to the different study arms as they were already enrolled in their respective programmes. It was also too challenging logistically and ethically to include a no-treatment group. In any event, this study is akin to an investigation of school effectiveness where the impacts of different learning programmes for children enrolled in school are compared. Additionally, recruitment and follow-up in so many areas without the possibility of enrolling children in effective programmes post-study was deemed unfeasible. Furthermore, many children participate in some form of early learning programme in their pre- Grade R year rendering a valid passive control impractical. All groups are thus active.

A field study of this nature poses risks to internal validity, particularly due to selection effects. For example, in some areas, while parents may wish to send their child to a preschool, a service may not exist. Where it does, the family may not be able to afford the fees, and therefore choose a free community playgroup run by a non-profit organisation (a form of selection effect).

Programme selection, family circumstances, and service availability factors are therefore confounded. Key features of programmes studied are presented in Table *i*.

Table *i*. Key Features of Study Programmes as provided by study organisations.<sup>1</sup>

<b>COTLANDS: PLAYGROUP PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Playgroup model directly managed by Cotlands
2. Target age of children	2 - 4 year olds
3. Sessions per week	Macassar sites: 2 sessions per week of 4 hours each. Lydenburg sites: 3 sessions per week of 4 hours each.
4. Total exposure per week	8 hours
5. Intended staff:child ratio	1 practitioner plus an assistant to groups of 15-20 children
6. Practitioner qualifications	Minimum NQF Level 4 ECD Qualification
7. Other staff	Community assistants
8. In-service training and support	Monthly on-site monitoring and bi-annual quality improvement sessions
9. Parent fees	Free service
10. Parent engagement	No formal parent component
11. Nutrition	Breakfast and snack provided
12. Employer	Cotlands
13. Number sites in study	14 sites in 2 localities [Macassar, Western Cape; Lydenburg, Mpumalanga]
14. Other comments:	
<b>LESEDI: PLAYGROUP PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Mobile Playgroup model directly managed by Lesedi (based on Ntataise ECD Enrichment Themed-Linked Programme)
2. Target age of children	3 - 5 year olds
3. Sessions per week	1 session per week of 2.5 hours
4. Total exposure per week	2.5 hours
5. Intended staff:child ratio	2 Practitioners per group of up to 25 children
6. Practitioner qualifications	Minimum NQF Level 4 ECD Qualification
7. Other staff	No
8. In-service training and support	Weekly feedback meetings with the Playgroup Coordinator; monthly reports on programme delivery and child progress; random quality assurance visits by Playgroup Coordinator and M&E staff
9. Parent fees	Free service
10. Parent engagement	Weekly formal parent component & Home visits to vulnerable parents
11. Nutrition	Nutritious snack
12. Employer	Lesedi
13. Number sites in study	2 sites in 1 locality [Mangaung, Free State]
14. Other comments:	Integrated service provision with referrals to DSD and DoH Parent programme based on Khululeka High Scope model
<b>LETCEE (SMARTSTART): PLAYGROUP PROGRAMME TYPE AND CHARACTERISTICS</b>	

<sup>1</sup> Table 1 is based on information on programme design provided by organisations.



1. Delivery model	Playgroup franchise model designed for scale (minimum critical specification for efficient replication)
2. Target age of children	3 - 4 year olds
3. Sessions per week	2 sessions per week of 3 hours
4. Total exposure per week	6 hours
5. Intended staff:child ratio	1 SmartStarter to groups of 5 to 12 children
6. Practitioner qualifications	Minimum: SmartStart 5 day training and accreditation if rated 'green'; Some have NQF Level 4 ECD Qualification
7. Other staff	Community members may assist
8. In-service training and support	Franchisors are supported by the National SmartStart Hub and manage Club Coaches who oversee the support and monitoring of Franchisees
9. Parent fees	Free service
10. Parent engagement	Parent information component & home visits to parents who do not attend parenting sessions and to vulnerable families
11. Nutrition	Fortified porridge
12. Employer	Franchisees linked to Franchisors. Most franchisees earn stipends
13. Number sites in study	17 sites in 1 locality [Greytown, KwaZulu Natal]
14. Other comments:	Franchisees provided with programme resources (toy kits, books and other resources)
<b>NTATAISE: CENTRE-DEVELOPMENT PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Centre development programme for practitioners in independent ECD sites; no direct intervention with children
2. Programme Target	Practitioners of Pre-Grade R children (4-5 years)
3. Child sessions per week	5 sessions per week of 4.5 hours (Ntataise programmes are full day but the learning programme is offered in the mornings – the hours indicated are morning only)
4. Child total exposure per week	22.5 hours
5. Intended staff:child ratio	Depends on the site
6. Practitioner qualifications	Depends on the site
7. Other staff	Depends on the site
8. Ntataise Programme inputs	Ten monthly theme-based workshops for practitioners, coupled with ten on-site visits by an experienced trainer
9. Parent fees	Variable. Depends on the site
10. Parent engagement	Variable: depends on the individual ECD centres. Not provided by Ntataise
11. Nutrition	Variable, provided by the individual ECD centres
12. Employer	Staff employed by the ECD centres, not by Ntataise
13. Number sites in study	13 sites in 2 localities [Viljoenskroon, Free State; Bothaville, Free State]
14. Other comments:	Centres may receive a subsidy of R15 per day per child from DSD
<b>THE UNLIMITED CHILD: CENTRE-DEVELOPMENT PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Centre development programme for practitioners in independent ECD sites; no direct intervention with children
2. Programme Target	Practitioners of Pre-Grade R children (4 - 5 years)
3. Child sessions per week	5 sessions per week of 3 - 4.5 hours (TUC also has an aftercare programme for certain children - the hours indicated are morning only)
4. Child total exposure per week	15 – 22.5 hours

5. Intended staff:child ratio	Depends on the site
6. Practitioner qualifications	Depends on the site
7. Other staff	Depends on the site
8. In-service training and support	Initial five-day training followed by ongoing support facilitated by a team of trained ECD specialists; intensive ongoing support to practitioners and random quality assurance visits by qualified ECD practitioners; TUC provides each Centre with an educational resource kit and practitioner guide
9. Parent fees	Variable. Depends on the site
10. Parent engagement	Variable: depends on the individual ECD centres. Not provided by TUC
11. Nutrition	Variable, provided by the individual ECD centres
12. Employer	Staff employed by their ECD centres, not by TUC
13. Number sites in study	17 sites in 2 localities [Ethekwini District - Umlazi and KwaNyuswa - KwaZulu Natal]
14. Other comments:	Centres may receive a subsidy of R15 per day per child from DSD

## ETHICS AND CONSENT PROCEDURES

The study protocol was approved by the University of Cape Town Psychology Department Ethics Committee (Approval Number PSY 2018-002). Consent to children's participation was obtained from parents (or primary caregivers). Passive consent was used where consent forms were not returned (as approved by the Ethics Committee). Parents and practitioners gave consent to be interviewed.

## SAMPLING APPROACH

Programme site location was included as a sampling criterion for all five programmes to reduce travel costs and time in the field. For all except Cotlands and Ntataise, programme sites were randomly selected within the chosen location. As Cotlands only had 6 sites in Macassar and Nomzamo/Lwandle Strand it was decided that all be included. The Lydenburg, Mpumalanga Cotlands site was added as the Western Cape sites did not have sufficient children of the required age. All centres supported by Ntataise in Bothaville and Viljoenskroon were included in the sample. TUC is based in Durban. Their KwaZulu-Natal (KZN) programme is most established and delivered by their staff rather than by partner organisations. To realise sufficient centres meeting the TUC quality standard two sites were selected in Umlazi and KwaNyuswa. At programme site level, children were randomly selected for participation in both centre development programmes and in the Lesedi and LETCEE (SmartStart) playgroups. Convenience sampling was deployed in Cotlands sites as the limited numbers of age-eligible children (see Table ii below) did not permit

randomisation. The study therefore includes both elements of site and child randomisation as well as convenience sampling (to address practical challenges in the field).

The intention was to realise a sample of **113** children aged 59-69 months in each study arm (**565** in total) with sufficient power for an effect size of 0.20 (given a wide variety of possible interaction effects). However, challenges recruiting children in the required age band in playgroups occurred, as many participants were either too young or too old to include. We increased numbers by widening the sample age by two months below and above the 50-69 month ELOM standardisation age range (this affects a small number of the sample). As a result, the sample had to be no younger than 47 months at baseline and not older than 71 months by study endline. Using this criterion, numbers at both baseline and endline are presented in Table ii.

*Table ii.* Child Sample.

<b>Programme</b>	<b>Child Sample Target</b>	<b>Child Baseline Realised</b>	<b>Lost to Follow-Up</b>	<b>Child Attrition (Baseline – Endline) %</b>	<b>Removed from Sample</b>	<b>Child Endline Realised</b>
<b><i>CENTRE DEVELOPMENT</i></b>	226	242	46	19 %	1	195
TUC	113	102	12	12 %	0	90
Ntataise Enrichment	113	140	34	24 %	1	105
<b><i>PLAYGROUPS</i></b>	339	240	60	25 %	6	174
LETCEE(SmartStart)	113	76	12	16 %	2	62
LESEDI	113	74	32	43 %	0	42
Cotlands	113	90	16	18 %	4	70
<b><i>TOTALS</i></b>	565	482	106	22 %	7	369

As reported in Table ii, valid ELOM data on 369 children was available for analysis. We sought to address attrition due to absence at endline by making arrangements to assess children who were still enrolled but did not attend on the day of the visit. Where a programme was no longer operating, we did not follow up. Of those children who were not available for assessment at endline, 91% had dropped out of their programmes and 9 % were still enrolled but absent on the

day of assessment. Overall attrition was 22 % at endline; a further seven children were removed from the sample during cleaning. Taking attrition into account, this sample size enables detection of an effect of 0.20 with a power of 0.88, and an effect of 0.23 with a power of 0.95. Both are sufficient for the complexity of the statistical model, where we are interested in testing only a single interaction with a 2x4 structure (ELOM Assessment (time)<sup>2</sup>\*programme<sup>3</sup>), while controlling for the hierarchy present<sup>4</sup> in the nested data.

Playgroups experienced higher attrition than centres (25 % and 19 %, respectively). Primary reasons for children leaving playgroup programmes were family re-location and placement of children in centre-based programmes. Lesedi attrition was particularly high, mainly as families had been relocated away from programme sites or returned to their homes in Lesotho. In the case of the centre-development programmes (e.g. a quarter of Ntataise children dropped out), relocation and unaffordability of centre fees were primary reasons.

To establish whether children who dropped out or remained in their programmes differed on key characteristics likely to bias the findings, we compared them on age and ELOM baseline total scores. No difference was evident on either variable. We can be confident that, at least on these two indicators, attrition was not likely to lead to bias.

#### THE INFLUENCE OF THE HOME LEARNING ENVIRONMENT

The influence of children's home environment on development across all domains is well established, contributing to a significant proportion of the variance in the test scores of children attending early learning programmes. That is, both programme and home environment influence the developmental level of the child prior to entering school (Melhuish et al., 2008). This has not been explored in South Africa. As many parents or primary caregivers of children with both baseline and endline ELOM assessments as possible were interviewed and responses were recorded. Questions were drawn from the UNICEF MICS4 and the Home Learning Environment (HLE) instrument devised by Melhuish and colleagues (2008) with some modifications that take

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<sup>2</sup> ELOM standard scores at baseline and endline.

<sup>3</sup> The four programmes being compared.

<sup>4</sup> Multi-level modelling takes into account predictors of change in ELOM from baseline to endline: the programme attended by the child (e.g., Ntataise) is the highest level of the hierarchy; predictors nested within each programme and below that level include a) characteristics of the child's practitioner and group, and b) child factors.

the local context into account) (see Appendix D). The caregiver sample to whom the HLE was administered, is presented in Table iii.

*Table iii.* Caregiver Sample.

<b>Programme</b>	<b>HLE Sample Realised</b>
<b>CENTRE DEVELOPMENT</b>	168 (86 %)*
Unlimited Child	72 (80 %)
Ntataise Enrichment	96 (91 %)
<b>PLAYGROUPS</b>	159 (90 %)
LETCEE (SmartStart)	62 (100 %)
LESEDI	41 (98 %)
Cotlands	56 (80 %)
<b>TOTALS</b>	327 (89 %)

**\*Note:** (%) indicates the match between children assessed at endline and their caregivers interviewed.

As reported in Table iii, valid HLE data on 327 caregivers (89 % of children with both baseline and endline ELOM assessments) was available for analysis. This sample size enables us to detect an effect of 0.20 with a power of 0.88, and an effect of 0.23 with a power of 0.95. Both are sufficient for the complexity of our model.

#### CONTRIBUTION OF PROGRAMME VARIABLES LIKELY TO INFLUENCE CHANGE IN ELOM SCORES

The primary goal of the study was to compare the extent to which different types of early learning programmes improve early learning outcomes as measured by the ELOM. It did not involve close scrutiny of daily programme quality through observation. However, all practitioners were rated competent by the participating organisations. It was possible to measure a few key indicators of quality through interviews with practitioners of participating sites at endline. This has permitted exploration of the relationship of the characteristics of each child’s programme site to child outcomes in each ELP. The relative contributions of the child’s home learning environment and programme quality indicators on ELOM at endline were also investigated. Data were collected on the indicators presented in Table 21.

#### DATA COLLECTION

Baseline child assessments were conducted in March 2018 and endline during October and early November 2018. All children were assessed in their home language (Afrikaans, isiZulu, Sesotho, or SePedi) by language-matched ELOM trained assessors. Interviews were undertaken at endline

with parents or primary caregivers to assess the home learning environment, and with practitioners to assess programme characteristics.

#### HIGH LEVEL FINDINGS:

It is essential to repeat that the programmes studied are not representative of the South African ECD programme population. Study children were attending ECD playgroups and Centres where the practitioners had been rated as *well-functioning* by their parent organisations. The same programmes, if poorly delivered, could not be expected to show the same outcomes as those observed here. The effect on change in ELOM scores from baseline to endline of four of the five programmes in the study was investigated using multilevel modelling – this takes into account programme, child and home environment predictors at both baseline and endline. LETCEE (SmartStart) was excluded from the modelling, as their attendance data was not sufficiently reliable. All programmes had to have the same variables for inclusion in the modelling. Descriptive analysis of LETCEE is provided.

In summary, the main study findings (based on multi-level modelling) are as follows:

1. After accounting for covariates child (age and growth status), home learning environment, and socio-economic status variables likely to predict child outcomes, all four programmes included in the model made statistically significant gains in ELOM total and in domain scores from baseline.
2. Children with lowest baseline scores on ELOM made the greatest gains. These children attended a five-session per week centre-based programme (TUC) and a two or three-session playgroup (Cotlands).
3. Children with higher height-for-age scores (healthier and less likely to be malnourished) performed significantly better on all ELOM domains and on the ELOM Total score.
4. Regardless of programme type, children who attended more sessions performed significantly better than children with lower programme exposure on the Fine Motor Coordination and Visual Motor Integration (FMCVMI) domain of the ELOM at endline. Additionally, sessions attended emerged as a significant contributor to the overall picture of child performance on the ELOM Total and the Emergent Literacy and Language domain.
5. Children who had been in some form of ECD programme for 3 years performed significantly better than children with fewer years on Gross Motor Development (GMD) and Emergent Literacy and Language (ELL).
6. Children with greater learning resources (books and a variety of different types of toys) at home performed significantly better on FMCVMI and Cognition and Executive Functioning (CEF).
7. More than two thirds of parents and other primary carers had two hours or less available for activities with their children during weekdays and on weekends.

8. Across programmes, significant proportions of caregivers or other family members never read, told stories or sang to children. Without significant changes to prevailing parenting practices and life circumstances of parents, programmes relying largely on parent input to achieve child education outcomes are unlikely to be successful.

Table iv shows changes in the children’s ELOM Total score status using the ELOM performance bands (*At Risk* – **indicated in Red**, *Falling Behind* – **indicated in Orange**, and *Achieving the ELOM Standard* – **indicated in Green**). The standard score that marks the transition to *Achieving the ELOM Standard* is provided for both baseline and endline.

It is essential to note that as stressed throughout the report, the ELOM standards tables are for descriptive purposes only. These observations provide a snapshot of the performance of children between baseline and endline. They do not include any controls for factors likely to predict change. These are included in multi-level modelling. Only children aged 50-59 months at baseline and 60-69 months at endline<sup>5</sup> were selected from programme samples for these illustrations so as to correspond to the ELOM performance bands. These samples are therefore smaller than those included in the multilevel modelling. Despite the lack of statistical controls, the data presented in Table iv has practical relevance and shows that:

- a. Children in the five programmes started at different points (baseline averages).
- b. Despite improvements in all domains by children in all programmes there was variability in terms of how much they gained.
- c. Children in two playgroup programmes improved from being *At Risk* at baseline {{Cotlands and LETCEE (SmartStart)}} to *Falling Behind* at endline.
- d. Cotlands and Lesedi children made significant gains to be close to the standard (54.38) at endline. Note Cotlands Lydenburg attended sessions three times per week which likely contributed to the improved average performance of this group across all ELOM domains.
- e. One centre-based programme (TUC) improved Total ELOM scores by 23.7 points to move children from *Falling Behind* to *Achieving the ELOM Standard*.

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<sup>5</sup> Children in each programme <60 months at endline are excluded from the table: LETCEE 23(37%); TUC: 26(28%); Cotlands: 15(21%); Lesedi: 4(9%); Ntataise: 5 (5%). In the cases of Cotlands, Lesedi, and Ntataise, there is no merit in constructing separate tables for the small numbers of children <60 months. Using the appropriate performance band for the remaining two programme samples would have necessitated additional tables while adding little value. Our intention is to show high-level findings.

Table iv. Change in Average ELOM Total Scores by Programme.

<b>Programme</b>	<b>Baseline Score</b> (based on ELOM profiles for children 50-59 months) <sup>6</sup>	<b>Endline Score</b> (based on ELOM profiles for children 60-69 months) <sup>7</sup>	<b>Extent of Change</b>
<b>Cotlands</b> (Baseline n=61; Endline n=52)	32.6	52.6	20.0
<b>Lesedi</b> (Baseline and Endline n=38)	36.9	50.1	13.2
<b>LETCEE(SmartStart)</b> (Baseline n=45; Endline n=39)	33.9	47.7	13.8
<b>Ntataise</b> (Baseline n=54; Endline n=86)	49.8	66.9	17.1
<b>TUC</b> (Baseline n=75; Endline n=51)	37.8	61.5	23.7

One might ask why some programmes had higher baseline score than others. It is plausible that this would be the result of a mix of child, home background, and programme factors. We have not investigated this systematically. However, it is instructive that 89 % of Ntataise children had participated for more than a year in a centre-based programme prior to baseline, which very plausibly raised their performance by the time they were assessed at baseline. Ninety-six per cent (96 %) of children in LETCEE (SmartStart) had been in that playgroup programme for more than one year (some were in programmes prior to SmartStart involvement in October 2016). However, this had not advantaged them, quite possibly because the average poverty level of these rural children was very high (82 % are in quintile 1 sites) in contrast to Ntataise where only 12 % were in that poorest category. Across the sample, TUC and Ntataise had the most children (63 % and 64 % respectively) in quintile 3 sites – substantially less deprived than LETCEE (SmartStart) and Lesedi (36% quintile 3).

<sup>6</sup> For children 50-59 months a score of **46.32** is required to achieve the ELOM Standard.

<sup>7</sup> For children 60-69 months a score of **54.38** is required to achieve the ELOM Standard.



Cotlands is of particular interest. Their children, like LETCEE (SmartStart), were *At Risk* at baseline and their deprivation profiles are similar. More than 90 % of both LETCEE (SmartStart) and Cotlands children were in receipt of the Child Support Grant.<sup>8</sup>

For the other programmes, we observe that forty-two per cent (42 %) in the TUC sample, and twenty-four per cent (24 %) in Lesedi had participated for more than a year. In the absence of attendance data for prior programme years, there is little we can add. Further investigation would be necessary to clarify the baseline variation.

In other findings:

- *Fine Motor Coordination and Visual Motor Integration (FMC/VMI)*: This was a weak area for all children regardless of programme type. Despite gains, playgroup children remained in the *Falling Behind* category at endline, while both centre-development programmes had *Achieved the ELOM Standard* by endline.
- *Emergent Numeracy and Mathematics (ENM)*: Children in two playgroup programmes moved from *At Risk* to *Falling Behind* for ENM, while children in one playgroup programme moved from *Falling Behind* to *Achieving the ELOM Standard*. Children in one centre-development programme *Achieved the ELOM Standard* at both baseline and endline, while the other centre-development programme, where children were *Falling Behind* at baseline, achieved the most growth, with the children *Achieving the ELOM Standard* by endline.
- *Cognition and Executive Functioning (CEF)*: While change is evident in all programmes, this an area of concern for the playgroup programmes in particular.
- *Emergent Literacy and Language (ELL)*: Considerable gains were evident in one playgroup programme, with their children moving from *At Risk* to *Falling Behind* (1 standard score point off the ELOM Standard). Children in both centre-development programmes had *Achieved the Standard* by endline (one programme making significant gains).

Finally, in *Figure i*, we present key findings for the four programmes included in multilevel modelling to illustrate programme effects on ELOM total scores. It is important to be aware that modelling takes into account the influence of child, home background and practitioner factors on baseline and endline scores, so that the effects of each specific programme can be specifically

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<sup>8</sup> CSG is used here as accurate quintile data is only available for the Cotlands Lydenburg site

teased out. This technique derives ‘estimated means’ that take into account the influence of these factors at both points in time.

Figure i. Modelled Change in ELOM Total Score for Each Programme from Baseline to Endline

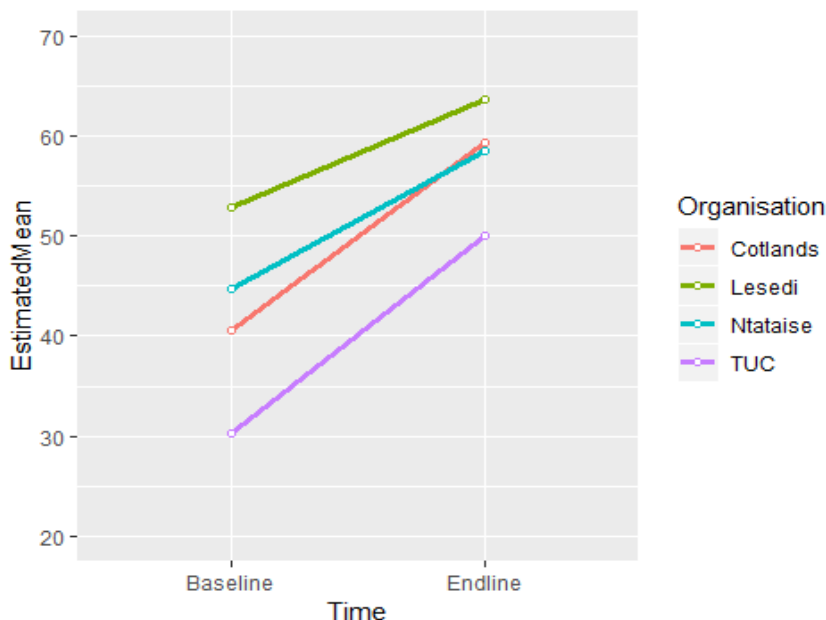


Figure i shows that all four programmes contributed to improvement in children’s ELOM Total scores<sup>9</sup>. Children in the Cotlands two or three-morning per week playgroup programme (the red line), and TUC’s five morning per week centre-based programme (the purple line) experienced significantly greater improvement in ELOM Total scores than the other programmes: 1.34 Standard Deviation (SD) and 1.41 SD respectively<sup>10</sup>.

#### COMMENTS

This is the first study of the effectiveness of a part time playgroup model in South Africa and suggests that carefully controlled and supported groups of sound quality, with school-readiness-targeted curricula, can make a difference for the poorest children, but not necessarily enable them to achieve the expected ELOM Standard. This may be a function of one or two mornings per week programme exposure. However, given the challenge of meeting the needs of all young

<sup>9</sup> Note that the position of these lines should not be expected to line up with raw ELOM scores for each programme, as these are adjusted based on the relative contribution covariates included in the analyses.

<sup>10</sup> Note that 1 Standard Deviation on the ELOM Total score standardisation sample distribution = 14.07 standard score points. See the ELOM Technical Manual at: [http://elom.org.za/wp-content/uploads/2019/06/ELOM-Technical-Manual\\_2019\\_WEB.pdf](http://elom.org.za/wp-content/uploads/2019/06/ELOM-Technical-Manual_2019_WEB.pdf)

children in South Africa in the short to medium term, the fact that playgroups can shift ELOM Total scores on average by between 10 and 20 points is encouraging. The two centre-based programmes in this study enabled children to achieve the ELOM Total score standard (or grow within it in the case of Ntataise).

Ensuring regular attendance in all programmes, particularly those with limited numbers of sessions per week, is essential if gains are to be realised. We were not able to obtain reliable data on programme hours. This is an important area for further study, particularly in relation to plans for the pre-Grade R year and international benchmarks recommending a minimum of 15 hours of early learning input per week.

The literature suggests that two or more years' exposure to a programme is more beneficial than one. In this study, children who attended for at least three years showed greater gains on GMD and ELL. Given our finding of limited time devoted to language stimulation at home, longer participation in a programme is indicated to compensate, suggesting that children who have a group-based early learning opportunity prior to the pre-Grade R year are likely to derive greater benefit during that year.

As would be expected, in line with the literature on early learning outcomes (Boyden, Dawes, Dornan & Tredoux, 2019), children with higher height-for-age scores performed significantly better on all ELOM domains and on the ELOM Total score. This re-emphasises that interventions that ensure adequate health and nutrition (and improved water and sanitation) in the early years are essential to achieving good educational and developmental outcomes. The finding supports the NIECD focus on health and nutrition and the first 1000 days. We would argue that nutritional support remains essential beyond this point. ECD programmes provide opportunities for improving children's access to good nutrition.

In sum, there are positive gains from all channels of early learning programme delivery studied, especially for those children who were most behind at baseline. Key gaps are evident in early numeracy and mathematics, cognitive and executive functioning, and fine motor coordination for many children. A concerted focus on these in programming may be indicated.

Finally, it is well established that family economic circumstances and the home learning environment are the most significant contributor to educational outcomes across childhood, with the gains evident by age five. In this study, educational resources available in the home

contributed to ELOM outcomes, but parents' activities with children did not. This is likely because caregivers reported having very little time to engage with young children in activities that could promote early learning.

The lesson is that programmes depending largely on parent education are unlikely to be successful in changing children's early learning outcomes unless they have the time, and spend available time, in activities that support early learning. Where programmes include parent input, it is crucial that parent implementation of learnings over the course of the programme is monitored. Increased time in stimulating activities and increased frequency in early language activities would be a particularly important goal.

## ACRONYMS

<b>CEF</b>	Cognition and Executive Functioning
<b>CPD</b>	Continuing Professional Development
<b>ECD</b>	Early Childhood Development
<b>ECEC</b>	Early Childhood Education and Care
<b>ELDA</b>	Early Learning Development Area
<b>ELF</b>	Early Learning Facilitator
<b>ELPO</b>	Early Learning Programme Outcome
<b>ELOM</b>	Early Learning Outcome Measure
<b>ELL</b>	Emergent Language and Literature
<b>ENM</b>	Emergent Numeracy and Mathematics
<b>DFID</b>	Department for International Development
<b>DSD</b>	Department of Social Development
<b>FMCVMI</b>	Fine Motor Coordination and Visual Motor Integration
<b>GMD</b>	Gross Motor Development
<b>HLE</b>	Home Learning Environment
<b>KZN</b>	KwaZulu-Natal
<b>LETCEE</b>	Little Elephant Training Centre for Early Education
<b>MICS4</b>	Multiple Indicator Cluster Surveys
<b>NCF</b>	National Curriculum Framework
<b>NDP</b>	National Development Plan
<b>NIECD</b>	National Integrated Early Childhood Development Policy
<b>NQF</b>	National Qualifications Framework
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PD</b>	Professional Development
<b>SASPRI</b>	Southern African Social Policy Research Institute
<b>SD</b>	Standard Deviation
<b>SES</b>	Socioeconomic status
<b>TUC</b>	The Unlimited Child

## INTRODUCTION

The National Development Plan (NDP) Vision 2030 (National Planning Commission (NPC), 2012, p. 300) proposes making:

*“early childhood development a top priority among the measures to improve the quality of education and long-term prospects of future generations. Dedicated resources should be channelled towards ensuring that children are well cared for from an early age and receive appropriate emotional, cognitive and physical development stimulation.”*

Among other provisions the NDP calls for encouraging innovation in:

- the way early childhood development services are delivered,
- the piloting of home and community-based early childhood development interventions in selected districts,
- the introduction of two years of pre-primary education, and
- investing in the training of practitioners, thereby upgrading their qualifications.

Accordingly, the early learning related goal of the National Integrated Early Childhood Development Policy (RSA 2015, p. 59) is:

*“By 2030 to provide a universally available comprehensive quality age and developmental stage appropriate opportunities for learning for all children from birth until they enter formal school, which lay the foundations for optimal early learning, inclusion and the socio-emotional, physical, intellectual development of young children through play and other related, recognised methods for early learning...”*

The policy refers to a continuum of early care and learning settings for the delivery of early learning opportunities. These include:

- home visiting/health facility-based programmes for parents,
- child minding services,
- community-based early learning playgroups, and
- ECD centres.

These services encourage social and emotional development and preparation for schooling through play-based learning and exploration. The Department of Social Development (DSD) draft document on funding models for early childhood development (DSD, 2014) recognises the range of programmes for children aged three to four years (i.e. not yet five years) and provides costings for ECD centres, toy libraries, mobile programmes and community-based playgroups. At the same time, by 2019, the Department of Basic Education (DBE) needs to have a plan in place for the form that the second year of pre-primary will take.

Currently a range of programmes of different kinds are being funded, by DSD in some provinces, as well as by the donor sector. It is a priority to evaluate the effectiveness of these different types of provision to build evidence of what programming options are worth investing in, to provide direction for the scale up of services and, in particular, for the planning of the pre-Grade R year. It is also important to explore how great an effect can be expected from well-implemented programmes of different kinds for children in different quintiles. The study seeks to provide an answer to this question.

In the next section of the report we group the study programmes in two categories:

- 1) playgroup programmes: Lesedi, SmartStart and Cotlands; and
- 2) centre development programmes: The Unlimited Child and the Ntataise Network's Enrichment Programme.

We first consider the evidence-base for each category and then describe each programme. Finally, we comment on the plausibility of the programme type realising its goals.

## **PLAYGROUP PROGRAMMES**

### THE EVIDENCE-BASE

A playgroup is defined by the National Integrated Early Childhood Development Policy (NIECD) (RSA, 2015) as:

*“A group of young children organised for play or play activities for early learning and development usually accompanied by their mothers and/or their fathers or primary caregivers and supervised by a voluntary or paid playgroup facilitator.”*

Playgroups that include a strong focus on parenting are widely offered in the region (e.g. Save the Children, 2014; Centre for Basic Research, 2017). In South Africa a number of NGOs offer playgroups of different kinds (Biersteker, 2007; Dawes, Biersteker & Hendricks, 2011; Ebrahim, Killian, & Rule, 2011; Van Niekerk, Ashley-Cooper & Atmore, 2017).

It is important to note that despite all being labelled 'playgroup' programmes, the manner in which these are designed and delivered is highly variable. For example, some focus primarily on improving parent capabilities for care and stimulation at home. In others, children only are included, while still other interventions include both parents and their children. Inputs and outcomes also vary, with some focusing on child socialisation and play, while others seek to improve school readiness. This 'apples and pears' problem makes it very difficult to draw overall conclusions from the limited available research because the unit of analysis is not consistent. Mobile playgroups are common in Australia serving isolated hard to reach communities and families living in temporary accommodation (Williams, Berthelsen, Nicholson, & Viviani, 2015).

Studies of playgroup programme outcomes are very limited, to the extent that we know of no randomised trials. The literature is primarily descriptive and qualitative and tends to emphasise improving the quality of services through training, support and resources (e.g. Ramsden, 1997; French, 2005). The current study is the first quasi-experiment of playgroup programme effects to be conducted in South Africa, providing an opportunity to extend the limited evidence for this type of intervention through the comparison of the three playgroup models with each other and with centre-based provision.

In the United Kingdom, where the majority of children who attended playgroups participate for two to three mornings per week, a review by Lloyd, Melhuish, Moss & Owen (1989) concluded while preschool programme exposure was beneficial for children's development and educational attainment, the relative effectiveness of different forms of provision (e.g. playgroup or nursery school) was unclear, with studies reporting conflicting results. A major problem at that time was the lack of controlled studies on playgroups. This remains the case.

One of the few studies on the effects of playgroups on cognitive outcomes that we were able to source was conducted with children (average age of 49 – 50 months), in Northern Ireland by Turner (1974). The programme ran for three hours a day, five days per week during the school terms. Participating children had significantly higher vocabulary and cognitive scores than non-



attending children from the same community. Note that in this case the ‘dose’ would have been 15 hours per week, which is the minimum recommended participation for children to benefit from an early learning programme (UNICEF, 2008).

Regarding effects of playgroups and other forms of preschool experience on social relations, Erwin and Letchford (2003) found that those who attended had better social relations than their peers when the children were in primary school (dose is not reported).

In the only low income country experimental study on playgroups we were able to source, Rao, Pearson, Constan & Pearson, (2007) and Rao & Pearson (2009) report research on what they term home-based “playgroup style programs” run by Cambodian “core mothers”, where mothers and their children meet once per week for one hour over 26 weeks. The programme sought to reach mothers and children who would not otherwise access an ECD service. The mothers were provided with inputs on how to promote their children’s development. Core mothers received training from preschool and primary teachers and attended monthly meetings. Part of the programme involved working with parents twice a month to help them understand how they could help their children to learn and assisting them to design child development activities that are comprehensive, holistic and culture-specific. Children who had attended a playgroup programme were assessed on the Cambodian Developmental Assessment Test (CDAT), which is similar to the Early Learning Outcomes Measure (ELOM). Playgroup children had better developmental outcomes than children who had not participated in a programme and had the same performance as those who attended a five session per week home-based preschools. Children attending government preschools performed best (Rao et al., 2012).

A recent three-year tracer study in Uganda (Centre for Basic Research, 2017) assessed the extent to which school readiness through attendance of pre-primary educational provision improves learning achievement of children in primary one to three comparing children who had gone through the RARE project Home Learning Centre (HLC) education and those who had no exposure. The HLC programme focuses on pre-literacy development for three- to five-year-olds and is offered by trained community parent educators three days a week for at least three hours a day. It is supported by parenting sessions which focus on equipping parents with information and skills to support their children’s education. Results from standard tests on numeracy and literacy indicated that children who went through the HLC scored relatively better in numeracy and literacy, by a range of about 8.9 % and 8.3 % respectively, by primary Grade 3. However, in

general, more than half of all children, whether under the control or the experimental group, did not meet the proficiency level in both numeracy and literacy by primary Grade 3.

The only South African playgroup programme with some data on programme effects is Ntataise's Mosupatsela, a weekly two-hour structured programme for children 3 – 5 years run by a trained ECD practitioner and delivered for 27 weeks (Dawes, Biersteker and Hendricks, 2011). Like those in the current study, the goal of Mosupatsela is school readiness. This small-scale study found that children who attended 15 or more sessions showed significant improvements in cognition compared with those who attended less. The results indicate that a highly structured programme provided by well-trained staff with suitable equipment, can have positive short-term effects with relatively light exposure. However, when followed into Grade R, Mosupatsela children were no different on cognitive, language, numeracy and academic readiness scores to those who had not been exposed to an ECD programme.

Mosupatsela has some similarities to the Lesedi approach (a participant in this study) in that a van with equipment moves from site to site in a community offering the services to different groups of children each day. Similar to the Cambodian model, in Mosupatsela, inputs for parents are provided while the ECD practitioner works with the children. The Mosupatsela study found that attendance by parents was very low and irregular.

Some evidence for the effectiveness and benefits of playgroup attendance for children under 36 months has been established by Hancock and colleagues (2012) using longitudinal data from Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC). After controlling for a range of socio-economic and family characteristics, playgroup children from disadvantaged families who attended prior to 36 months of age, had higher early learning competence than children from the same socio-economic background who were not exposed to an early learning programme. Dose was not specified in the report.

In sum, very few studies have investigated the effectiveness of playgroups in improving the school readiness of children. As a result, we can draw few pointers from the literature. However, as with other early learning programmes, it is plausible that those characterised by higher intensity (more sessions more frequently), delivered by well-trained facilitators who focus on abilities that are related to readiness to learn in school, are likely to be more successful. There is some evidence that relatively light touch interventions can achieve this goal, as demonstrated by

the Cambodian study and Mosupatsela. It is likely that in the former case, the instruction of mothers in child development contributed to the outcome. The aphorism 'more research is needed' accurately captures the state of playgroup effectiveness research.

#### PARENTING PROGRAMMES AS A COMPONENT OF PLAYGROUP PROGRAMMES

There is an extensive literature on the features of effective parenting programmes, but these have diverse goals and target a range of ages. Studies and reviews of parenting interventions (e.g., Baker-Henningham & Boo, 2010; Evans 2006; Richter & Naiker, 2012; Rao et al., 2014; Skar et al., 2015) tend to include the following as key features of effectiveness:

- Programmes must be appropriately timed in order to reach parents when they are most receptive to change.
- Parental participation needs to be active, engaged, and regular, normally over extended periods. Contact (home visits and group meetings) over at least a year is desirable. The actual amount depends on the degree of risk and complexity of messaging. Evidence suggests that at least two sessions a month are needed, and booster sessions are important if a programme is of short duration (Aboud, 2007).
- Parenting programmes are more likely to be effective if they change parents' attitudes, skills, and aspirations, rather than only improving their knowledge. Including an active, skills-based component where parents practise their newly acquired skills supports this.
- Joint interventions that involve direct activities with the child and training with the parent, plus joint activity with both, work best to improve cognitive and language development.
- A focus on building social support among participants and assisting participants in identifying external sources of social support (referrals).
- Parent programmes which help parents cope with stress and build their self-efficacy are more likely to be successful.
- Group based programmes are efficient for reaching parents and also create a supportive group environment. However, to be effective barriers to participation, such as time constraints, distance/transport cost, lack of available childcare and lack of salience, must be addressed.
- Facilitators must be culturally competent, warm and empathic, responsive to families and have respect for individual differences; a strengths-based approach is helpful.
- Facilitators (professional or para-professional) need adequate training, support and effective supervision for fidelity of implementation.

Turning to parent programmes focused on school readiness, and therefore children three to five years, studies are limited. The Turkish Early Education Project (Kagıtcıbası et al., 2009) had significant long-term positive effects on children’s cognitive skills, social relations, and school adjustment compared with control peers, even seven years after the end of the intervention. This was a two-year programme with weekly participation, a one on one visit in week one, and a group meeting every second week.

The Rwandan Early Literacy and Maths Initiative end-line study (Save the Children, 2015) found weekly parenting programmes run by trained volunteers with the support of programmed radio broadcasts impacted positively on parenting group children aged 3 – 6 years, producing gains in early literacy and maths (measured on the IDELA tool) almost as strong as ECD centres, but at much lower cost.

A final point of importance for the delivery of all early learning programmes is the availability of manipulatives and materials to support a range of learning experiences. Each of the ELPs in this study provides some support with this. While the need for these is widely recognised, research is limited though Montie, Xiang, and Schweinhart (2006), using data from ten countries, found significantly better language outcomes at age seven from children who had attended preschools where free-choice activities predominated, supported by access to many and varied materials.

We turn now to a description of the playgroup programmes in this study.

#### IE COMPARATIVE STUDY PLAYGROUP PROGRAMMES

Three different playgroup programmes are included. All support school readiness and are delivered to poor children in urban, peri-urban and rural contexts across a number of provinces. Lesedi is a ‘mobile’ playgroup delivered from within a vehicle that is adapted for the purpose and moves from site to site. The other two programmes operate from fixed locations.

#### COTLANDS<sup>11</sup>

The Cotlands Playgroup gives children access to early learning opportunities through play. The focus is on ensuring the holistic development of children while promoting school readiness. Playgroups are held in a variety of settings, from inner city Johannesburg to deep rural regions in

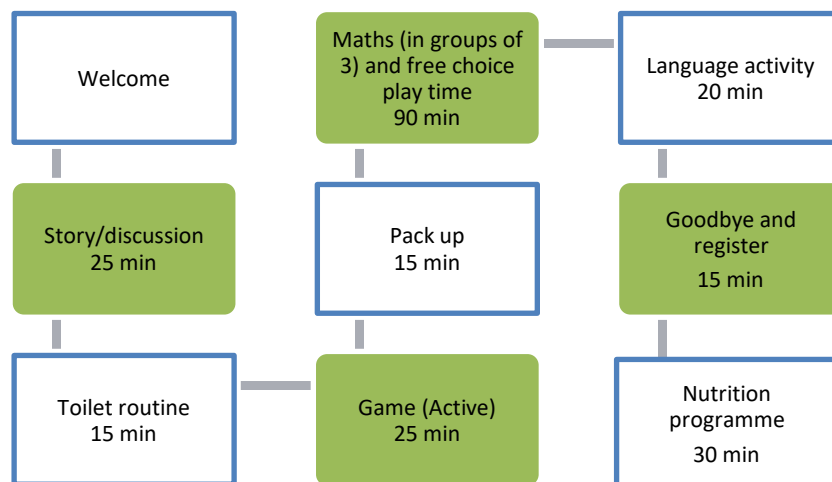
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<sup>11</sup> Information provided by Cotlands and Van Niekerk, Ashley Cooper and Atmore (2017)

Northern KwaZulu-Natal. Playgroups are also offered in informal settlements, on farms, and in a variety of settings in townships around the country. These playgroups are not intended to provide full day care, but rather to offer high impact stimulation sessions where specific concepts are introduced, explored and discovered through play.

Cotlands offers a direct service to children. The Cotlands model is to provide sessions twice a week (8 hours in total) throughout the school year. However, the model does not always apply. Their Lydenberg sites (in this study), operate on three mornings per week. Each four-hour session is structured around a routine (see Figure 1), creating learning and play opportunities that develop language, mathematical problem solving, and gross and fine motor skills, as well as social and emotional abilities.

Figure 1. Cotlands Playgroup Routine.



The early learning playgroups are presented by an early learning facilitator (ELF). The aim is that the ELF has an NQF Level 4 ECD qualification. To ensure quality and minimise risks, each ELF has an assistant from the community who has an interest in ECD. The playgroups are hosted in family homes, churches, community halls, at partner organisations' facilities and sometimes even outdoors. The main condition for venue choice is that it must be within easy walking distance for the beneficiaries.

Every ELF sets up two playgroups, each with 15 to 20 children aged from 2 to 4 years. The same children attend the playgroup for four hours twice a week (12 in the case of Lydenburg playgroups), giving them at least 80 early learning sessions within per year.

The groups follow a structured programme of 24 learning plans, each indicating key concepts to be explored with the children every week. The 24 learning plans are repeated twice in a calendar year. Every learning plan details activities for routines, lists resources needed and includes a monitoring checklist. The learning plan for the following week is explained when ELF's meet with their team leader on a Friday.

Maths concepts covered include learning to count, identifying shapes, exploring measurement and creating simple graphs. Language concepts include the early stages of learning reading by listening to stories, discussing pictures, identifying sounds at the beginning of words and learning how to handle books properly.

Breakfast and a meal/snack are provided to all children attending early learning playgroups. To deliver an integrated service to the children, partnerships have been formed with local clinics for screenings of the children's general health. Children are measured and weighed to check for stunted growth and poor nutrition, screened for symptoms of illness, including HIV and TB, and immunisation cards are checked for defaulters.

ELF's have access to the Cotlands Toy Library where they exchange equipment for use in the playgroup each week. Available toys include puzzles, shape games, blocks, drawing and modelling material, and books.

## SUPPORT AND MONITORING

Cotlands has a well-developed support, mentoring, monitoring and evaluation process to ensure quality service provisioning. The impact of the programme in terms of outcomes for children is measured internally using baseline and summative assessments that determine what they have gained by attending the programmes. It also identifies gaps that need to be addressed to ensure the child is school ready. At project level, daily registers are completed for each intervention; monthly reports highlight challenges and achievements; monthly on-site monitoring visits are conducted by team leaders at all early learning playgroups; quality improvement sessions are held twice a year to ensure consistently high levels of service delivery across all the regions.

## LETCEE (SMARTSTART)<sup>12</sup>

SmartStart is a national social franchise model targeting three- and four-year-olds from the poorest income groups across South Africa, who do not have access to early learning programmes. SmartStart's aim is to build a delivery mechanism to scale access affordably to quality early learning opportunities for those children currently without such access. SmartStart's focus on delivery at scale means that they have deliberately and necessarily designed a programme that is lean and easily replicable. In other words, their main design consideration was the *minimum critical specification* for the maximum number of children possible to achieve early learning gains. The organisation's desired outcome is "five-year-old children (to) have age-appropriate social, emotional, learning and language skills and (to be) ready for primary school."

SmartStart can be delivered in a number of ways and franchisors include organisations working with ECD centres, playgroups and day mothers. Franchisees receive a manual and play kit for delivery of the programme.

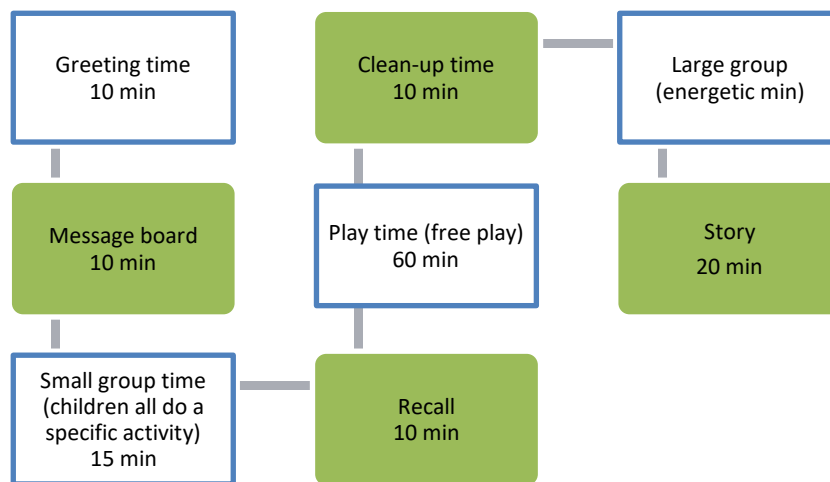
The focus of this study is on the playgroup approach delivered by the Little Elephant Training Centre for Early Education (LETCEE) which provides two three-hour playgroup sessions (six hours in total) per week (minimum five and maximum 12 children per group). SmartStart learning outcomes that prepare children for primary school have been formulated as follows:

1. Every child can form the kinds of healthy relationships that make them happy and give them a secure foundation.
2. Every child is a great thinker and communicator, able to use language confidently to listen, reason, and speak.
3. Every child has developed the core general skills – such as self-control, perseverance and flexibility – that are essential tools for living and learning.

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<sup>12</sup> Sources include SmartStart Programme Documentation and Interview with LETCEE Director. SmartStart advised that we should either call this programme LETCEE or LETCEE(SmartStart). We have chosen the latter as LETCEE is a SmartStart franchise and has followed their model since October 2016.

Figure 2. SmartStart Playgroup Routine.



Playgroup facilitators, known as ‘SmartStarters’, are each supplied with a toy kit containing basic educational materials including balls, beanbags, scissors, crayons, paper, threading toys, puzzles, and small books. LETCEE (SmartStart) supplements this kit with toys and books from their toy library and with additional supplies for drawing and creative activities.

Child progress is regularly assessed through observation and the completion of developmental charts, including social and emotional development, language, cognitive development and physical development (gross and fine motor development).

Children in the LETCEE (SmartStart) playgroups receive fortified porridge, which is an incentive for attendance.

#### LICENSING, MONITORING, AND SUPPORT

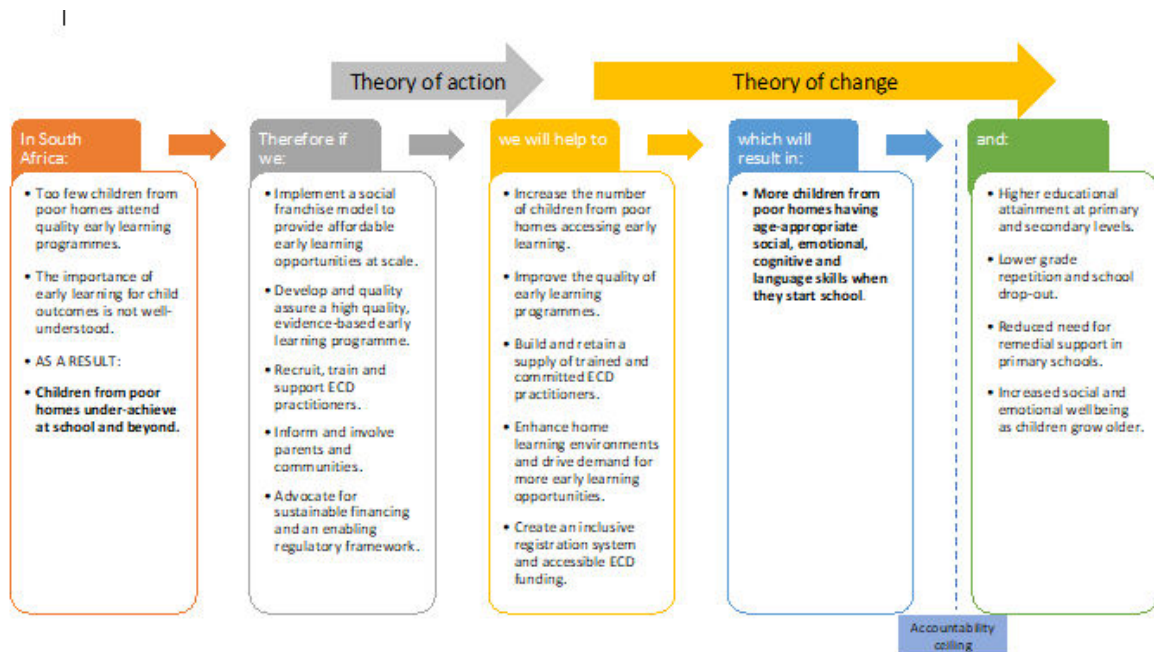
SmartStarters receive five days of training. Upon successful completion of the training, facilitators receive a starter licence and can set up a site and recruit children using SmartStart resources. SmartStarters are observed and rated by Club Coaches and if they are rated green, receive a practice license valid for a year. If there are gaps, they receive an orange rating and will be supported through onsite coaching and reassessed after six months; if there are severe shortcomings and they are rated red, they will be supported and reassessed within two to four weeks, and if not resolved, deactivated. Club Coaches oversee the support and monitoring of Franchisees through a licensing and Programme Quality Assessment (PQA) system. LETCEE (SmartStart) has four dedicated Club Coaches.



In addition to running a playgroup, SmartStarters are expected to organise hour-long Caregiver Meetings. Meeting content is provided to franchisees by Club Leaders, passed down by Club Coaches. Meetings focus on helping parents/primary caregivers understand how young children learn and develop, and on sharing ideas and techniques to use in the home. The LETCEE SmartStarters offer home visiting services targeting younger children and their primary caregivers when they are not operating the groups. As there are some families with children in both programmes, some parents do not attend the SmartStart parenting meetings. LETCEE (SmartStart) has therefore introduced the same topics in their home visits.

SmartStarter networks are supported by SmartStart's Franchisors and a National Hub based in Johannesburg. Franchisors are local NGOs or social development organisations that are contracted to support implementation of the SmartStart model within a specified region. Franchisors are also responsible for the quality of programmes implemented by franchisees. Franchisors manage the Club Coaches, who run networks of Clubs led by Club Leaders and provide training and skill-building when needed by the franchisees. The SmartStart Hub contracts and supports these franchisors and provides central operational functions, such as branding, training, financing, and product design. The SmartStart Theory of Change (TOC) is provided in Figure 3.

Figure 3. SmartStart Theory of Change<sup>13</sup>



It is evident from the TOC that quality of programme delivery and the commitment of SmartStarters are central to the realisation of the programme goal. In addition, improved parent knowledge of early learning, through provision of parent information sessions, complements the direct intervention with the children. These are both plausible mechanisms of change in children’s learning outcomes. However, they depend on whether the programme facilitator (in this case LETCEE(SmartStart)) is able to maintain the level of quality required, whether content relevant parent sessions are provided, whether parents attend these sessions, and whether their behaviour changes as a result. The study sought to address these questions as far as possible. However, as the attendance data provided was not sufficiently reliable, it was unfortunately not possible to investigate whether six hours per week of exposure made a difference to the early learning outcomes of LETCEE (SmartStart) children.

<sup>13</sup> Provided by SmartStart May 10, 2019

## LESEDI EDUCARE ASSOCIATION COME AND PLAY PROGRAMME<sup>14</sup>

The Lesedi Educare Association programme operates its outreach programme for children with no access to ECD through regular structured playgroup sessions, reinforced by information and awareness sessions for parents/caregivers. The key objectives are:

- To provide children with access to exciting opportunities to play with a variety of educational toys, equipment and materials, contributing to their holistic development (language, cognitive, social & emotional, fine and gross motor development); and developing them to an appropriate level so that they are ultimately able to progress into formal schooling;
- To promote a greater understanding in parents/caregivers of the importance of ECD and how young children develop and learn through play, and the important role which they play as the first and most important teachers of their young children. The intention is that the capacity of parents/caregivers is enhanced and supported to provide quality care to, and stimulation of, their young children, resulting in improved parenting skills and practice;
- To provide a platform of support for parents/caregivers to discuss issues impacting on the well-being of their young children as well as their own well-being, including issues of Health and Nutrition;
- To provide a hub for integrated service provision with referrals, visits by Clinics, Social Workers, Department of Home Affairs, Child Protection Services, specialist services, etc.).

The programme operates through Come-and-Play buses, or Mobile ECD units, as follows.

Each Come-and-Play bus provides a weekly two-and-a-half-hour session to a group of up to 25 children from 3 to 5 years (though some younger children do attend).

Lesedi provides each child with one playgroup session of 2.5 hours per week. The two Come-and-Play buses deliver a total of 16 structured playgroup sessions per week (eight per bus) in ten informal settlement communities on the outskirts of Bloemfontein.

The same programme is offered through mobile units in rural areas. The sessions are facilitated on the buses by two qualified Playgroup Facilitators per bus (ECD NQF Level 4), as well as in gazebos erected alongside the buses. Playgroup sessions are structured and planned on a weekly basis, with age-appropriate activities linked to themes and developmental learning areas. Children attending the playgroup sessions are provided with a nutritious snack.

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<sup>14</sup> Lesedi documentation and email correspondence.

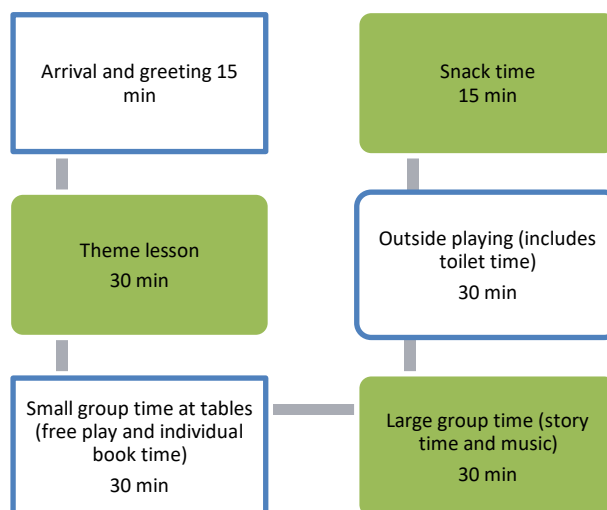
Parent/caregivers also attend the playgroup sessions, with regular parent information sessions being facilitated each week encouraging simple home activities to promote early learning at home. Lesedi distributes Toy Kits to parents who attend 70% of their sessions. Kits include five multi-purpose, high quality educational toys to support early learning at home and positive parent-child interaction.

Weekly parent sessions also provide a support forum for parents to discuss issues impacting on the well-being of their children, as well as their own well-being. Household visits are carried out to especially vulnerable families and there is a referral system for other needed services. Playgroup Facilitators liaise and work closely with key community stakeholders, especially Ward Councillors, Ward Committees and Community Policing Forums.

### PLAYGROUP PROGRAMME

The bus and mobile unit playgroup programme lesson plans are developed according to weekly/bi-weekly themes and weekly topics that are part of the Ntataise ECD Enrichment Themed-Linked Programme, taking cognisance of the required developmental standards that will prepare children for formal schooling. Each theme is used for up to two weeks with topics changing on a weekly basis.

Figure 4. Lesedi Playgroup Routine



Records are kept of each child in their portfolio, including enrolment, birth certificate, clinic card, assessments, progress reports and examples of work. Children from 3 years old are assessed

three times a year.<sup>15</sup> This allows for playgroup facilitators to track the development of the children in their playgroups for a period of three years until they are school-ready, with the aim that by the end of this programme, all the children can successfully make the transition into primary school and are developmentally equipped to cope and thrive.

## PARENT CURRICULUM

The parent sessions are based on a plan developed by the Playgroup Coordinator and facilitators to address the pertinent needs and issues they are facing in their communities, allowing for input from key stakeholders within the relevant communities. The material used as a basis for these sessions is taken from Khululeka’s High-Scoped Child/HHH (Happy, Healthy, High-Scoped) programme and the UNICEF/DSD Parent Programme (see Figure 5). The focus is on improving the capacity for early learning to continue at home.

Figure 5. Parent Programme Topics.

Khululeka’s HighScope 3 H programme	Department of Social Development
<ul style="list-style-type: none"> <li>● Nutrition</li> <li>● Household Gardening</li> <li>● Household Hygiene</li> <li>● Children’s Health</li> <li>● HIV/AIDS</li> <li>● Children’s Rights</li> <li>● Accessing Social Grants</li> <li>● Children’s Safety</li> <li>● Child Abuse</li> <li>● Active Learning</li> <li>● Creating and Active Learning</li> <li>● Environment               <ul style="list-style-type: none"> <li>○ Schedules and Routines</li> <li>○ Supporting Adult/Child</li> </ul> </li> <li>● Interactions               <ul style="list-style-type: none"> <li>○ Key Experiences</li> <li>○ Early Literacy (language, communication, pre-reading, pre-writing)</li> <li>○ Early Numeracy (numbers, counting, classification seriation, space)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Health and Nutrition</li> <li>● Play and Creativity</li> <li>● Physical Development</li> <li>● Social Development, Emotional Development, and Confidence Building               <ul style="list-style-type: none"> <li>○ Intellectual and Language Stimulation</li> <li>○ Child Safety and Protection</li> <li>○ Healthy Family Relationships</li> <li>○ Positive Discipline</li> <li>○ Grief and Bereavement</li> <li>○ Me, The Parent/Caregiver</li> </ul> </li> </ul>

<sup>15</sup> The assessments are based on their performance of activities recommended by both the Free State Department of Education (in their Pre-Grade R Curriculum/ECD sub-directorate) and the Sunshine Association (START)’s manual.

Sessions are run concurrently during the playgroup session and last about one hour. They are facilitated by one of the facilitators during the story and outside playtime on the bus or by the Playgroup Coordinator when she is visiting the bus. Lesedi staff members indicate that at present the 11-week UNICEF/DSD programme is running. This is well-aligned with the needs for life-skills and parenting support of their poverty-stricken target communities. Once this content is complete, they focus on how parents can extend the themes and activities done on the bus at home for the rest of the week.

#### SUPERVISION AND SUPPORT

- The playgroup facilitators are directly accountable to the Playgroup Coordinator;
- Weekly feedback and planning meetings are held with the Playgroup Coordinator and all playgroup facilitators on a Friday when everyone is at the office;
- Monthly report forms are completed after each playgroup session, giving feedback on what has been covered and how well the sessions have been received;
- Every second week playgroup facilitators submit all child assessments to the Monitoring and Evaluation (M&E) staff for evaluation and feedback;
- The Playgroup Coordinator and M&E staff attend and monitor randomly-selected playgroup and parent sessions using monitoring guidelines.

#### COMMENT ON THE PLAYGROUP PROGRAMMES IN RELATION TO THE EVIDENCE FOR SUCCESS IN PROMOTING IMPROVED EARLY LEARNING OUTCOMES

Regarding weekly programme exposure, Cotlands Macassar (eight hours) and SmartStart (six hours) are similar. Cotlands Lydenberg children have twelve hours exposure. Lesedi provides children with significantly less exposure (one two-and-a-half-hour session each week) but parent involvement and continuing with home stimulation during the week is key to its model. All the programmes have a focus on linking children to health and social services as integral parts of their models. As noted above, the literature regards 15 hours per week as a minimum requirement. Of interest to the study is whether programme exposure (number of sessions) makes a difference to playgroup child development outcomes (other factors considered).

Lesedi and LETCEE (SmartStart) provide a parent component. Lesedi's parents attend with their children. While LETCEE (SmartStart) holds stand-alone parent sessions, there is no reported formal parent component in Cotlands. Only Lesedi had data on parent sessions suitable for descriptive analysis.

Differences are evident in the qualifications of the facilitators. Lesedi's and Cotlands' practitioners have level-4 ECD qualifications. This is not required for SmartStarters, who receive five days in-house training followed by support in the field. The influence of practitioner qualifications will be examined.

Cotlands' structured lesson plans may advantage their children in terms of school related inputs. The literature indicates that trained ECD practitioners may be able to deliver a better-quality programme and hence more reliably realise programme outcomes. These issues will be explored in the study by comparing the outcomes of the three playgroup programmes with each other and with the centre-based interventions.

## **ECD CENTRE DEVELOPMENT PROGRAMMES**

### **THE EVIDENCE-BASE**

ECD centres are the major vehicle for the delivery of early learning programmes in South Africa. The programmes offered by ECD centres have been noted to be of variable quality, with children from lower income groups receiving poorer-quality programmes (Biersteker, Dawes, Hendricks & Tredoux, 2016; Richter et al., 2012; National Planning Commission, 2012). Numerous interventions to improve the quality of centre-based programme delivery are offered both by government (through its National Curriculum Framework (NCF) training) and by NGOs.

The focus of this brief review is on practitioner development and resources as key components of programme design and delivery. Both programmes in the study seek to enhance participating children's school readiness. However, it is defined that outcome is the product of curriculum design, content and associated activities, the quality of the interactions between practitioners and children, available materials, and the time devoted to the programme overall (dosage) and to specific domains (Wasik et al., 2013). The classroom may be likened to a pedagogic ecosystem or niche, comprising the physical setting and equipment, the children and practitioners, and the daily routine and activities managed by the practitioners. Practitioners' understandings of young children and their development, and how their interactions can enhance this, are central to how they go about their interactions with the children. Their ability to guide and scaffold children's learning in areas related to school readiness is central to the realisation of that goal (Weiland &

Yoshikawa, 2013; Zaslow et al., 2016). That is by no means a simple process. In-service training and enrichment programmes have the potential to support practitioners to improve their interaction skills.

## PROFESSIONAL DEVELOPMENT

Research conducted in a range of countries and contexts has established that practitioner qualifications and/or training are associated with improved child learning outcomes. These indicators are often used as indicators of service quality (e.g. UNESCO, 2007; Fukkink & Lont, 2007). Practitioners' level of education and participation in training is a better predictor of program quality than other factors such as child-staff ratios or group size (Burchinal et al., 2010).

However, qualifications alone are not sufficient to make a difference. Oversight, mentoring, and support from suitably qualified personnel, are central to quality improvement and successful programme delivery (Early et al., 2007). Continuing support is important, even where practitioners are qualified, to ensure that the effects of initial education do not fade out (Fukkink & Lont, 2007; OECD, 2012). Ongoing professional development has the potential to fill in the knowledge and skills that staff may be lacking or require updating due to changes in particular knowledge fields.

Recent reviews of effective continuing professional development (CPD) (US Department of Education, 2010; Eurofound, 2015) and a consensus study on key issues for training of the ECD workforce in low resource contexts (DFID, 2017), as well as a range of smaller studies, highlight the key components for practitioner continuing professional education to support effective delivery of early childhood programmes:

- Mentoring and supervision
- A focus on practice linked to knowledge
- Reflection and peer learning
- Specific training focused on interaction skills
- Motivational management and leadership

Mentoring and supervision in supporting effective early childhood practices is widely referred to in the literature on ECD provision of all kinds (DFID, 2017). For example, the Aga Khan Foundation's successful Madrasa ECD programmes, like many others, have incorporated on-going mentoring in their approach (Evans & Bartlett, 2008). And in a Delphi study on training for



the ECD workforce in low resource contexts (DFID, 2017), expert consensus was strongest around the importance of ongoing supportive mentoring and supervision. However, challenges with effective delivery, including the capacity of supervisors and trainers, commitment, and cost were acknowledged.

Field-based/on-site consultation is a key component of effective CPD, as it provides ECD staff with opportunities to receive feedback on their practices. The importance of reflection and peer learning as part of the learning process was also highlighted in the DFID study. As one Expert commented:

*“For all ECD professionals - my perspective is that a combination of gaining/strengthening knowledge and practices related to ECD theory with actual practice - and then coming together to reflect and discuss issues experienced that touch on theory and practice works the best.” DFID 2017 p. 24*

CPD guidelines for South East Asian countries (Putcha, 2018) also include these elements, recommending that training:

- Be purposefully designed to include the active participation of those receiving the additional training; and
- Have enough space and time for “reflective practice,” peer learning and class-based exploration.

Furthermore, programme managers play an important role in supporting professional development. Quality is maintained by leadership that motivates and encourages working as a team, information sharing and professional staff development (OECD, 2006). The quality of leaders and managers of ECD services is also strongly related to their level of education and professional development, as found in the Effective Provision of Preschool Education (EPPE) study (Sylva et al., 2010).

Table 1 presents evidence for effective professional development for early childhood educators compiled by the US Department of Education (2010).

*Table 1.* Evidence for Effective Professional Development for Early Child Educators from the United States of America.

CPD EVIDENCE	COMMENT
Professional Development (PD) has specific and articulated objectives.	Specialized, content-specific training in child interactions is associated with overall practitioner competence (Fukkink & Lont 2007). PD content should be guided by what is appropriate and important for children to know in particular domains. Content should take account of curriculum standards and guidelines.
PD has an explicit focus on practice; educator knowledge and practice must be linked.	Most studies reviewed combined course work or training with individualized modelling and feedback on interactions with children in the practitioner’s classroom. While not all evaluations involving individualized professional development showed positive effects on practice or child outcomes, there is promising evidence.
Collective participation of teachers from the same classrooms or schools supports embedding of learning.	Joint participation can help to support a professional culture and ensure the sustainability of new techniques and skills.
The intensity and duration of PD is matched to the content being conveyed.	The length of time spent in PD activities depends on the goals of the activities themselves.
Practitioners are assisted to conduct child assessments and interpret their results as a tool for ongoing monitoring of the effects of PD.	Assessments can help practitioners view their knowledge and skills as contributing to improvement in children’s outcomes and can serve as a source of feedback for how to target instruction overall and for individual children.

A systematic review of European CPD initiatives for early childhood staff focused on which features of CPD affect children (their outcomes/well-being) and staff–child interactions and which forms of delivery are most effective (Eurofound, 2015). The general conclusions are presented in Table 2.

*Table 2. Features of CPD that Influence Child Outcomes and Staff–child Interactions: Evidence from the European Union.*

CPD EVIDENCE	COMMENT
CPD interventions that are integrated into the ECEC centre’s practice with a focus on reflection that leads to changes in practice and curricula (feedback component) are effective.	For short-term training, intensive intervention with a video feedback component has been found to be effective in fostering practitioners’ competences in care-giving and language stimulation; regarding children’s short-term outcomes, there were significant gains in terms of language acquisition and cognitive development.
Long-term CPD interventions, integrated into practice, have proven effective in very different contexts including in countries with low qualification requirements and poorly subsidised ECEC systems. Those that build on practitioners’ needs and involve their participation increase pedagogical awareness and professional understanding.	Pedagogical support to staff by specialised coaches or counsellors in reflection groups enhances the quality of ECEC services (e.g. Sheridan, 2001; Hayes et al., 2013). Several studies report improvements in at least one aspect of development, including maths, science language and social development (e.g. Beller et al. 2007, 2009; Evanschitzky et al 2008; Hayes et al, 2013).
Provide CPD activities that enhance practitioners’ reflectivity both at individual and at team level.	These allow practitioners to strengthen their capacities and address areas for improvement in everyday practices.
CPD needs to be focused on practitioners learning in practice, in dialogue with colleagues and parents.	A coach should be available during both contact and non-contact hours (for parent interventions).
Providing ongoing CPD of sufficient duration is important	Attending a workshop may be an easy way to realise means of professional development but may only be suitable for highly specific inputs. High-quality subject training, field-based consultation training or supervised practices may be more effective for more complex areas such as practitioner-child interaction and scaffolding of learning.
Practitioners in reviewed studies reported on the value of: <ul style="list-style-type: none"> <li>● Active participation in a learning cycle characterised by learning skills of reflective thinking, action and goal setting;</li> <li>● The development of practitioner self-confidence, both individually and as a team, through the active participation process.</li> </ul>	

The support provided in studies showing successful child outcomes has generally been intensive and quite extended. For example, the German approach of Evantischzky (2008) involved 90

sessions over two years, and the Beller (2007) intervention involved weekly group training and one on one feedback sessions based on video clips over a six-month period. Sheridan's intervention (2001) involved eight group lectures a month, group reflections and feedback on video over a year. These interventions are simply not practical in a low resource context such as South Africa.

There is the additional caveat (e.g. Putcha, 2018) about the dilution of training in cascade systems of training (train-the-trainer models), in which master trainers at the top of the system train a layer of trainers below, who then train another layer below and so on. Quality assurance must avoid a situation in which the message received at the bottom becomes much less detailed or accurate than that at the top.

Finally, it should be noted that very few studies report on retention of training effects. This is a significant weakness in the research. Fukkink and Tavecchio (2010) showed retention of learning at three months post-intervention. The long-term impact of CPD was not reported in any of the Eurofound studies.

We turn now to descriptions of the Unlimited Child and Ntataise Network's Enrichment Programme, the two centre development programmes included in the study.

## **IE COMPARATIVE STUDY CENTRE DEVELOPMENT PROGRAMMES**

### **THE UNLIMITED CHILD<sup>16</sup>**

The Unlimited Child (TUC) was initiated in 2008 in response to the poor quality of learning and stimulation programmes at ECD centres, including rote teaching, a lack of quality educational resources, and practitioners who were not able to meet entry-level requirements for qualifications and who remained unskilled and unsupported. In the Western Cape the programme operates through partners but in KwaZulu-Natal, where our sample sites are located, TUC manages it directly. The TUC ECD Centre Routine is presented in Figure 6.

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<sup>16</sup> Information supplied by TUC, and van Niekerk, L.J., Ashley-Cooper, M. & Atmore, E. (2017). Effective early childhood development programme options meeting the needs of young children. Cape Town: Centre for Early Childhood Development.

Figure 6. The TUC ECD Centre Routine



The TUC model involves an initial five-day training programme followed up by ongoing support facilitated by a team of trained ECD specialists.

#### THE INITIAL TRAINING PROGRAMME

TUC trainers have two years' experience and at least an NQF 5 ECD, credits in adult learning facilitation, driver's licence, English and a local South African language, and computer literacy. Centre supervisors as well as practitioners are required to attend training. They are introduced to a foundational understanding of child development from birth to 6 years, how children learn, and play based methodology. The NCF and especially the ELDA's are explained. There is a focus on the daily programme and key ingredients as well as different physical layouts of the playroom for different needs and sessions. The TUC toy kit is introduced, and practitioners explore and practice how to use particular toys, linking them to different parts of the daily programme, themes, and Early Learning Development Areas for the pre-Grade R age group. The roles of the practitioner, centre supervisor and TUC monitor are explained as well as the feedback and assessment process.

After successful completion of the training, a curriculum-aligned, age-appropriate educational resource kit comprising of learning materials, educational toys and resources is provided to the ECD centre. The materials in the kit provided for the pre-Grade R age group includes drawing, painting, cutting and modelling supplies, small outdoor equipment, musical instruments, wooden

cars, pots, pans and tea sets for fantasy play, concept games, puzzles, story cards and books. Practitioners are provided with the TUC *Practitioner's Guide*, which includes 36 weeks of daily plans (to guide activities in the Centre Routine). These are organised around 18 themes (e.g. I am special, Hygiene, the five senses, my family, helpers, transport, animals). The themes facilitate learning in mathematics, language, life sciences, life skills and motor development. TUC has programmes for babies, toddlers, pre-Grade R and Grade R. The pre-Grade R programme has been most extensively rolled out and is the one used for the age of the children in this study.

#### CONTINUOUS FOLLOW-UP SUPPORT

Centres are grouped into geographic clusters that function as a support group. To enable continuous learning monthly interactive cluster meetings are held, led by trained TUC project monitors and facilitators. Monitors are also allocated to centres to provide support through monthly onsite visits coupled with continuous monitoring and evaluation.

Each cluster monitor receives a stipend and supports two to three centres a day, reaching 50 centres over a 20-day period. Local field monitors have to have two years of practical experience at an ECD centre, a minimum NQF 4 ECD and technical skills including the ability to use a smartphone. Their duties include:

- Monthly onsite monitoring and support to ensure implementation of a quality stimulation programme;
- Setting up and sustaining geographic clusters of up to 50 centres through monthly cluster meetings;
- Assisting with verification and distribution of kits to centres in the cluster;
- Co-facilitation of training workshops; and
- Ensuring regular reporting through electronic information management systems.

Visits are approximately two hours long, including observation and feedback. There are monthly assessments of compliance with the daily programme, including use of the kit and guide, practitioner proficiency, layout and health and safety. These are unannounced visits and data is collated through the tablet-based information management system.

Cluster meetings for practitioners are facilitated monthly by trainers, supported by field monitors. At these training sessions content is reinforced, knowledge and experience shared, and practitioners are drawn into a support group. Supervisors attend Forum Association Meetings

monthly to assess the programme. Child assessments at baseline, midline and endline are done by trainers with at least 10% of children and with over two – four children in each area are undertaken every year.

#### NTATAISE ECD CENTRE OF EXCELLENCE ENRICHMENT PROGRAMME

This is a well-established programme designed to improve the learning environment provided to children attending ECD centres offered by several of the Ntataise network members in several provinces. It was introduced to address the need for good quality effective learning programmes based on the National Curriculum Framework and emphasises early literacy and numeracy. The target age group is 4- to 5-year-olds, but there are children aged 3 years in some classes and some centres have community-based Grade R classes which participate.

The programme is delivered to experienced pre-school practitioners who have their own class and have completed and received an NQF level 4 ECD qualification. These are nominated by their matrons/principals on the basis that they are ‘champions’, who not only meet the qualification criteria, but also have the capacity to share the information with their colleagues.

The programme consists of ten monthly theme-based workshops for practitioners, coupled with ten on-site visits by an experienced trainer who mentors practitioners and demonstrates a ‘model’ pre-school day for children (see Table 3). The ECD trainer visits each pre-school and spends a day there, helping the practitioners to implement what they have learnt during their Level 4 training and demonstrating an ECD programme with the children. There is a focus on providing a wide variety of activities and interacting with children in ways that facilitate learning through appropriate questioning, supporting and extending of children’s ideas. Practitioners have the opportunity to watch and participate in the programme, thereby improving their implementation skills. Key to the workshops is a focus on the reason for offering different activities and interactions so that practitioners’ understanding of how they develop different capacities is enhanced. The content of the Ntataise Hub Enrichment Programme is presented in Table 3.

Table 3. Content of the Ntataise HUB Enrichment Programme.

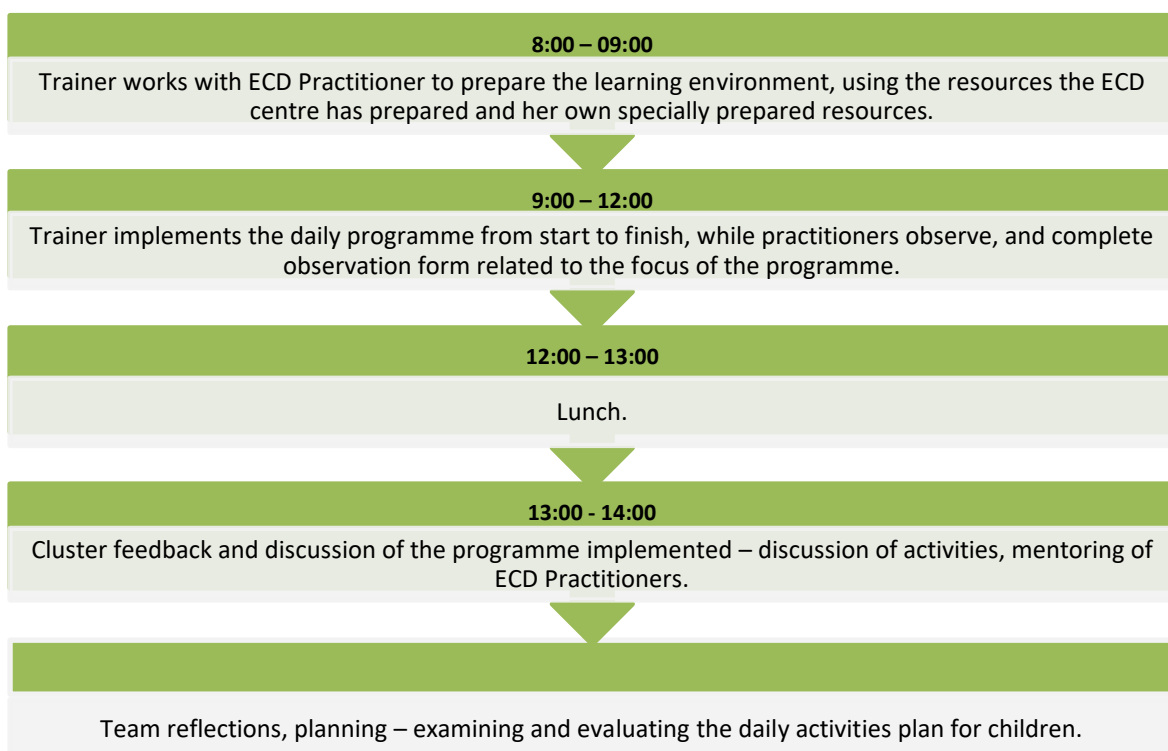
ACTIVITIES	INFORMATION CONTENT
<b>Orientation</b>	<ul style="list-style-type: none"> <li>● Gather centre information through a standard survey tool</li> <li>● Selection of practitioners</li> <li>● Learner application form</li> </ul>
<b>Baseline Assessment</b>	<ul style="list-style-type: none"> <li>● Information about centre background, staffing, registration status.</li> <li>● Class: number/ages of children, any special needs, equipment and learning materials, child records, observation of daily programme</li> </ul>
<b>Workshop one</b>	<ul style="list-style-type: none"> <li>● Quality ECD programme</li> <li>● Quality ECD practitioners, daily programme</li> <li>● Theme: All about me (Integration in morning ring, indoor &amp; outdoor, music &amp; movement, story)</li> </ul>
<b>Workshop two</b>	<ul style="list-style-type: none"> <li>● Beliefs about children, childhood development</li> <li>● National Curriculum Framework</li> <li>● Keeping records of children</li> <li>● Theme: My family</li> </ul>
<b>Workshop 3 (+ special workshop on Autism)</b>	<ul style="list-style-type: none"> <li>● How we care for children and support their well being</li> <li>● First aid kit and safety equipment</li> <li>● Routines</li> <li>● Theme: My home (special activities, creative art, music, and movement in addition to above)</li> </ul>
<b>Workshop 4</b>	<ul style="list-style-type: none"> <li>● Daily programme and activities</li> <li>● Practitioner support in daily programme</li> <li>● Theme: Food we eat (including focus on creative art)</li> </ul>
<b>Workshop 5</b>	<ul style="list-style-type: none"> <li>● Anti-bias in the playroom</li> <li>● NCF Identity, belonging</li> <li>● Planning a show and tell for parents</li> <li>● Theme: Clothing (special activities at story)</li> </ul>
<b>Workshop 6</b>	<ul style="list-style-type: none"> <li>● Children to understand the world they live in</li> <li>● Observing children and reflecting on child progress records</li> <li>● Theme: Five senses</li> </ul>
<b>Workshop 7</b>	<ul style="list-style-type: none"> <li>● Communication and mathematical skills</li> <li>● Making book and mathematics game</li> <li>● Theme: Farm Animals and Wild Animals</li> </ul>
<b>Workshop 8</b>	<ul style="list-style-type: none"> <li>● Professionalism, continuing education and peer support</li> <li>● Record keeping</li> <li>● Theme: Community helpers</li> </ul>
<b>Workshop 9</b>	<ul style="list-style-type: none"> <li>● Child observation and progress report</li> <li>● Theme: Tiny creatures</li> <li>● Post evaluation</li> </ul>
<b>Workshop 10</b>	<ul style="list-style-type: none"> <li>● Year evaluation and plan</li> <li>● Review playroom layouts</li> <li>● Daily programme (Post evaluation)</li> <li>● Theme: Seasons</li> </ul>

Implementation is undertaken through a ‘Hub’ model, which consists of monthly theme-based workshops for practitioners, coupled with on-site visits by an experienced trainer who mentors



20 – 25 practitioners in total and demonstrates a ‘model’ pre-school day for children. ECD centres participating in the project are clustered in ‘ECD Hubs’ of five ECD centres. A monthly Monday workshop is followed during that week with the Ntataise Trainer demonstrating at one of the ECD Centres. Practitioners from the four other centres in each group participate in the demonstration session at the ‘host’ centre, and up to three other staff members are invited to sit in. This is repeated for each cluster. Each month, the ‘host’ centre rotates within the group. ECD practitioners observe the Ntataise trainer and then, using guiding questions, discuss their observations and plan how they would implement what they have seen in their own centres. The trainer will role model for at least the first five visits and will then co-teach with the practitioner from visits six to eight and also at the post-intervention visits, and will observe and provide feedback. Thus, there is an opportunity for practitioners who co-teach to receive feedback later in the year.

Figure 7. The Agenda for On-site Visits



The Hub model allows practitioners the opportunity to visit each other’s playrooms and develop a peer support network within each grouping. At the subsequent workshop they have a further opportunity in the ‘Recap’ session to reflect on what they have seen and what they have found when implementing the ideas. Matrons of participating centres attend quarterly Matron’s

Capacity Building sessions which focus on a range of areas necessary for running an effective centre and learning programme (including compliance, understanding of ECD issues, staff leadership and management and the learning programme). These sessions emphasise the need for matrons to monitor the learning programme and check on implementation. Each centre and participating class is assessed in detail at baseline and again at the end of the programme. Records of attendance are kept for practitioners at workshops and demonstration sessions and for the matrons' capacity building workshop. The tool used to assess quality at baseline and follow-up is not used to guide ongoing implementation, though individual feedback is given post-assessment.

### THE ENRICHMENT THEMES

Ntataise Early Childhood Development (ECD) Themes consist of 14 resource books and a matching set of 14 envelopes containing visual educational aids. Themes are selected topics, which are used as a tool for planning a variety of learning activities to help children to achieve the learning outcomes of the National Curriculum Framework. Each theme guide has a weekly visual guide, which includes all areas of the programme, with references to the ideas for special activities and group times in the Resource material. It also contains other ideas related to the topic. Guidance is also given on the age group or broad phase the activity is most suitable for, ways of scaffolding the activity up or down, the materials needed, how to make equipment (if necessary), and teaching methods.

Programme topics are generally subject-based to allow children to explore the social and natural environment or world in which they live. The emphasis, however, is on the learning process of discovering for oneself and not on memorising information taught by the practitioner. Children need to learn actively and to show what they can do with their knowledge and understanding. Themes provide a framework for organised and continuous learning, helping children develop concepts and skills in an integrated and ongoing way through a wide variety of activities. They are most useful for planning group activities involving discussion, stories and music.

The guide indicates the need for flexibility in when to introduce a particular theme, depending on the age and location of children but within the basic principle of known to unknown.

The Resource material for each theme is presented in the following way:

- The ideas for special activities include, where appropriate art/ handiwork, discovery activities (science and technology), make-believe and block play, educational toys and games.
- The ideas for group times include morning ring introductory exercises referred to as symbol board or classification board ideas, Talk-about ideas (group discussions often involve practical activities), words games, movement activities, including games, songs and rhymes, and story ideas.
- Group outings and visits can fall into either category, and children's books are an important educational resource in any playroom.

## EDUCATIONAL AIDS

This programme was designed for a wide range of participants, but especially for those whose resources are limited. For this reason, there is an emphasis on the use of natural and scrap materials, and there are many ideas for making educational materials and equipment.

Template drawings for making materials and posters are available separately so that they can be easily copied. These are presented as simple line drawings that need to be coloured in realistically with crayons or paints for use with children. These materials can also be used to make children's books and puzzles.

## COMMENT ON THE CENTRE DEVELOPMENT PROGRAMMES IN RELATION TO THE EVIDENCE FOR SUCCESS IN PROMOTING IMPROVED EARLY LEARNING OUTCOMES

TUC and Ntataise have the same objectives. There are a number of similarities and some differences – particularly in regard to delivery of the training programme. TUC training commences with a continuous five days of input followed by monthly continuous cluster workshops and ongoing site support with quality monitoring. Centre managers and practitioners attend the initial training. In the case of Ntataise, where only NQF qualified and experienced practitioners are enrolled, ten training sessions are offered over ten months, coupled to ten site demonstrations (two at each trainee's centre, as this takes place in a cluster). Centre managers (matrons) do not attend the training but participate in quarterly workshops. Both programmes utilise hubs to provide ongoing support for their centres.

Both programmes provide comprehensive guides to assist practitioners in delivering their programmes. Regarding equipment, TUC provides trained practitioners with a comprehensive, age-appropriate, curriculum-aligned toy kits. Ntataise provides some basic materials in the form

of posters and theme guides but, recognising the need for a sustainable approach, also trains practitioners to draw on natural materials and scrap when making equipment.

How do TUC and Ntataise training and CPD programmes approaches stack up against the evidence base? In Table 4, we specify indicators of CPD quality suggested by the evidence and show whether the two programmes are aligned with the evidence.

*Table 4.* TUC and Ntataise Enrichment: Alignment with Evidence for Effective Practitioner Training and CPD (based on programme documentation and interviews with programme managers).

FEATURE OF EFFECTIVE CPD	TUC	NTATAISE
1. Professional Development (PD) has specific and articulated objectives.		
2. Trainer competence for fidelity to the model is assessed.		
3. Ongoing monitoring and supervision (coaching on site).	Ongoing Monthly site visit	10 monthly on-site demonstrations linked to workshops
4. Training is of sufficient duration (intensity and duration is matched to the content being conveyed).	5 Day initial intensive	10 workshops over 10 months
5. Management involvement to improve knowledge and encourage motivational management and leadership.	✓	✓
6. Involvement of several staff at the centre.	✓	✓
7. Specific training focused on interaction skills.	✓	✓
8. Training involves active participation with practice opportunities linked to knowledge acquisition.	✓	✓
9. Opportunities for reflection and peer learning are provided.	✓	✓
10. Child assessments are undertaken to inform programme improvement.	✓ (baseline, midline, endline)	X

✓ = Yes included in the programme;

X = Not included in the programme;

It is evident that both training models are aligned with evidence for good practice.

Both TUC and Ntataise materials are theme-based with supporting materials.

## STUDY DESIGN

### MAIN RESEARCH QUESTIONS

1. How do different ELP interventions, targeting three- to five-year-old children from low-income backgrounds, vary in their effectiveness in preparing children for Grade R (as measured by the ELOM)?
2. What programme, child, and home environment factors predict change in ELOM scores following exposure to an early learning programme?

### DESIGN

The study compares the outcomes of five different ELP interventions on children's development in areas relevant to readiness to learn prior to the Grade R year using a quasi-experimental pre-test post-test field study design (Cook & Campbell, 1979; Cook, Campbell, & Shadish, 2002).

Study arms comprise three playgroup models: LETCEE (SmartStart) (study site: LETCEE Greytown, KwaZulu-Natal), Cotlands (study sites: Macassar, Western Cape and Lydenburg, Mpumalanga), and Lesedi (study sites: Mangaung, Free State). These are compared with two ECD centre development models that focus on improving the quality of teaching and early learning in centres largely through in-service staff training. They include the Unlimited Child (TUC) (study sites: Umlazi and KwaNyuswa, KwaZulu-Natal), and the Ntataise Centre of Excellence Enrichment Programme (study sites: Viljoenskroon and Bothaville, Free State). All models are included in National ECD Policy. Programme sites were limited to those where practitioners were rated by their organisations as being of satisfactory quality or better.

As is the case in studies of school effectiveness (Goldstein, 1997), it was not possible to randomly assign children to the different study arms as they were already enrolled in their respective programmes. It was also deemed too challenging, logistically and ethically, to include a no-treatment group. In any event, this study is akin to an investigation of school effectiveness where the impacts of different learning programmes for children enrolled in school are compared. Also, recruitment and follow-up in so many areas, without the possibility of enrolling children in effective programmes post-study, was deemed unfeasible. In addition, 29% of children do not participate in some form of programme prior to Grade R (Statistics South Africa, 2018), rendering a valid passive control unrealistic. All groups are thus active.

We are aware that a field study of this nature faces risks to internal validity, particularly due to selection effects. For example, in some areas, while parents may wish to send their child to a preschool, a service does not exist. Where it does, the family may not be able to afford the fees and may therefore choose a free community playgroup run by a non-profit organisation (a form of selection effect).

Children were assessed on the ELOM during March 2018 (baseline) and again in October and early November 2018 (endline). In addition to measurement of change in children's performance on the ELOM, we explore predictors of change using child, home background, and programme variables. The child's Home Learning Environment (HLE) was measured through parent or primary caregiver interviews at endline. Practitioners were interviewed at endline to obtain data on programme factors likely to influence quality and moderate programme outcomes. Participating organisations also provided programme descriptions and some administrative data, including child attendance (not all was suitable for analysis).

## **FIELDWORK PROCESS**

### **ETHICS AND CONSENT PROCEDURES**

Approval for the study was submitted to the University of Cape Town, Faculty of Humanities Psychology Department Ethics Review Committee on 22<sup>nd</sup> February 2018: Reference Number PSY 2018-002. Agreement to participate in the study was provided in writing by all of the organisations: Lesedi, SmartStart, The Unlimited Child, Cotlands, and Ntataise. These agreements are available on request.

Parents or primary caregivers were approached to give consent for child assessments. Consent forms (Appendix A) were distributed to the organisations in the appropriate languages (Afrikaans, isiZulu, Sesotho or Sepedi). The consent form is provided in Appendix A.

In addition, a letter (Appendix B) was sent out prior to the commencement of fieldwork to all centre managers for the centre-based programmes, requesting their permission for one of the research staff to visit their centre to assess the development of some of the children and informing them about the process, consent requirements, and potential parent interviews at endline.

Parents (or primary caregivers) of children who had completed both baseline and endline ELOM assessments were approached to participate in an interview on activities with children at home. They were also asked to provide limited biographical information. Adult consent forms were provided in Afrikaans, isiZulu, Sesotho or Sepedi. The English version is in Appendix A.

#### REFERRAL OF CHILDREN WHO MAY BE AT RISK

The names of children who, on assessment, showed possible significant developmental delay or disability were provided to the senior management of each participating organisation with the request that they seek parental consent for referral to an appropriate practitioner for assessment. Where significant neglect or violence to the child was evident, these cases were also referred. Twenty-eight children were referred at baseline, and three at endline.

#### ASSESSOR PREPARATION

Accredited ELOM assessors conducted the child assessments. With two exceptions, the same assessors tested the same children at baseline and endline. Prior to the baseline all assessors were equipped with ELOM assessment materials, briefed over the phone, and sent training guidelines. Before endline data collection commenced, nine of the ten assessors attended a one-day fieldwork refresher course in four venues around the country (Bloemfontein, East London, Pretoria, and Cape Town). Assessors were also trained in the capture of Practitioner Interviews using the study's assessment battery, programmed into their tablets. This enabled accurate matching of children and interviews. Assessors were re-trained in measurement of children's height and schooled in the protocol for reducing attrition at endline (see Appendix C). The session on endline planning was included to troubleshoot 'mopping up' and finding children, contacting practitioners before visiting, and how to decide whether a child was no longer enrolled or simply absent from a programme.

#### BASELINE AND ENDLINE DATA COLLECTION

With the exception of LETCEE (SmartStart), the baseline was conducted over four weeks in March 2018 and endline fieldwork was conducted in November 2018. LETCEE (SmartStart) children were assessed prior to the other programmes at both baseline and endline (February and October 2018) so there is no variation between groups in the period between the two points of measurement.

Assessor language was matched with that of the child. The Cotlands sample was split between two provinces, the Western Cape and Mpumalanga, given the smaller number of 4-year-old children at these assessment venues. The Cotlands Macassar (Western Cape) sample target of  $n = 57$  meant that one Afrikaans speaking ELOM assessor was needed. Similarly, one Sepedi speaking assessor worked in Lydenburg (Mpumalanga) on the other half ( $n = 57$ ) of the Cotlands sample. Four Sesotho speaking assessors worked with Lesedi in Mangaung and Ntataise in Viljoenskroon. Two isiZulu speaking assessors worked with TUC in Umlazi and KwaNyuswa and two with LETCEE (SmartStart) in Greytown.

## CHILDREN

Assessors arrived at assessment venues in the early morning in order to set up the testing area. Where possible, a quiet space or room inside the venue would be set up with the ELOM materials; otherwise, assessors would set up outside the building or mobile bus using a gazebo, table and chairs. Between two and five children would be assessed by each assessor per day, depending on how many eligible children were enrolled at each assessment venue.

## PARENTS

At endline, programme staff were requested to alert parents or primary caregivers that they would be required for a brief interview when the child was fetched from the programme. Parents were interviewed by assessors once they had assessed the children.

## PRACTITIONER INTERVIEWS

At endline, assessors interviewed study children's practitioners to capture data on personal and programme indicators likely to predict change in children's ELOM scores at endline (see Appendix E).

## STUDY SAMPLES

### EARLY LEARNING PROGRAMME SAMPLE

The study includes children participating in programmes in four provinces: Western Cape, Mpumalanga, Free State and KwaZulu Natal. Programmes were selected in consultation with Innovation Edge on the basis that they represented common variants of South African models.



Three forms of playgroup models and two centre development models are included and are presented in Table 5 and Table 6.

We used four criteria to determine whether the programmes were evaluable at baseline:

1. Programme goals, objectives, and uncontrolled external influences were specified, and programmes asserted that relevant programme information would be available.
2. Programme goals and objectives were plausible (likely to be realised) and informed by evidence and experience.
3. Relevant administrative data required for the study was stated to be available.
4. Innovation Edge agreed with the study team on how the findings would be used.

As the study unfolded, it became apparent that securing accurate child attendance data was a challenge. With the assistance of study programme staff, we were able to obtain sufficiently reliable attendance data in all cases except LETCEE (SmartStart). Significant challenges were also encountered in obtaining accurate group size numbers. Again, these were eventually resolved through checks with study partners.

Table 5. Key Features of Study Playgroup Programmes.

<b>COTLANDS: PLAYGROUP PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Playgroup model directly managed by Cotland
2. Target age of children	2-4 year olds
3. Sessions per week	Macassar sites: 2 sessions per week of 4 hours each. Lydenburg sites: 3 sessions per week.
4. Total exposure per week	8 hours
5. Intended staff:child ratio	1 practitioner plus an assistant to groups of 15-20 children
6. Practitioner qualifications	Minimum NQF Level 4 ECD Qualification
7. Other staff	Community assistants
8. In-service training and support	Monthly on-site monitoring and bi-annual quality improvement sessions
9. Parent fees	Free service
10. Parent engagement	No formal parent component
11. Nutrition	Breakfast and snack provided
12. Employer	Cotlands
13. Number sites in study	14 sites in 2 localities [Macassar, Western Cape; Lydenburg, Mpumalanga]
14. Other comments:	
<b>LESEDI: PLAYGROUP PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Mobile Playgroup model directly managed by Lesedi (based on Ntataise ECD Enrichment Themed-Linked Programme).
2. Target age of children	3-5 year olds
3. Sessions per week	1 session per week of 2.5 hours
4. Total exposure per week	2.5 hours
5. Intended staff:child ratio	2 Practitioners per group of up to 25 children
6. Practitioner qualifications	Minimum NQF Level 4 ECD Qualification
7. Other staff	No
8. In-service training and support	Weekly feedback meetings with the Playgroup Coordinator; monthly reports on programme delivery and child progress; random quality assurance visits by Playgroup Coordinator and M&E staff
9. Parent fees	Free service
10. Parent engagement	Weekly formal parent component & Home visits to vulnerable parents
11. Nutrition	Nutritious snack
12. Employer	Lesedi
13. Number sites in study	2 sites in 1 locality [Mangaung, Free State]
14. Other comments:	Integrated service provision with referrals to DSD and DoH Parent programme based on Khululeka High Scope model.
<b>LETCEE (SMARTSTART): PLAYGROUP PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Playgroup franchise model designed for scale (minimum critical specification for efficient replication)
2. Target age of children	3 - 4 year olds
3. Sessions per week	2 sessions per week of 3 hours
4. Total exposure per week	6 hours
5. Intended staff:child ratio	1 SmartStarter to groups of 5 to 12 children
6. Practitioner qualifications	Minimum: SmartStart 5-day training and accreditation if rated 'green'; Some have NQF Level 4 ECD Qualification
7. Other staff	Community members may assist.
8. In-service training and support	Franchisors are supported by the National SmartStart Hub and manage Club Coaches who oversee the support and monitoring of Franchisees
9. Parent fees	Free service
10. Parent engagement	Parent information component & home visits to parents who do not attend parenting sessions and to vulnerable families
11. Nutrition	Fortified porridge

12. Employer	Franchisees linked to Franchisors. Most franchisees earn stipends
13. Number sites in study	17 sites in 1 locality [Greytown, KwaZulu Natal]
14. Other comments:	Franchisees provided with programme resources (toy kits, books and other resources)

*Table 6. Key Features of Study Centre-Development Programmes.*

<b>NTATAISE: CENTRE-DEVELOPMENT PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Centre development programme for practitioners in independent ECD sites; no direct intervention with children.
2. Programme Target	Practitioners of Pre-Grade R children (4-5 years)
3. Child sessions per week	5 sessions per week of 4.5 hours (Ntataise programmes are full day but the learning programme is offered in the mornings – the hours indicated are morning only)
4. Child total exposure per week	22.5 hours
5. Intended staff:child ratio	Depends on the site
6. Practitioner qualifications	Depends on the site
7. Other staff	Depends on the site
8. Ntataise Programme inputs	Ten monthly theme-based workshops for practitioners, coupled with ten on-site visits by an experienced trainer.
9. Parent fees	Variable. Depends on the site
10. Parent engagement	Variable: depends on the individual ECD centres. Not provided by Ntataise
11. Nutrition	Variable, provided by the individual ECD centres
12. Employer	Staff employed by the ECD centres, not by Ntataise
13. Number sites in study	13 sites in 2 localities [Viljoenskroon, Free State; Bothaville, Free State]
14. Other comments:	Centres may receive a subsidy of R15 per day per child from DSD
<b>THE UNLIMITED CHILD: CENTRE-DEVELOPMENT PROGRAMME TYPE AND CHARACTERISTICS</b>	
1. Delivery model	Centre development programme for practitioners in independent ECD sites; no direct intervention with children.
2. Programme Target	Practitioners of Pre-Grade R children (4-5 years)
3. Child sessions per week	5 sessions per week of 3-4.5 hours (TUC also has an aftercare programme for certain children - the hours indicated are morning only)
4. Child total exposure per week	15 – 22.5 hours
5. Intended staff:child ratio	Depends on the site
6. Practitioner qualifications	Depends on the site
7. Other staff	Depends on the site
8. In-service training and support	Initial 5-day training followed by ongoing support facilitated by a team of trained ECD specialists random quality assurance visits by qualified ECD practitioners; TUC provides each centre with an educational resource kit and practitioner guide
9. Parent fees	Variable. Depends on the site
10. Parent engagement	Variable: depends on the individual ECD centres. Not provided by TUC
11. Nutrition	Variable, provided by the individual ECD centres
12. Employer	Staff employed by their ECD centres, not by TUC
13. Number sites in study	17 sites in 2 localities [Ethekwini District - Umlazi and KwaNyuswa - KwaZulu Natal]
14. Other comments:	Centres may receive a subsidy of R15 per day per child from DSD

We ensured that only programmes rated by the organisations as maintaining a certain standard were included. SmartStarter franchisees rated Green, and TUC centres rated Level 1 or Level 2 are included in the study. Cotlands practitioners are qualified ECD practitioners and the organisation has an internal monitoring system that tracks and scores how effectively the programme is implemented. When considering the findings, it should be borne in mind that these apply to sites operating at a satisfactory standard and not to all sites where the different programmes might be operating.

Practitioner Quality Assurance ratings (PQAs) could not be included in modelling predictors of ELOM outcomes as each programme used their own specific system and the metrics are not comparable.

However, for descriptive purposes, we could use each practitioner's score on their programme's PQA system to assess their competence from the programme's perspective. We used the average of each programme's practitioner ratings on their PQA items for this purpose (per cent achieved out of total possible marks).

We find that, on average, study practitioners and their sites scored as follows: Cotlands 67%; Lesedi 78%; LETCEE(SmartStart) 87%; Ntataise 63%; and TUC, 94%. Some practitioners are higher functioning than others. All are regarded by their programmes as being in the upper range of their programme's PQA system.

#### CHILD SAMPLE

All organisations included in the study have significant geographic spread and random selection of programme sites across the country was not feasible, given the size of the research grant. The approach taken was to:

- a. conveniently sample *clusters* of geographically proximal programme sites;
- b. randomly select sites within these clusters; and
- c. as far as possible, randomly select children for participation in each site.

Where there were few children of the required age in programme sites, all age-eligible children were assessed in order to reach sample targets. As Cotlands only had six sites in Macassar and Nomzamo/Lwandle Strand it was decided that all six be included (thereby precluding random site selection). Cotlands sites in Lydenburg, Mpumalanga were added in order to reach the Cotlands child target, as there were insufficient children of the required age in the Western Cape.

In sum, children aged between 47 and 71 months (two months younger at baseline and older by endline than the standardisation sample) were randomly selected in each programme site. An exception was Cotlands, where all age-eligible children were recruited to realise the sample required. It is evident that the study includes both elements of randomisation and convenience sampling as a consequence of practical challenges in the field. The approach is presented in Table 7.

Table 7. Sampling Approach.

SELECTION LEVEL	PROGRAMME				
	Ntataise Centre-Development	Cotlands Playgroups	The Unlimited Child Centre-Development	Lesedi Mobile Playgroups	LETCEE (SmartStart) Playgroups
Site Level	<i>Convenience Sample</i> <u>Cluster a)</u> : All 6 ECD Centres in Viljoenskroon serving 120 age appropriate children <u>Cluster b)</u> : All 6 ECD Centres in Bothaville serving 119 age appropriate children	<i>Convenience Sample</i> <u>Cluster a)</u> : All 6 Afrikaans sites in Macassar serving 53 age appropriate children. <u>Cluster b)</u> : All Lydenburg sites serving 70 age appropriate children	<i>Convenience Sample</i> <u>Cluster a)</u> : Umlazi: All 31 Level 2 Centres (no Level 1 centres) <u>Cluster b)</u> : KwaNyuswa: All 5 Level 1 Centres; 10 Level 2 Centres	<i>Convenience Sample</i> <u>Cluster a) Bus 1)</u> : All 5 Sites <u>Cluster b) Bus 2)</u> : All 5 Sites All Bloemfontein townships and settlements.	<i>Convenience Sample</i> LETCEE(SmartStart) evaluation sites
Child Level	<i>Random Sample</i> Target: 8 age eligible children in each classroom.	<i>Convenience Sample of all age eligible children</i> <u>Cluster a)</u> Macassar: Target: 53 Afrikaans. <u>Cluster b)</u> Lydenburg: Target: 60-70 Sepedi	<i>Random Sample</i> KwaNyuswa: Target: 60 children in Level 1 practitioner classrooms (every 3 <sup>rd</sup> child). Umlazi: Target: 60 children in Level 2 practitioner classrooms (every 3 <sup>rd</sup> child)	<i>Random Sample</i> Target: 12 children in each bus site. Where not possible, enrol as many age-eligible as possible.	<i>Random Sample</i> Target: 76 children from the SmartStart Evaluation Study

## FINAL CHILD SAMPLE AT ENDLINE

As reported in Table 8, valid ELOM data on 369 children at both baseline and endline was available for analysis.

Seven children were removed from the sample during data cleaning. Criteria employed were:

- the child failed the disability screen;
- assessment discontinued;
- child had a Total ELOM score <15 and a Task Orientation score = 0;
- the child fell outside the study age range;
- the child was not assessed in their home language; and
- the assessment was compromised due to assessor error.

Table 8. Child Sample (after cleaning).

Programme	Child Sample Target	Child Baseline Realised	Lost to Follow-Up	Child Attrition (Baseline – Endline) %	Removed from Sample	Child Endline Realised
<b><i>CENTRE DEVELOPMENT</i></b>	226	242	46	19%	1	195
TUC	113	102	12	12%	0	90
Ntataise Enrichment	113	140	34	24%	1	105
<b><i>PLAYGROUPS</i></b>	339	240	60	25%	6	174
LETCEE (SmartStart)	113	76	12	16%	2	62
LESEDI	113	74	32	43%	0	42
Cotlands	113	90	16	18%	4	70
<b><i>TOTALS</i></b>	565	482	106	22%	7	369

As reported in Table 8, valid ELOM data on 369 children was available for analysis. Attrition was 22% at endline; a further seven children were removed from the sample during data cleaning. Of those children who were not available for assessment at endline, 91% had dropped out of their programmes and 9% were still enrolled but absent on the day of assessment. Playgroups experienced higher attrition than centres (25% and 19% respectively). Primary reasons for children leaving playgroup programmes were family re-location and placement of children in

centre-based programmes. In the case of Lesedi<sup>17</sup> families of 16 children were re-settled in other areas or had returned to Lesotho and were not available at endline. In the case of the centre-development programmes (24% of Ntataise children dropped out), relocation and unaffordability of fees were primary reasons, suggesting that attrition was not random.

To check for bias in the remaining sample, we compared children who had dropped out with those who had been retained using baseline data. Bivariate correlation was conducted to determine whether there was a relationship between ELOM performance at baseline and whether the child was available for testing at endline. We included age here to determine whether age was related to availability for testing at endline. We found no relationship between either variable. This suggests that there was no systematic attrition based on the baseline performance of the child, or the age of the child. Reasons for leaving noted above suggest that attrition was not random and was instead driven by migration and programme fees (at centre-development programmes).

The final sample size at endline enables detection of an effect of 0.20 with a power of 0.88, and an effect of 0.23 with a power of 0.95. Both are sufficient for the complexity of the statistical model, where we are interested in testing only a single interaction with a 2x4 structure (ELOM Assessment(time)<sup>18</sup>\*programme<sup>19</sup>), while controlling for the hierarchy present<sup>20</sup> in the data.

In terms of the power of our analyses, this sample size enables us to detect an effect of 0.20 with a power of 0.88, and an effect of 0.226 with a power of 0.95. Both of these are sufficient for the complexity of our model, where we are interested in testing only a single interaction with a 2x4 structure (ELOM Assessment(time)\*programme), while controlling for the hierarchy present in the data.

The table below presents our check for assessor bias. Although there are differences in the average scores awarded by assessors, their method of scoring is consistent in terms of the

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<sup>17</sup> Information provided by Lesedi.

<sup>18</sup> ELOM standard scores at baseline and endline.

<sup>19</sup> The five programmes being compared.

<sup>20</sup> Multi-level modelling takes into account predictors of change in ELOM from baseline to endline: the programme attended by the child (e.g. Ntataise) is the highest level of the hierarchy; predictors nested within each programme and below that level include a) characteristics of the child's practitioner and group, and b) child factors.

standard deviation (SD; the spread of scores), and the relative distance of their scores from baseline to endline.

Table 9. Assessor Means and Standard Deviations for Baseline and Endline Assessments.

		<i>BASELINE</i>		<i>ENDLINE</i>	
		<b>Average Total Score</b>	<b>Standard Deviation Total Score</b>	<b>Average Total Score</b>	<b>Standard Deviation Total Score</b>
<b>TUC</b>	Assessor 1	39.18	14.19	59.83	12.86
	Assessor 2	33.04	13.11	51.66	14.08
<b>LETCEE(SmartStart )</b>	Assessor 1	29.12	11.67	46.78	11.84
	Assessor 2	35.53	11.68	45.3	12.06
<b>Ntataise</b>	Assessor 3	51.77	11.25	66.83	9.96
	Assessor 4	44.04	13.16	56.85	12.9
	Assessor 5	62.81	12.97	74.61	13.78
<b>Lesedi</b>	Assessor 6	38.58	10.54	48.77	13.95
	Assessor 7	43.28	16.66	53.94	17.46
<b>Cotlands</b>	Assessor 8	27.23	12.63	43.73	14.68
	Assessor 9	32.64	9.06	54.37	8.35
	Assessor 10	37.91	11.05	62.75	9.44

#### CHILD SAMPLE CHARACTERISTICS

The final sample with both baseline and endline ELOM data is comprised of 369 children.

Table 10. Number of Sample Children per Programme.

	<b>Cotlands</b>	<b>Lesedi</b>	<b>LETCEE (SmartStart)</b>	<b>Ntataise</b>	<b>TUC</b>
<b>n (%)</b>	70 (19%)	42 (11%)	62 (17%)	105 (29%)	90 (24%)



Table 11. Average Age and Variation in Age per Programme Sample at Baseline (Base) and Endline (End)\*.

	COTLANDS		LESEDI		NTATAISE		TUC		LETCEE (SmartStart)	
	Base	End	Base	End	Base	End	Base	End	Base	End
<i>n</i>	90	70	74	43	140	105	102	90	76	62
<b>Average Age in Months (SD)</b>	54.4 (3.5)	62.2 (3.5)	55.9 (4.7)	64.4 (4.5)	56.2 (3.6)	64.1 (3.8)	53.2 (3.4)	60.7 (3.5)	52 (2.9)	59.6 (3)
<b>Age Range in Months</b>	47 - 62	55 - 70	48 - 65	57 - 73	49 - 65	57 - 74	48 - 61	55 - 69	48 - 60	55 - 68

\*Note: because of the extended age range at baseline, 15 children were between the ages of 70 and 74 months at endline.

We found that, in all the programmes, children may have been enrolled for one or more years. Table 12 displays this data based on children assessed on ELOM at both baseline and endline and used in our analyses. At Cotlands, Lesedi, and TUC, the majority of children were in their first year. However, children attending the LETCEE (SmartStart) and Ntataise programmes were mostly in their second and third years. Attendance data for each year enrolled was not available. Variations in enrolment years are taken into account in the analysis of programme effects that follow.

Table 12. Years of Enrolment by Programme.

Programme Year	COTLANDS		LESEDI		LETCEE (SmartStart)		NTATAISE		TUC		Total <i>n</i>	Total %
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
1st year in the programme	36	51	32	77	1	2	12	11	52	58	133	36
2nd year in programme	13	19	2	5	13	21	43	41	19	21	90	24
3rd year in programme	21	30	8	19	45 <sup>21</sup>	73	50	48	17	19	141	38
Unsure	0	0	0	0	3	5	0	0	2	2	5	1
<i>Total</i>	70	100	42	100	62	100	105	100	90	100	369	36

<sup>21</sup> Note that SmartStart commenced their franchise with LETCEE in October 2016. Therefore these children were only subject to SmartStart programming for 2 years (2017 and 2018) (information provided by SmartStart).

## USING PROGRAMME SITE QUINTILE RANKINGS TO CATEGORISE CHILDREN'S SOCIOECONOMIC BACKGROUND

In this study, children's programme sites are assigned quintile rankings so as to have an indication of the child's socio-economic background. This enables us to compare the child's performance on the ELOM with children from a similar background using the Quintile 1 - Quintile 5 reference groups. When the ELOM was developed, the children assessed were in Grade R. The Quintile assigned to the school by the DBE was used as a proxy for the socio-economic status (SES) of each child as we did not have the resources to measure the SES of each child's household. The quintiles used by the DBE are based on the demographics of the school catchment area. When children are not yet in the school system, as is the case in this study, and when household data is not available, estimating the SES of their children using the quintiles is a challenge. As the children the school might serve may include a range of economic backgrounds and areas, a school quintile may not be a sound proxy for the SES of the children who attend.

For this reason, at endline, a different approach was used, drawing on the work of SASPRI ([www.SASPRI.org.za](http://www.SASPRI.org.za)) conducted for this project, and using smaller areas called *datazones* to define the characteristics of the areas within which programme sites for this study were located. Datazones are a statistical geography. They nest within municipality boundaries and have a mean population of around 2,000, with most having populations between 1,000 and 3,000. They enable small area population description (Wright, Barnes, Noble & Dawes, 2009).

SASPRI was provided with the coordinates of each programme site. A radius of 1 km was drawn around the site and the characteristics of the population in each datazone covered by the radius were determined. Each site was then accorded a quintile rank based on the average rank of the datazones covered by the 1km radius (all datazones in South Africa have been '*quintised*' - ranked from 1 to 5 in the same manner as schools).

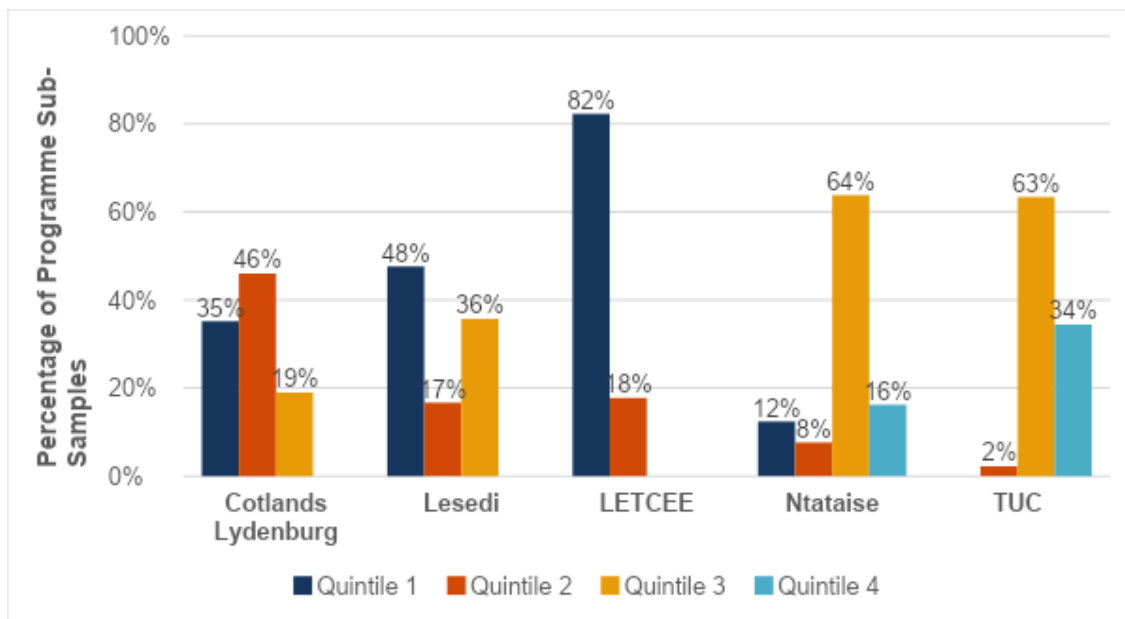
SASPRI datazones were used for all sites, except for Lesedi and two Ntataise sites, where school quintiles collected at baseline were used<sup>22</sup>. The majority of the entire sample ( $n = 146$ ; 40%) were classified as Quintile 3. However, the majority of the Lesedi and LETCEE (SmartStart) sub-

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<sup>22</sup> School quintiles were used for Lesedi as the buses move around the community and the closest school is a more stable measure. GPS coordinates could not be established for two Ntataise sites, which precluded the use of SASPRI datazones.

samples were classified as Quintile 1. The Cotlands sub-sample was split into the two study regions for this purpose (Macassar and Lydenburg), as each region had a different spread of quintile classifications. Figure 8 displays the spread of quintile classifications across programmes.

Figure 8. Proportions of Quintile Classifications per Programme Sample.



The Cotlands Macassar sample operates from the Cotlands office, which is in a Quintile 4 area. This does not reflect the economic background of the children, which is better represented by the fact that 97 % of their children are Child Support Grant beneficiaries (see Figure 11 below). The Macassar site is therefore excluded from Figure 8.

The sample was split evenly according to gender, with 49.6% of the sample being male and 50.4% of the sample being female. Figure 9 displays the gender split per programme sample.

Figure 9. Gender Composition of Each Programme

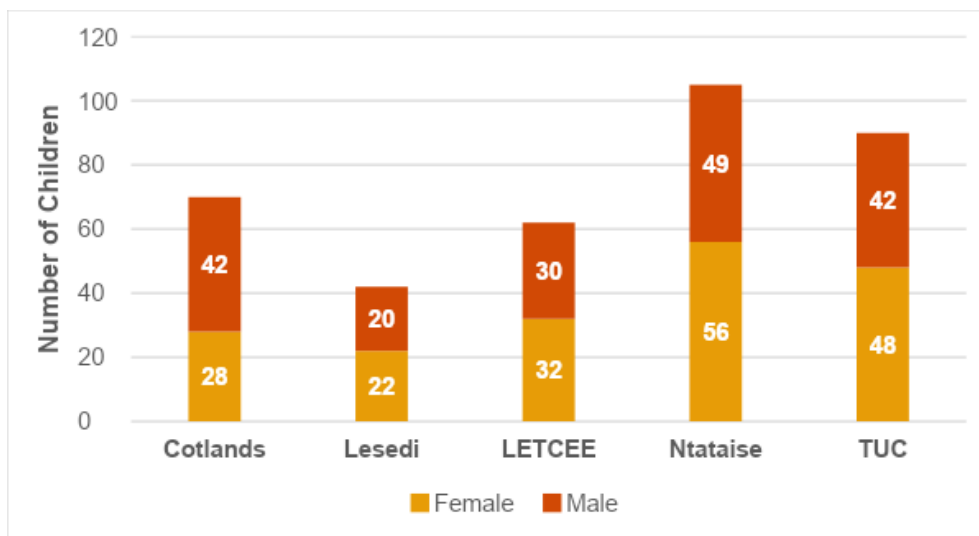


Figure 10. Number and Percentage of Children's Languages of Assessment at Endline.

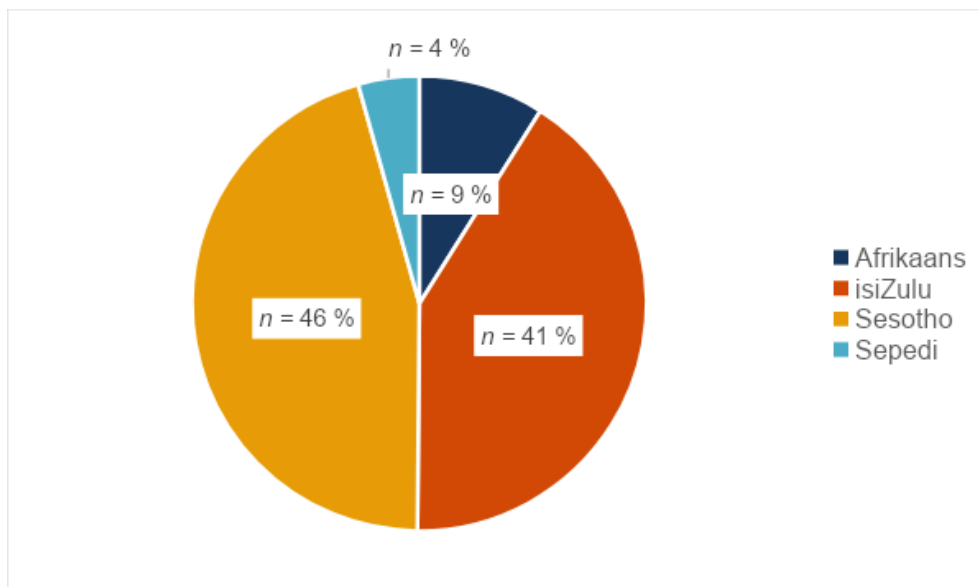


Figure 11 depicts the proportions of children in each programme who receive the Child Support Grant (CSG). This data was obtained from the programme practitioners – not the child’s primary caregiver – consequently, some practitioners ( $n = 20$ ; 18 %) were unsure whether the child has access to the CSG or not. A number of children in Lesedi are from Lesotho. It is probable that the 39 % of children not in receipt of the CSG are not eligible. Foreign nationals in other programmes may also account for lower proportions – particularly TUC. That said, the majority of the sample, across all programmes, has access to the CSG.

Figure 11. Proportions of children accessing the CSG by Programme.

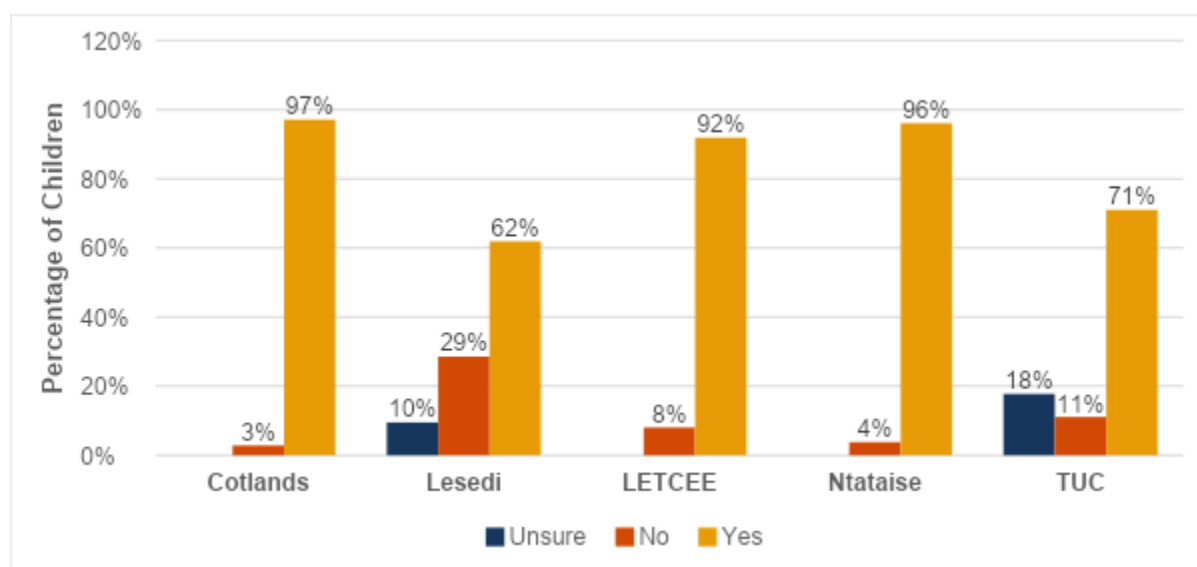


Table 13 presents the average number of sessions attended by children in each programme from the beginning of the programme year to its closing. Note that, as explained in the programme description section, programmes offer different numbers of sessions per week: Lesedi offers one session, Cotlands and LETCEE (SmartStart) offer two, while the ECD centres with which Ntataise and TUC work all offer five. LETCEE (SmartStart) attendance data is not included as the programme was not able to provide reliable data.

Table 13. Average Number of Sessions Attended by Sample per Programme.

	Cotlands	Lesedi	Ntataise	TUC
<b>Average Number of Programme Sessions</b>	51	31	107	150
<b>Range (Min – Max)</b>	18 – 98	15 – 35	55 – 129	98 – 177

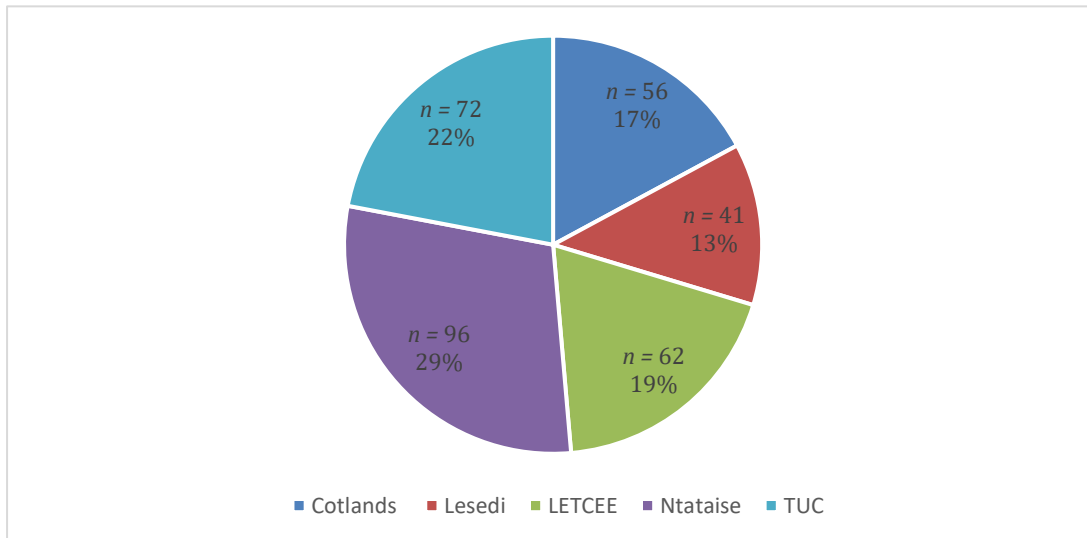
{Note: Cotlands Lydenburg sites which offer 3 sessions per week instead of two (Macassar) account for the upper end of their range}.

## CAREGIVER SAMPLE

At endline we sought to recruit as many parents or primary caregivers of children assessed at both baseline and endline as possible. Programme staff were requested to alert parents that they would be required for a short interview when the children were fetched from the programme site. The caregiver sample is presented in Figure 12 below. Valid home learning environment data on 327 caregivers was available for analysis, 89 % of the final child sample. Their average age was 36 years old, with the youngest being 16 years old, and the oldest 88 years old (note that date of

birth data was missing for 5 caregivers). Figure 12 displays the number of caregivers included from each programme.

Figure 12. Caregiver Sample per Programme.

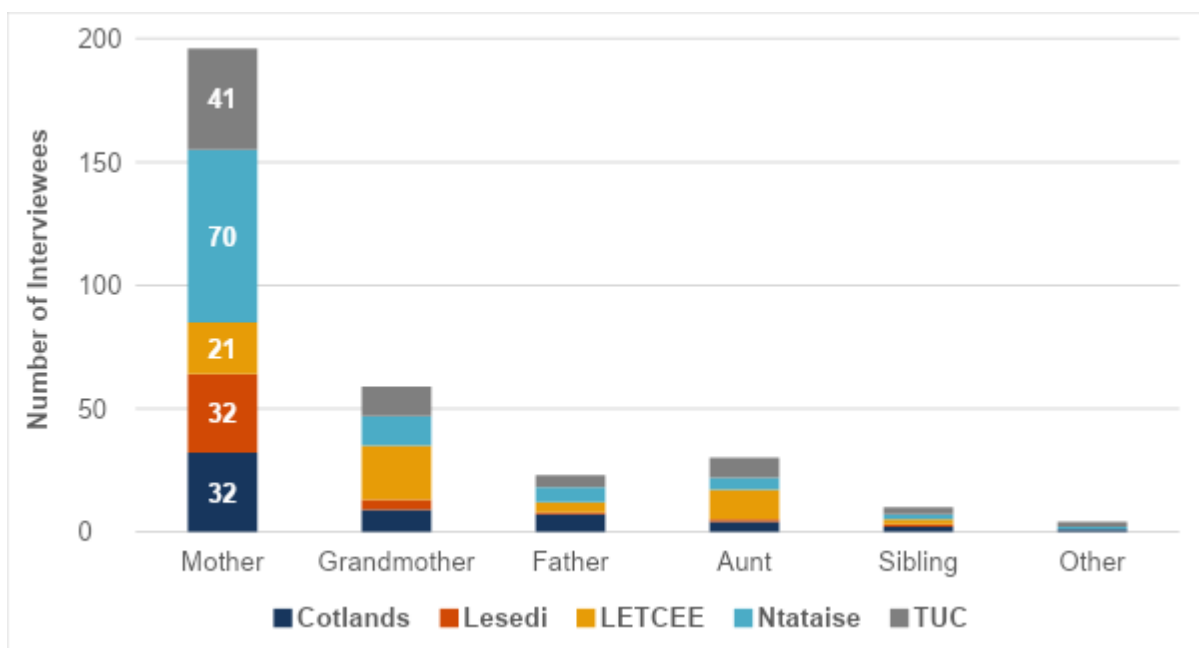


#### CAREGIVER INTERVIEWEE SAMPLE CHARACTERISTICS

The majority of the caregivers that were interviewed were mothers of the children ( $n = 196$ ; 60%).

Figure 13 displays the frequencies of each type of interviewee in the caregiver sample.

Figure 13. Interviewee's Relationship to Study Children.



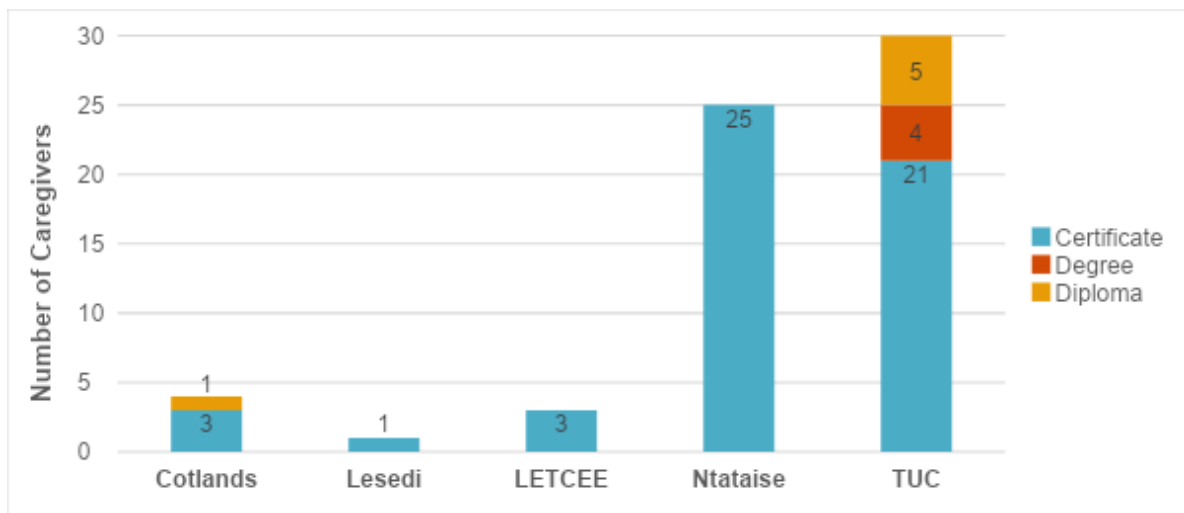
The average number of children looked after by the caregivers is three, with the least being one child and the most being fifteen. Thirty-four per cent of parents have matriculated; this was the most commonly reported level of education, while a small number have never been to school ( $n = 4$ ; 1%). On average, the highest school grade passed by the caregivers was Grade 9. Table 14 displays the average school grade of the caregivers per programme.

Table 14. Average Caregiver Education per Programme.

	<b>Cotlands</b>	<b>Lesedi</b>	<b>LETCEE</b>	<b>Ntataise</b>	<b>TUC</b>
<b>Average School Grade</b>	Grade 8	Grade 8	Grade 8	Grade 10	Grade 11

With regard to tertiary education, 81% of caregivers have no degree, diploma or certificate. Figure 14 breaks down the 19% of caregivers who have tertiary education, according to programme.

Figure 14. Number of Caregivers with Tertiary Education per Programme.



#### PRACTITIONER AND GROUP CHARACTERISTICS

Data was collected from seventy-one practitioners of study children. The average practitioner age was 39 years old as displayed in Table 15.

Table 15. Average Practitioner Age per Programme.

	Cotlands	Lesedi	LETCEE (SmartStart)	Ntataise	TUC
<b><i>n</i></b>	13	2	17	23	16
<b>Average Practitioner Age</b>	30	39	40	44	40
<b>Range (Min – Max)</b>	21 – 44	29 – 49	27 – 54	28 – 57	22 – 60

Table 16. Practitioners' Years of Experience per Programme.

	Cotlands	Lesedi	LETCEE (SmartStart)	Ntataise	TUC
<b>Average Years of ECD Experience</b>	5.1	10	6.6	12	8
<b>Range (Min – Max)</b>	1 – 18	9 – 11	0.08 – 13	3 – 34	0.6 – 20

As can be seen in Table 15 and Table 16, Ntataise practitioners, on average, are the oldest and have the greatest number of years of experience in ECD. Older practitioners have the greatest frequency ( $n = 9$ ) of the NQF Level 5 qualification (75 % of all practitioners with this qualification are from Ntataise). Most Cotlands and TUC practitioners have an NQF Level 4 ( $n = 7$ ; 54 % and  $n = 8$ ; 50 % respectively), as do both pairs of Lesedi practitioners. In the case of LETCEE (SmartStart) 29 % ( $n = 5$ ) reported having a Level 4 qualification.

Table 17 shows the average child-to-practitioner ratio and Table 18 displays the average number of children per group (group size) in each programme. These vary similarly across the different programmes. As is appropriate, the playgroup models have smaller groups than the centre development programmes, with LETCEE (SmartStart) has the smallest group size on average. Cotlands and LETCEE (SmartStart) have the lowest child/practitioner ratios of 11 children to one practitioner respectively.

Table 17. Average Child/Practitioner Ratio per Programme.

	Cotlands	Lesedi	LETCEE (SmartStart)	Ntataise	TUC
<b>Average Number of Children per Practitioner</b>	11:1	15:1	11:1	22:1	30:1
<b>Number of Children per Practitioner Range</b>	9 – 12	7 – 21	6 – 14	5 – 36	15 – 47



Table 18. Average Number of Children in each Group per Programme.

	Cotlands	Lesedi	LETCEE (SmartStart)	Ntataise	TUC
<b>Average Number of Children in each Group</b>	23	29	11	22	34
<b>Number of Children in each Group Range</b>	17 – 24	13 – 42	6 – 15	5 – 36	21 – 47

## MEASURES

### CHILDREN

#### THE EARLY LEARNING OUTCOMES MEASURE (ELOM)

The ELOM is a population-level instrument designed to measure the developmental status of children aged 50 to 69 months (Snelling, Dawes, Biersteker, Girdwood & Tredoux, 2019). Children are individually assessed by trained assessors in their home language in a session lasting about 45 minutes. Scores are captured on a tablet and uploaded to a server for capture and analysis. ELOM consists of 23 direct assessment items clustered in five domains: Gross Motor Development; Fine Motor Development and Visual Motor Integration; Emergent Numeracy and Mathematics; Cognition and Executive Functioning; and Emergent Literacy and Language. During standardisation, psychometry based on Item Response Theory was conducted on a sample of 1,331 children from five language groups and representative of five socio-economic strata. The ELOM is a reliable, age valid tool that provides a fair assessment of children from across ethnolinguistic groups. Children’s expected performance is specified in Early Learning Development Standards (ELDS). These are available for ELOM total scores and for each domain. Full details may be found at: <http://elom.org.za>.

#### ELOM DIRECT ASSESSMENT PROCESS

Ten experienced ELOM assessors, trained by the ELOM team experienced in administering the ELOM, conducted the baseline and endline assessments. Assessors did not assess children who were participating in programmes run by their organisations.

## CAREGIVERS

### HOME LEARNING ENVIRONMENT (HLE) MEASURE

Questions for the child's primary caregiver included biographic information and a set of questions to measure the stimulation received by the child at home. These questions were drawn from the UNICEF MICS4 and the Home Learning Environment (HLE) instrument (Melhuish et al., 2008) (see Appendix D). The HLE measure was administered by ELOM assessors in the parents' home language. Data was entered on a tablet as an interview. HLE items used in this analysis include:

1. Caregiver age;
2. Caregiver education;
3. Time available for activities with the child;
4. Activities completed with the child; and
5. Resources in the home (books and toys).

### PROGRAMME VARIABLES LIKELY TO INFLUENCE CHANGE IN ELOM SCORES

This study was not able to undertake a close scrutiny of daily programme quality through observation. However, it was possible to measure a few key indicators of quality through interviews with all practitioners of participating sites at endline. Data was collected on tablets using a structured interview schedule presented in Appendix E.

The following variables on which all programmes were measured could be used to provide assessment of programme quality. They were included in modelling and programme specific regressions:

1. Practitioner qualifications
2. Practitioner/child ratio
3. Practitioner satisfaction with resources (space and equipment)
4. Practitioner satisfaction with support
5. Practitioner rating of supervision

In addition, each programme was requested to provide their quality ratings for each site of participating children. It was not possible to include these in modelling as their indicators and scoring procedures varied. Each programme rated different quality domains (e.g. resources, interactions with children, the learning space) making it impossible to compare a universal set of quality domains across programmes. See Appendix F for a summary of this quality data per programme.

## DATA CAPTURE

To ensure consistent procedures and reduce the probability of measurement error, all ELOM data from children, caregiver and practitioner interviews was collected on tablets and submitted to a secure online database via the internet. All procedures were conducted in the respondent's home language.

## DATA CLEANING

Once baseline data collection was completed and the ELOM assessors had submitted all child assessment data, the data was consolidated per programme and cleaned. A set of seven criteria was used in order to determine whether a case was problematic and needed to be removed. These are listed in Table 19 below, along with the number of cases that were removed per criterion. A total of 101 ELOM assessments were removed from the sample used for this analysis at baseline, and 36 were removed at endline.

Table 19. Criteria for Data Removal.

Criterion	Number of Cases Removed (Baseline)	Number of Cases Removed (Endline)
1. The child failed the WHO disability screening.	29	3
2. The child refused to participate after the assessment had already begun.	3	0
3. The assessment was judged invalid if the child had a Total ELOM score < 15 and a Task Orientation score of 4.	6	0
4. The child was assessed but was not of appropriate age.	46	0
5. The child was assessed in a language that was not their home language.	1	0
6. Duplicate data or trial data was submitted.	9	27
7. The child scored 0 for 2 or more domains.*	7	0
8. The child's name could not be reliably attributed to their assessment.	0	6
<b>Total cases removed</b>	<b>101</b>	<b>36</b>

\*This is in line with the parameters used while developing the ELOM. Children who get a 0 score for 2 or more domains cannot be said to have engaged with the measure sufficiently for it to represent their ability level.

A validation process was completed on children failing the adapted World Health Organisation (WHO) Disability Screen at both times of assessment. Children who were failed on the WHO screening solely for Item 3 (“when you told this child to do something, did he/she seem to have difficulty understanding what you are saying?”) were reviewed, as this is the most subjective item, and may therefore be interpreted differently by different ELOM assessors. If these children scored above 20 on the ELOM Total Score, did not get zero for any of the domains, and scored above four for Task Orientation, they were put back into the dataset for analysis. Two assessments met these criteria and were returned to the dataset.

## FINDINGS

### HOME LEARNING OPPORTUNITY: DESCRIPTIVE FINDINGS

Caregivers were asked to estimate the amount of time that they have to spend with their children during the week (across all days) and the weekend (across both days): *very little time* (less than an hour), *some time* (about 2 hours), and *lots of time* (more than 2 hours). Figure 15 and Figure 16 display the percentage of caregivers who have less than an hour, about two hours, and more than two hours during the week and weekend, respectively.

Available time will depend on a range of factors including employment and other family responsibilities. Caregiver motivation to spend time with children is also likely to be a factor. This study does not explore these important aspects of caregiver time use. However, the findings presented here do indicate the limited time parents have available for activities with their children both during the week and on the weekend.

On average across programmes, 72 % of caregivers say they spend *2 hours or less* during *the week* in activities with their children. Regarding weekends 71 % say they *have 2 hours* or less available (LETCEE and TUC caregivers have particularly low time available). This would likely affect the extent to which they would be able to carry out what they have learnt through parent information sessions that might accompany an early learning programme.

Figure 15. Caregivers' Time for Children During the Week.

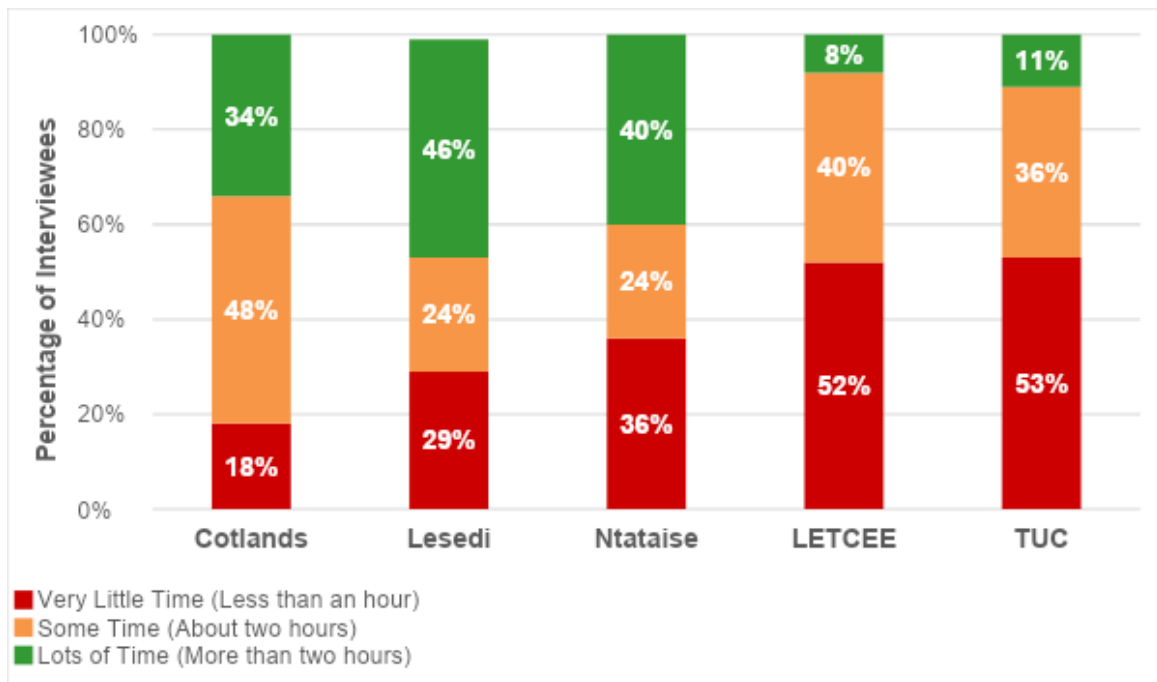
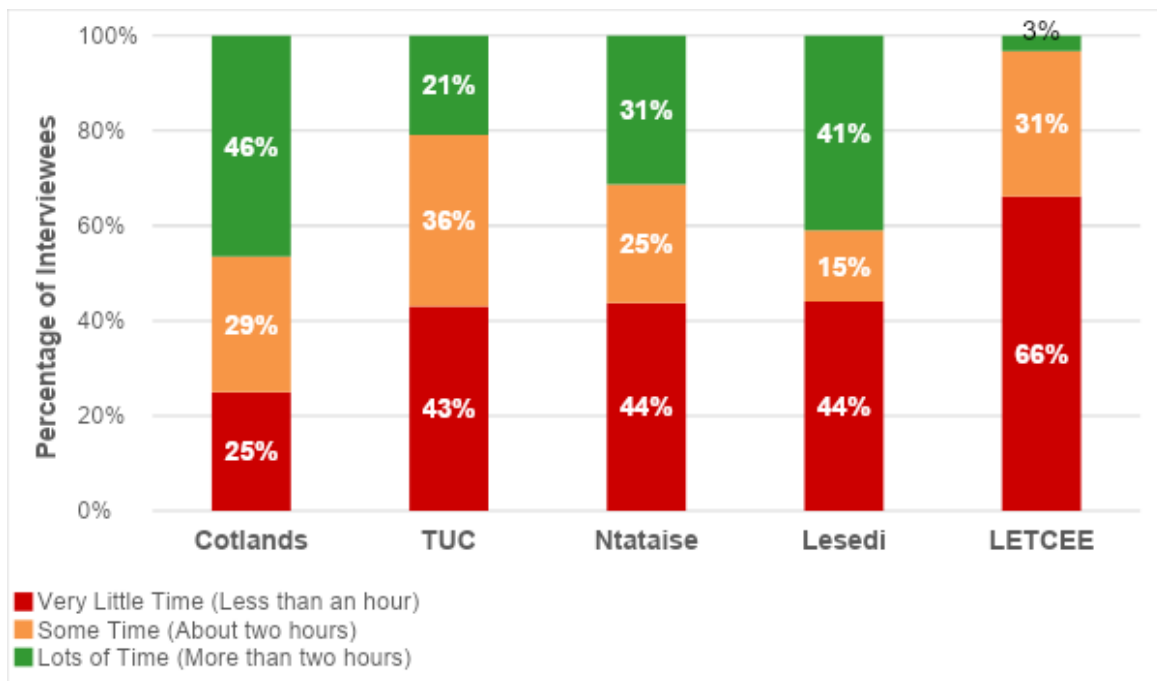


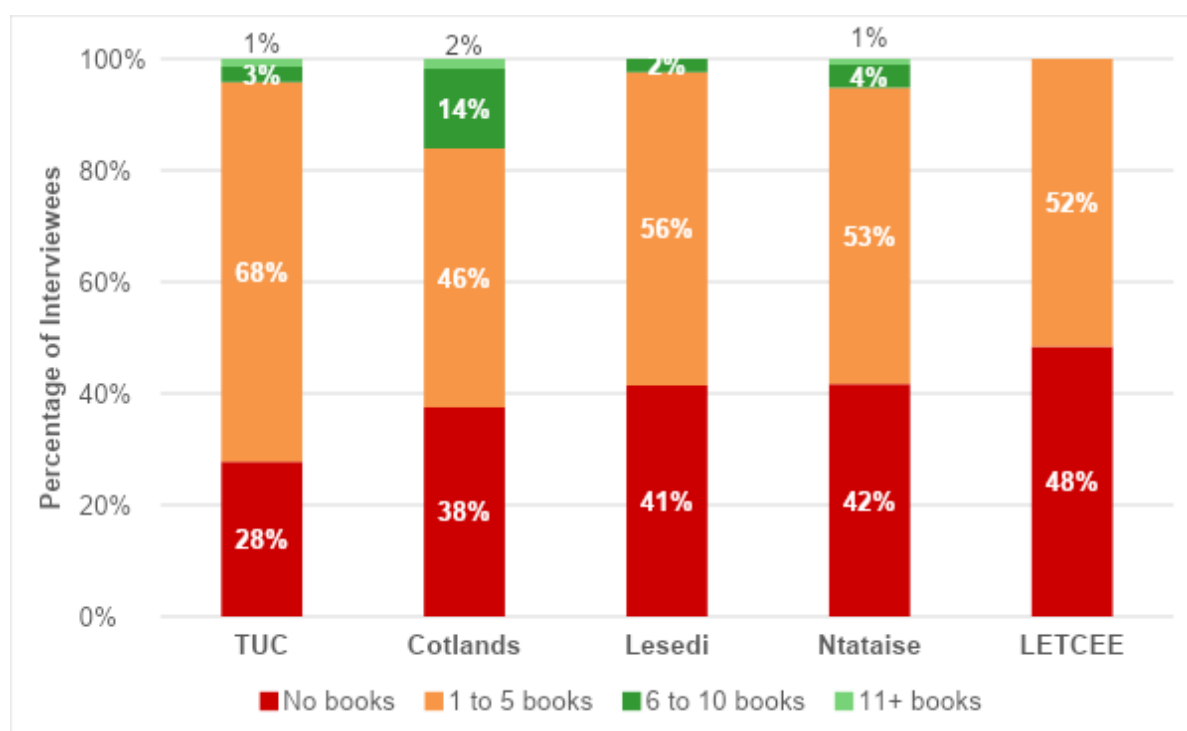
Figure 16. Caregivers' Time for Children During the Weekend.



## OPPORTUNITIES TO LEARN IN THE HOME: RESOURCES

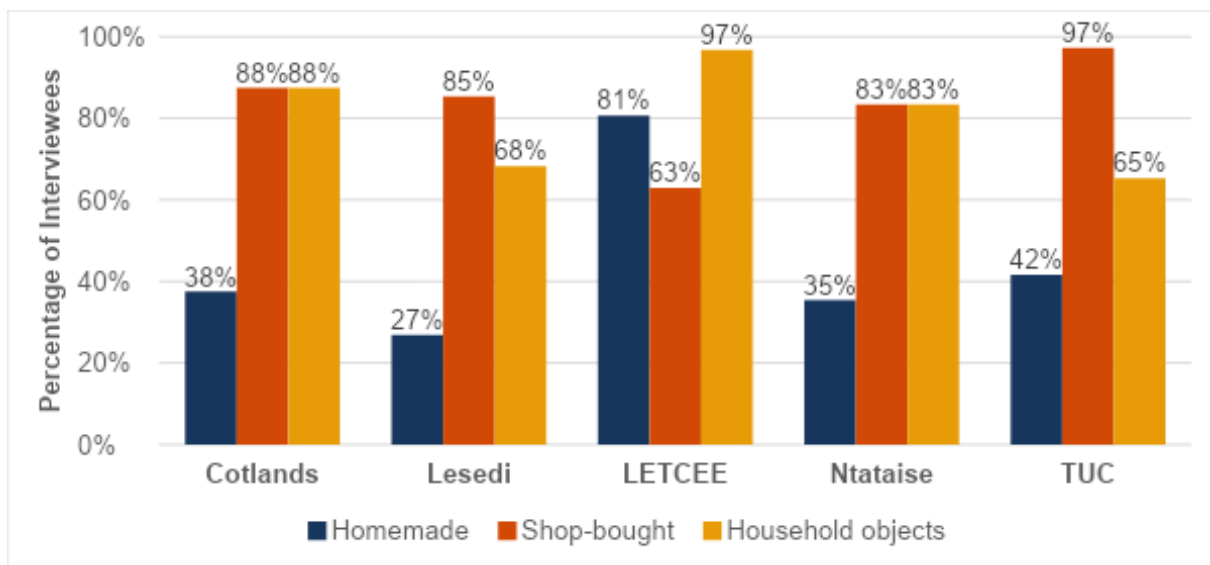
Regarding early learning resources in the home, we were not able to observe the situation in children's homes, so the findings cannot be regarded as objective. Based on interviews, the majority of all caregivers (55 %) say they have between one and five children's books or picture books in their home, while 39.5 % of all caregivers say they have none. Figure 17 breaks this down by programme, showing TUC households to have the largest number of books.

Figure 17. Number of Books in Caregivers' Homes per Programme.



In addition to books in the home, caregivers were asked whether their children had access to three types of toys: homemade, shop-bought, or household objects that can be used as toys (e.g. sticks and pans). Figure 18 displays the percentage of caregivers who reported having these types of toys in their homes.

Figure 18. Availability of Toys in Caregivers' Homes.



While all have some homemade toys, LETCEE (SmartStart) stands out as having the highest proportion of these and the lowest proportion of bought toys. This may be a function of their poorer economic circumstances and also encouragement by LETCEE (SmartStart) to make toys for their children.

#### OPPORTUNITIES TO LEARN IN THE HOME: ACTIVITIES WITH STUDY CHILDREN

In order to investigate the types of learning activities the study children are generally exposed to, caregivers were asked whether they, or other household members, engaged in particular activities with their children in the past week, including:

- Reading books or looking at picture books
- Telling stories
- Singing songs or lullabies
- Taking the child outside of the home, compound, yard or enclosure
- Playing
- Telling the child the names of things
- Counting things
- Drawing or painting

Table 20 below presents the percentage of respondents who said the child's mother, sibling or no one engaged in these activities with the study child during the week prior to the interview. While mothers do participate in activities, siblings clearly also play an important role as well.

Table 20. Percentage of respondents who chose 'No one', 'Mother', and 'Sibling' per Activity.

	Reading Books	Telling Stories	Singing Songs	Going Outside	Playing	Telling Names	Counting	Paint or Draw
No one	21 %	23 %	46 %	17 %	4 %	5 %	5 %	17 %
Mother	25 %	24 %	27 %	39 %	28 %	52 %	48 %	25 %
Sibling	34 %	23 %	14 %	19 %	52 %	30 %	37 %	39 %

#### ACTIVITIES WITH CHILDREN: PROGRAMME COMPARISONS

The figures that follow present the percentage of respondents who reported that they or another family member engaged in these activities with the study child *many times, sometimes, or never* in the past week. Programmes are compared on each activity.

Figure 19. Household Members Read to the Child in the Past Week.

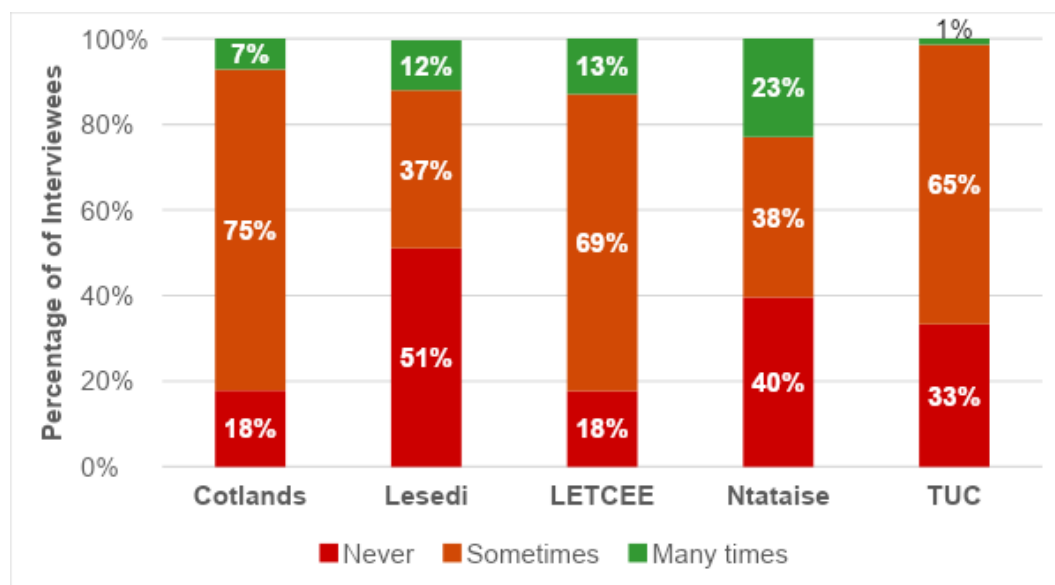




Figure 20. Household Members Told Stories to the Child in the Past Week.

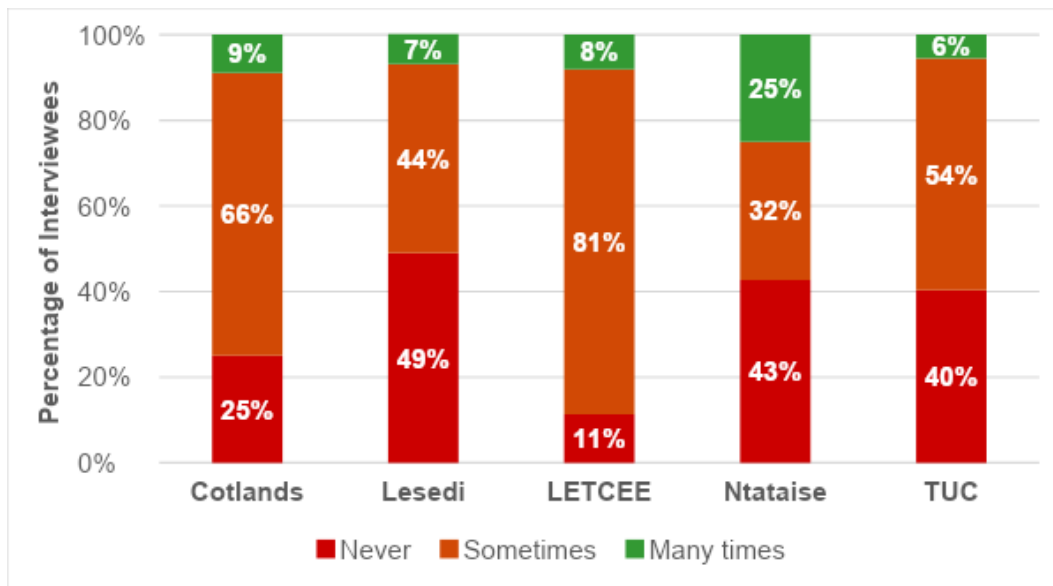
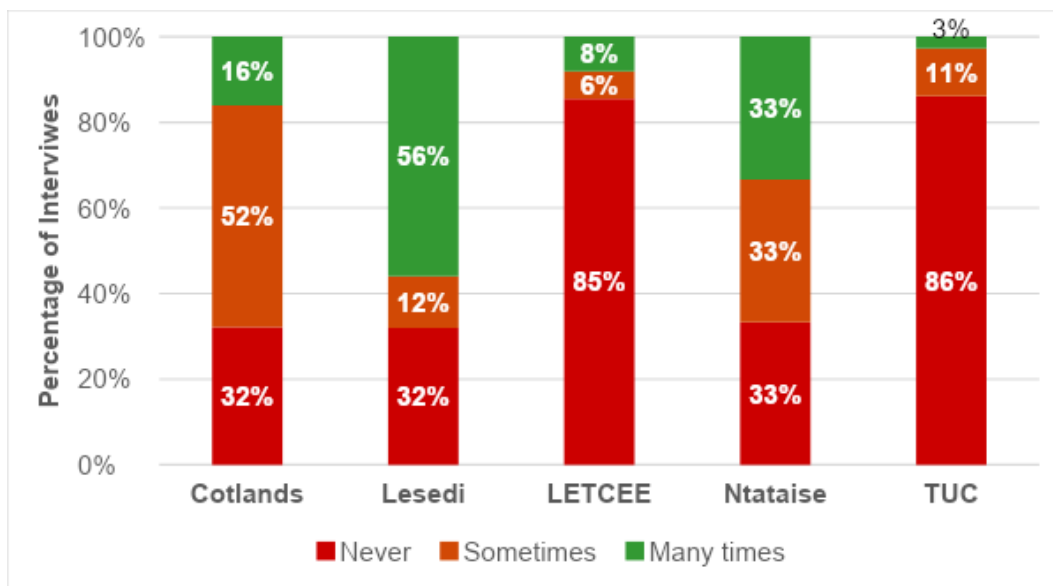


Figure 21. Household Members Sang to the Child in the Past Week.



Of note is that on average, across the programmes, many caregivers report that they a) their children were *never* read to (32 %); b) *never* told stories (33 %) and c) *never* sung to (53%). In excess of 20 % of those interviewed indicate that no one is reading, telling stories, or singing to the child. This is likely to negatively affect language acquisition.

Indicators of caregiver engagements with other activities follow. We question the usefulness of Figure 22, as the child will be taken out of the home to the ECD programme during the week. The item is retained as it is used in modelling the effects of activities on ELOM scores.

Figure 22. Household Members Took the Child Outside the Home in the Past Week.

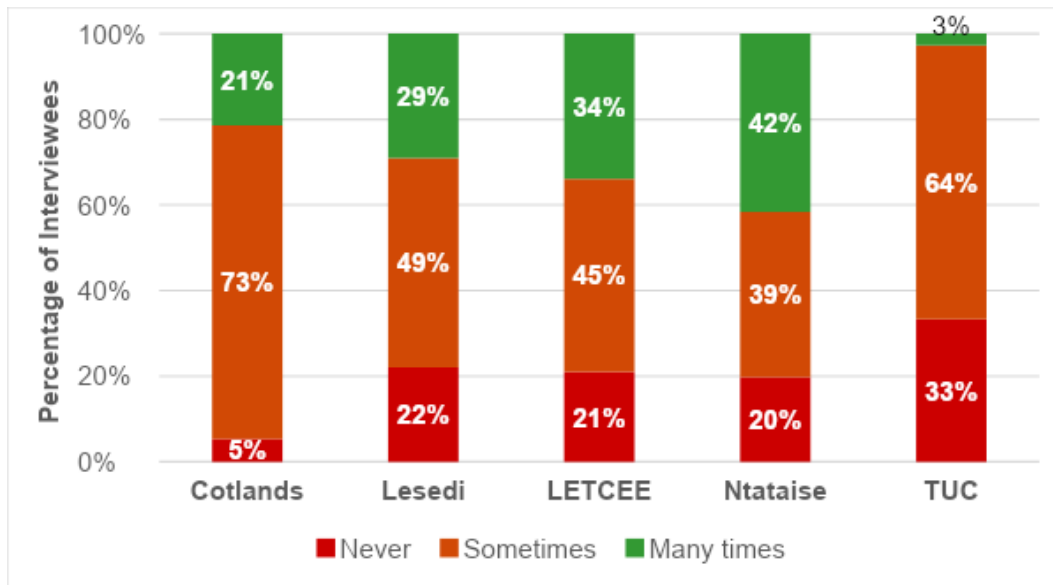
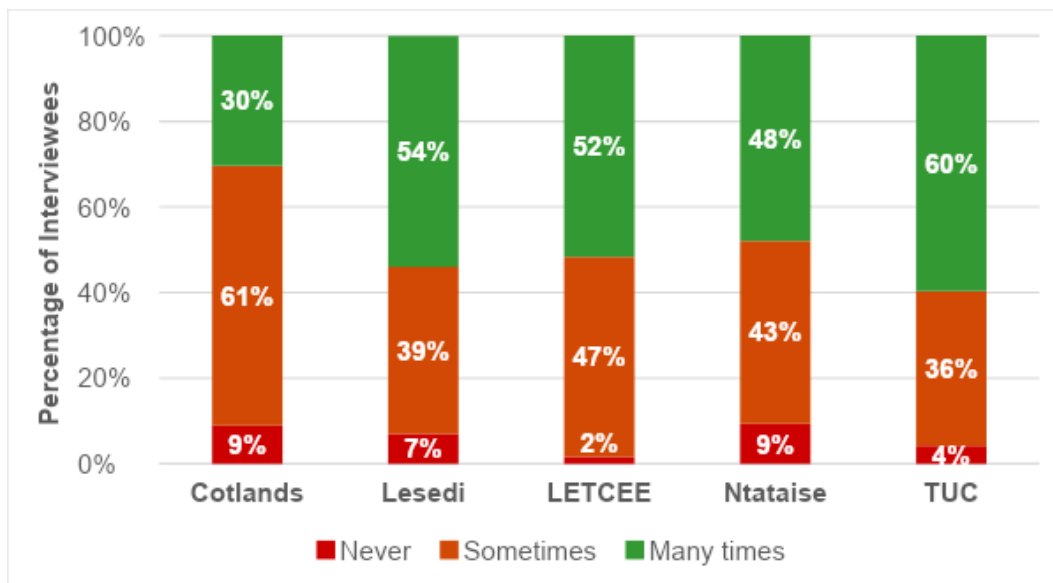


Figure 23. Household Members Played with the Child in the Past Week.



On a positive note, very few interviewees reported that the child was *never* played with during the week prior to interview.

Figure 24 and Figure 25 display findings on important early learning activities associated with emergent language and literacy and emergent numeracy, respectively. Encouragingly, high proportions of parents reported engaging in activities to support development in these domains at least *sometimes* in the week prior to interview.

Figure 24. Household Members Named Things with the Child in the Past Week.

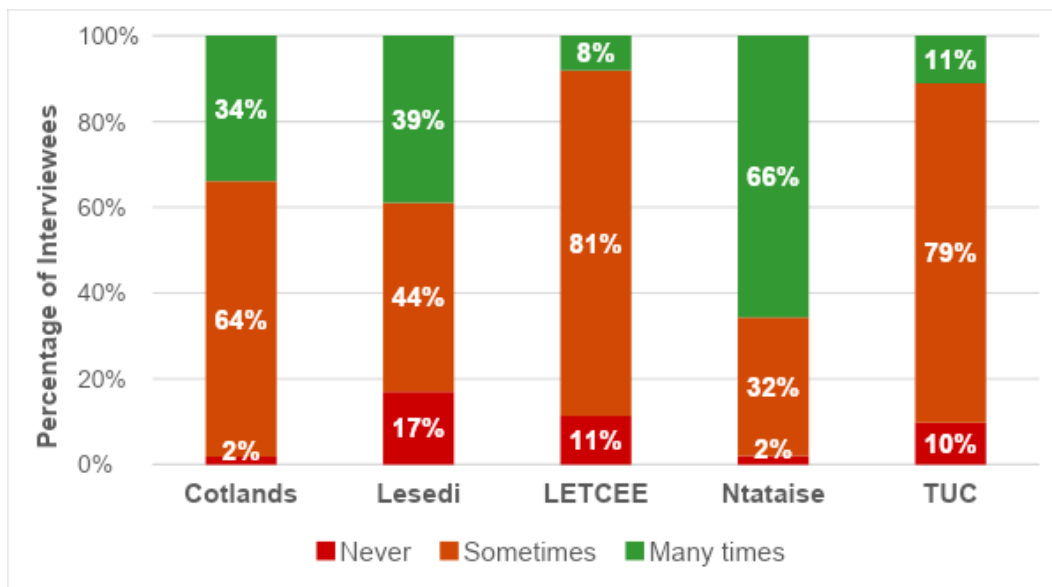


Figure 25. Household Members Counted Things with the Child in the Past Week.

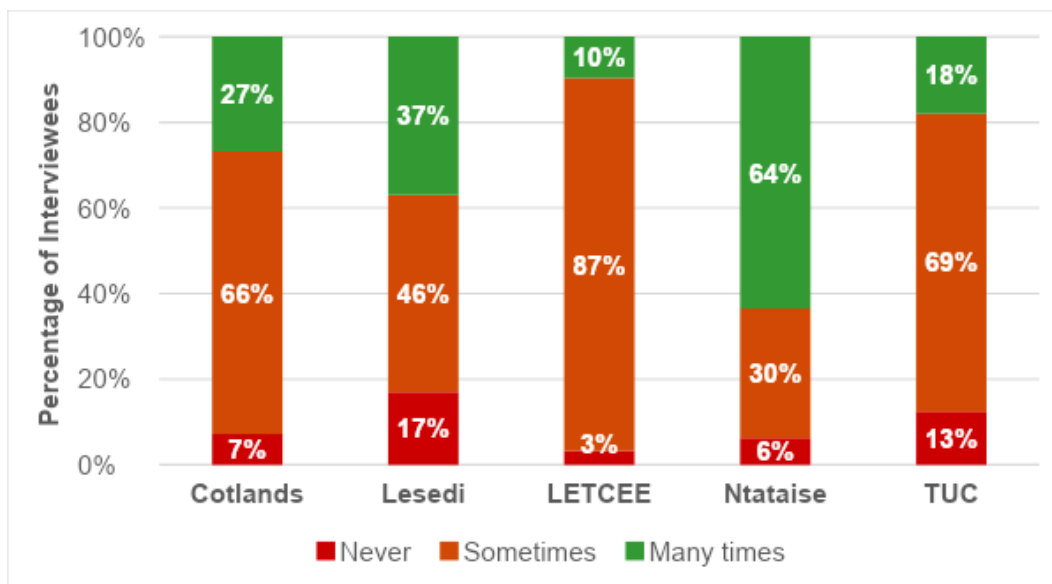
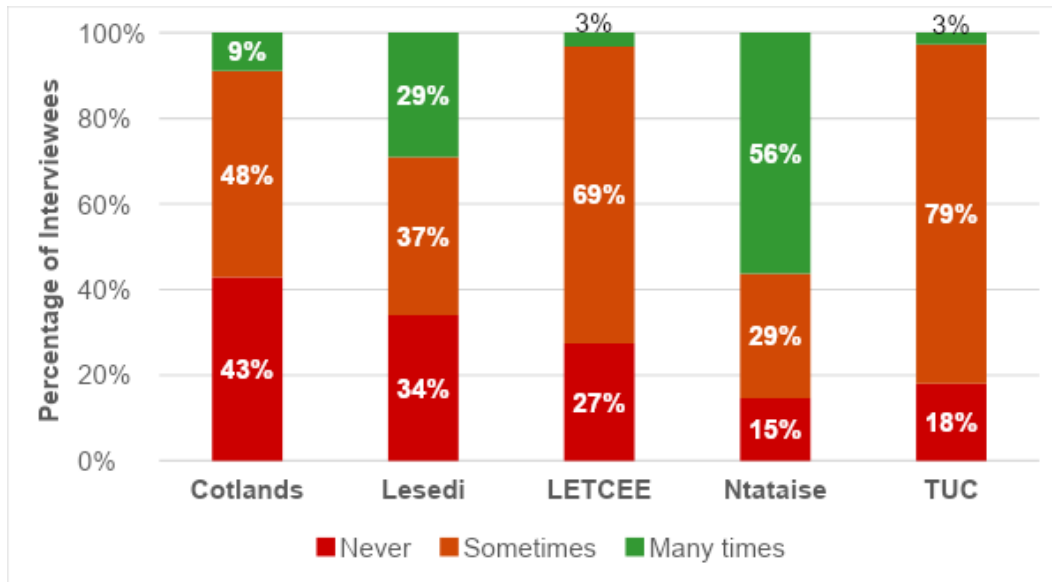


Figure 26 depicts activities that are likely to affect children’s fine motor and perceptual development. There is considerable variation across programme children’s homes, with Ntataise

children having the most opportunities. We do not have the data to comment on this observation.

Figure 26. Household Members Drew or Painted with the Child in the Past Week.



In the next section, we present the same data summarised per programme.

#### ACTIVITIES WITH CHILDREN AT HOME: SUMMARY FOR PLAYGROUP PROGRAMMES

Figure 27. Cotlands: Household Activities with Study Children in the Past Week.

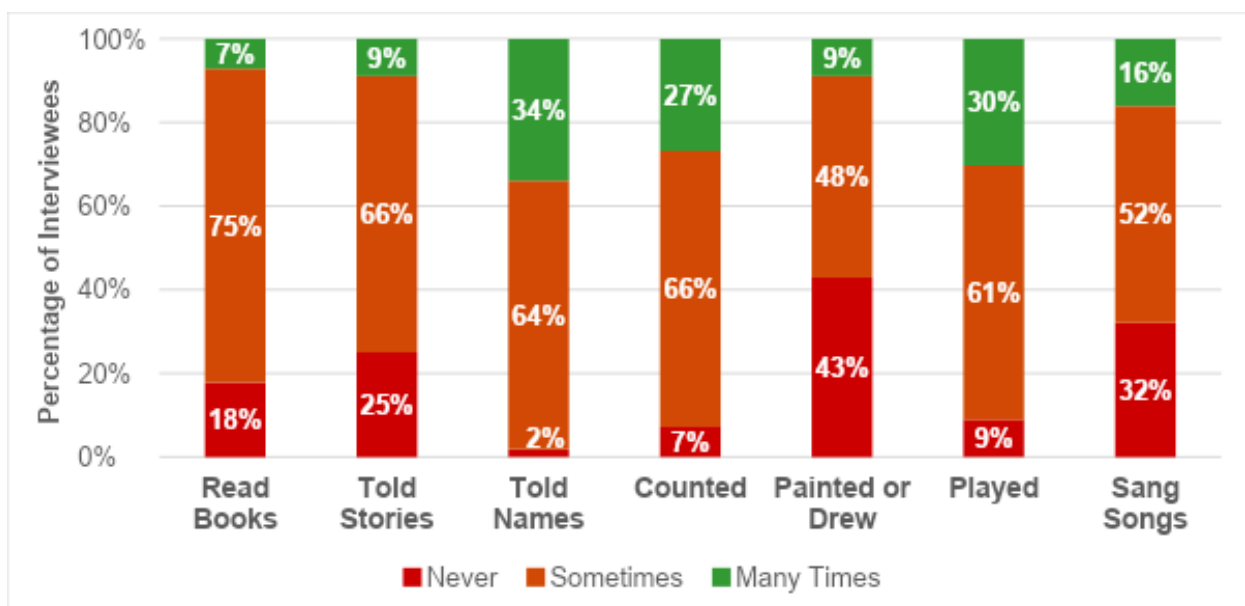


Figure 28. Lesedi: Household Activities with Study Children in the Past Week.

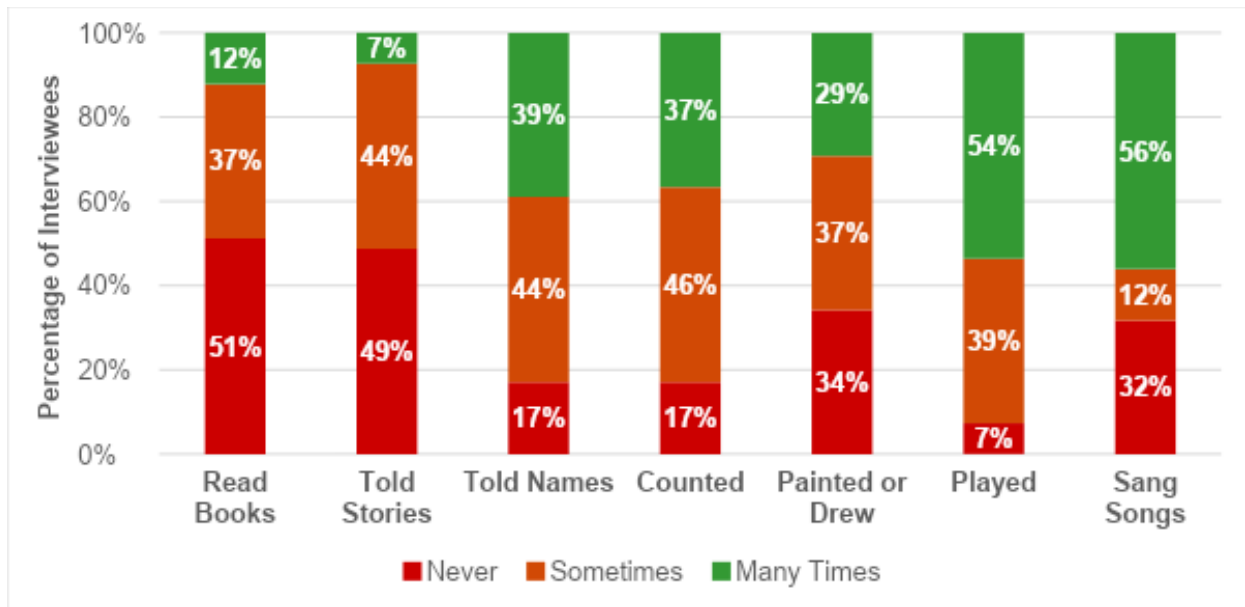
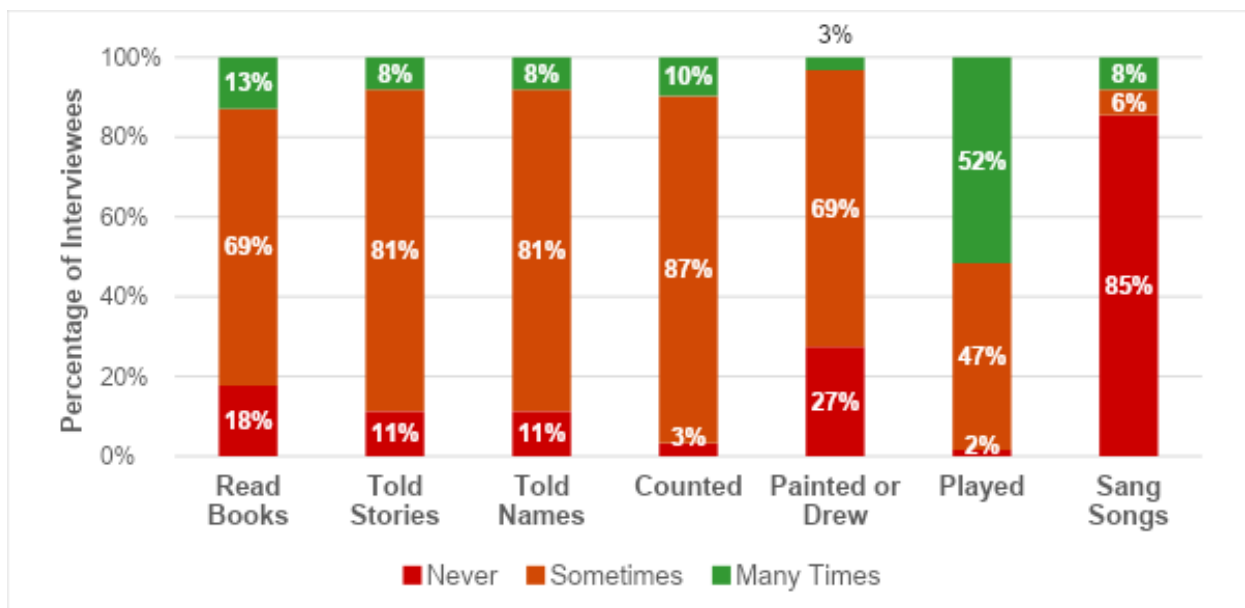


Figure 29. LETCEE (SmartStart): Household Activities with Study Children in the Past Week.



LETCEE (SmartStart) and Lesedi programme descriptions state that they provide parent programmes. Only Lesedi was able to provide parent attendance data and this indicates that the number of sessions offered to their parents ranged from 31 – 35 over the course of the year (average across groups = 31). On average, parents attended 52% of the sessions offered (range =

0 – 100%). Lesedi's figures above indicate that their children are exposed to more opportunities for learning at home than the other two playgroup programmes, which may have been an influence of their parent programme. Across all of the playgroup programmes, exposure to reading and stories is very low.

#### ACTIVITIES WITH CHILDREN AT HOME: SUMMARY FOR CENTRE DEVELOPMENT PROGRAMMES

We observe that apart from play, Ntataise children are more exposed to more early learning opportunities at home than TUC. A low frequency of literacy activities in both is evident.

Figure 30. Ntataise: Household Activities with Study Children in the Past Week.

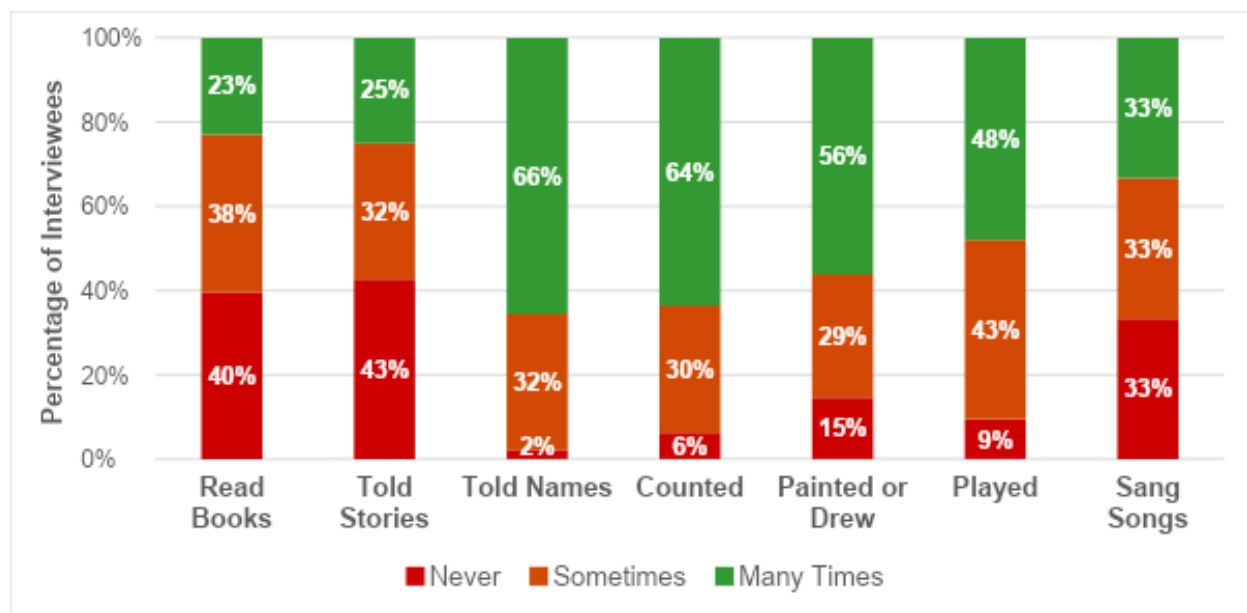
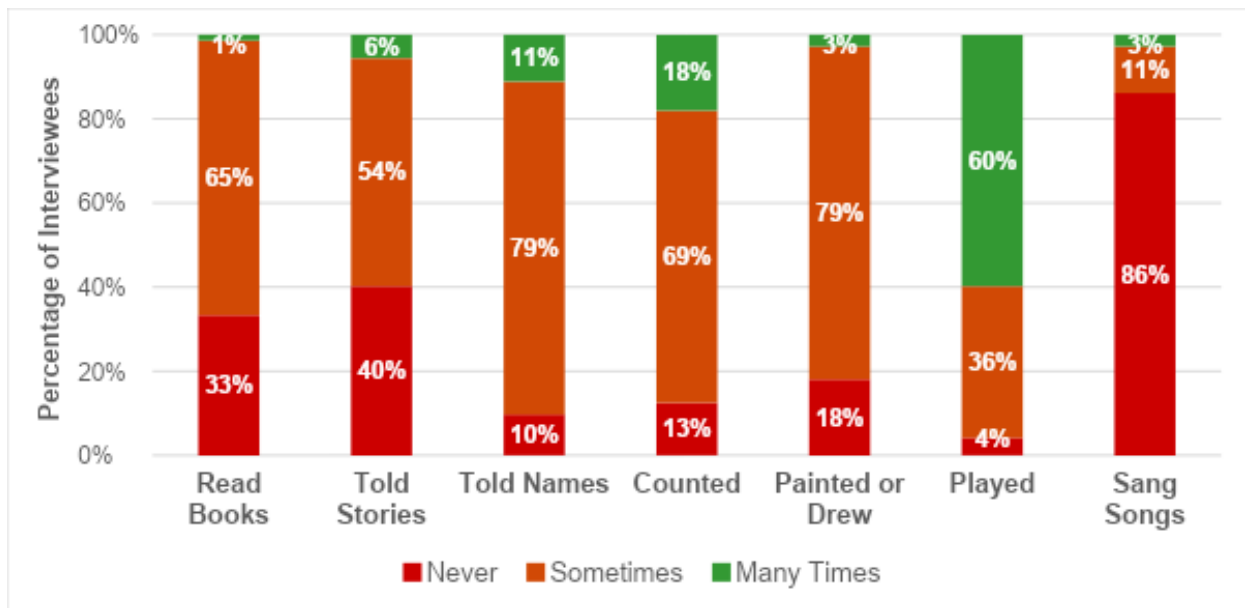


Figure 31. TUC: Household Activities with Study Children in the Past Week.



#### REASONS FOR ENROLLING THE CHILD IN AN ECD PROGRAMME

When asked how they found out about the programme attended by their child, the most common response was word-of-mouth: 48 % of interviewees said that they found out about the programme from a friend, family member, or community member. As to why they send their children to the programme, most (52 %) said that they do so because it prepares their children for school – indicating their awareness of potential benefits.

#### ECD SERVICE AVAILABILITY

Caregivers were asked to specify what other ECD services are available in their communities (in addition to that attended by their child). Most only reported having access to crèches and preschools (80 % and 22 % of caregivers mentioned these, respectively). Playgroups were mentioned by 13 % of caregivers. Day mothers and mobile libraries were both mentioned by under 5 % of caregivers. Interviewees said that they had chosen the programme that their children attend largely due to *convenience* (45 %) and because they *could not afford other ECD services* (33 %).

## WHAT MADE A DIFFERENCE TO CHILDREN'S PERFORMANCE ON THE ELOM FROM BASELINE TO ENDLINE?

In this section we address the first main research question:

*How do different ELP interventions, targeting children from three to five years old from low-income backgrounds, vary in their effectiveness in preparing children for Grade R (as measured by the ELOM)?*

Modelling enables us to control for the influence of variables other than the programme itself that might change child outcomes. Modelling also shows which variables contribute to child outcomes and to what extent (statistical significance and effect size). As the attendance data provided by LETCEE (SmartStart) was not sufficiently reliable for inclusion, we could not include them in the following modelling analysis.

### APPROACH TO ANALYSIS

We first sought to compare the performance of the four programmes, using multi-level modelling (Field, Miles, & Field, 2012). This procedure takes account of nested data and permits us to remove potential confounds at the individual (child) level and the practitioner level, within each programme. By way of an example, Cotlands has a number of programme sites in two very different areas: Macassar and Lydenburg and the latter offers three sessions rather than two per week indicating that there are likely to be differences in the way the programme is delivered in these different sites. Also, some practitioners may be more skilled and more experienced. Some practitioners may have a different way of interacting with children, which may be more or less likely to promote child development. Further, there will be variations in the characteristics of the children in each site. Sites are likely to vary in the proportions of children whose growth is stunted, or in the amount of stimulation that children receive at home. These variations will contribute to both their baseline and endline scores. Multi-level modelling permits us to account for this. We therefore modelled the performance of children in each programme (Ntataise, TUC, LESEDI, and Cotlands), while explicitly accounting for the effect of their practitioner (and by proxy, playgroup site or ECD centre classroom).

Further, for this analysis, it was necessary to account for the influence of the most stable characteristics of children in each programme (e.g. their age and gender), as well as the most important predictors of their performance that we could measure. These included their



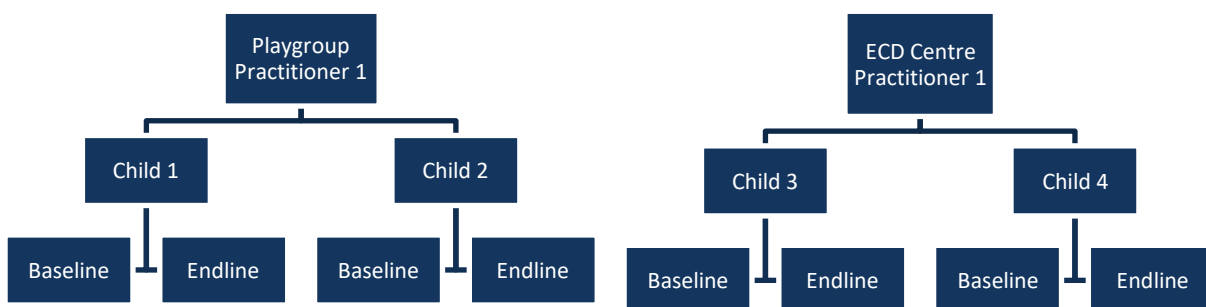
programme exposure (sessions attended), site characteristics (e.g. practitioner experience), aspects of their home environment, and their ELOM performance at baseline.

It stands to reason that children's ELOM score at baseline, and how often they attend the programme, should partially determine how well they do at endline. As the international literature suggests, children with higher baseline ELOM scores would be expected to show less change between baseline and endline assessments than those who start off with lower scores. Children with lower scores would be expected to show greater change between the two times of measurement. Figure 32 shows the hierarchical approach used in the multi-level models presented next. The modelling procedure used in this study is divided into two steps. All statistical analyses were conducted in R version 3.5.2 (<https://www.r-project.org>).

#### STEP 1: INCLUDING OUTCOMES AND CHECKING THE NEED FOR A MULTI-LEVEL MODEL

Before proceeding to our analyses, we tested the hierarchical structure presented in *Figure 32*.

*Figure 32*. Example of the Hierarchical Structure Used in the Multi-level Model.



We included our ELOM outcome scores (made up of child baseline and endline scores) and embedded these within the level of the child. We then included the level of the practitioner (practitioner and programme variables likely to predict ELOM endline scores). In all models (for each of the ELOM domains, and the ELOM total) preliminary analyses showed that children clustered into their ECD classes or playgroup sites: children in the same playgroup or classroom were more similar to each other between baseline and endline, than they were to children outside of their playgroup or classroom; also, children's baseline ELOM scores contributed to the endline score they obtained. This validated the choice of our multi-level modelling approach and we could proceed (see Appendix H for results of the test comparing these models).

## STEP 2: INTRODUCING THE CORE PREDICTORS

Predictors are features of the child, practitioner, or home environment that should be related to the outcome of interest (in this case, the change in ELOM scores over time). Predictors were entered into the model simultaneously to account for their effect on change in ELOM scores from baseline to endline. Both the hierarchical variables presented above and the predictors are presented in Table 21 below, along with their descriptions.

Table 21. Variables for the Final Model.

Variable	Description
<b>Child Variables</b>	
<b>Age at baseline</b>	The child's age (in months) measured at the time of baseline fieldwork.
<b>ELOM baseline and endline scores</b>	The children's ELOM scores grouped by time; whether they were measured at baseline or endline.
<b>Programme exposure (total sessions attended)</b>	The total number of programme sessions attended by each child. This data was not available for LETCEE (SmartStart).
<b>Years in programme</b>	The number of years (out of 4) that each child has been enrolled in the programme.
<b>Height for Age</b>	A Z-score calculated using the mean and standard deviation of a child's age and height. This is used as an indicator for the status of the child's growth – a proxy for the nutritional and health status of the child – using WHO standards.
<b>Programme Variables</b>	
<b>Programme (4)</b>	The programmes under study: Cotlands, Lesedi, Ntataise, and TUC. LETCEE (SmartStart) was excluded from the model due to the lack of programme exposure data.
<b>Child/practitioner ratio</b>	The number of children for which each practitioner was responsible. Note that this measure is imprecise as in several programmes parents and other community members may provide assistance and this may vary by programme day. A score of 1 was allocated for the practitioner; an additional point was added if there was an assistant. As the qualifications of the assistants were not known, these could not be weighted.
<b>Practitioner satisfaction with resources</b>	Practitioner rating of their satisfaction with their learning space and programme materials.
<b>Practitioner satisfaction with support</b>	Practitioner rating of their satisfaction with the supervision support that they receive from their organisation.
<b>Practitioner experience</b>	Practitioner years of experience working in ECD programmes.
<b>Practitioner ECD qualifications (score out of 4)</b>	Practitioners' ECD qualifications, scored out of 4: 1 = training by programme 2 = NQF Level 4 3 = NQF Level 5 4 = NQF Level 4, 5, and other diploma/certificate, etc.
<b>Home Learning Environment Variables</b>	
<b>Caregiver Education</b>	The highest level of education achieved by each caregiver, scored from 0 (no education) to 15 (matric and a degree).
<b>Home Early Learning Opportunity</b>	A combination of two variables: (1) the total amount of time that caregivers reported having to spend time with their children during the week and during the weekend; and (2) the total amount of time that caregivers reported actually spending on 8 types of activities (e.g. telling children stories and playing). In order to ensure each variable was weighted equally, they were divided by their maximum score, added together, and then multiplied by 5 to get a score out of 10.

	To validate the combination of these two variables, principal component analysis was conducted. We confirmed a factor loading of 0.80 on a single factor.
<b>Home Early Learning Resources: Books and Toys (score out of 10)</b>	A combination of two variables: (1) The total number of books that caregivers reported having in the home, and (2) the total number of toys (homemade, shop-bought, or household objects) that they reported having in the home. In order to ensure each variable was weighted equally, they were divided by their maximum score, added together, and then multiplied by 5 to get a score out of 10. To validate the combination of these two variables, principal component analysis was conducted. We confirmed a factor loading of 0.75 on a single factor.
<b>Quintile</b>	The socioeconomic ranking of particular geographic areas, in accordance with South Africa’s quintile system. SASPRI datazones (which made use of the GPS location of practitioners) were used to determine each child’s quintile, with the exception of Lesedi and two practitioners at Ntataise. The quintile of the nearest schools was used in these instances.
<b><i>Hierarchical Variables</i></b>	
<b>Child</b>	Child index used to nest baseline and endline scores within study children.
<b>Practitioner</b>	ECD practitioner and their playgroup or classroom, used to nest the study children.

## EFFECTS OF PROGRAMMES ON CHANGE IN ELOM SCORES: RESULTS OF MODELLING OUTCOMES FOR LESEDI, COTLANDS, NTATAISE AND TUC

In presenting the findings, we examine the results through two lenses. First, we present the findings of the multi-level modelling (for all programmes except LETCEE (SmartStart)) to better understand differences between programmes in the amount of growth in ELOM scores while controlling for influences beyond the programme itself. Second, we display the findings for all five programmes in tables to indicate children's start and end positions relative to the ELOM standards. These findings indicate the children's progression towards Achieving the ELOM standards, as outlined in the ELOM Technical Manual. The standard represents the level of performance that we would like to see for all children prior to entering Grade R. These tables use cells colour coded according to the ELOM convention: **Red = Children At Risk**; **Orange = Children Falling Behind the standard**; **Green = Children Achieving the ELOM Standard**. Baseline cell colour is derived from standards for children aged 50-59 months; endline cell colour is based on standards for children 60-69 months (as depicted in the ELOM Technical Manual).

It is important to note that for these tables, we only selected study children from each programme whose ages fell within these boundaries so as to correspond to the ELOM performance bands. This means that the samples and means will differ between the figures and the tables that follow. It is also essential to note that analyses for the ELOM standards do not require us to control for the factors included in the modelling process.

These tables include LETCEE (SmartStart). *Figure 33 to Figure 38* that follow show the effects of each of these programmes on the extent of change in ELOM Total and Domain standard scores from baseline to endline. For simplicity of presentation, confidence intervals are excluded. Estimated marginal means produced by the modelling are used to show these effects; they are adjusted to take account of the influences of all the other variables (practitioner and programme site, home and child) in the model (see Table 21 above). They therefore show true programme effects while controlling for other influences such as home background and practitioner characteristics (e.g. training). Under each figure, we limit our comment to those differences between programmes that are statistically significant ( $p \leq .05$ ). When used together, the figures and tables described here permit us to comment on the size of the changes between baseline and endline, and to comment on the developmental level reached by each group.

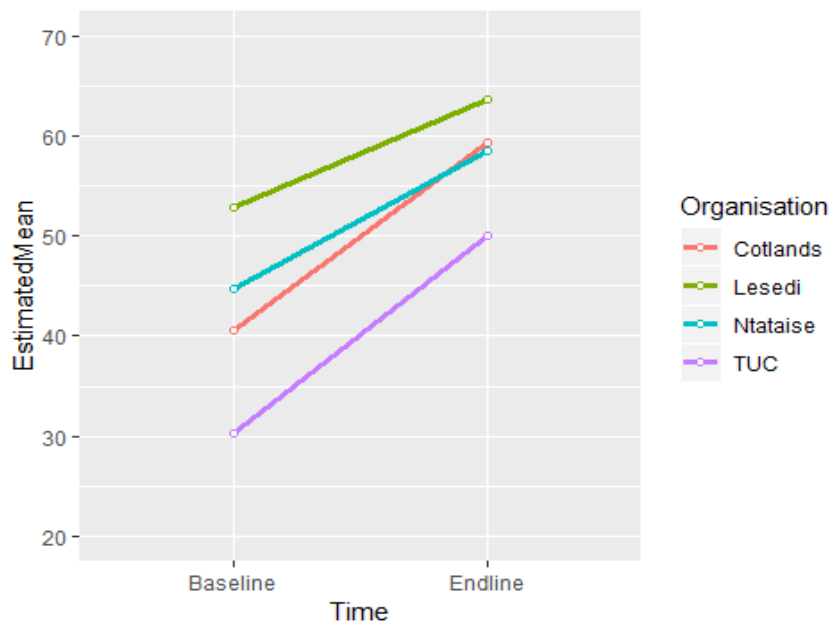
Appendix H provides the statistical analyses. As noted, LETCEE (SmartStart) unfortunately could not be included in the model (and the figures), as reliable attendance data was not available. LETCEE (SmartStart) is however included in the illustrative tables of change in ELOM scores in relation to the ELOM standards that are presented below each Figure.

We commence with effects of programmes on ELOM Total scores from baseline to endline, and then proceed to present findings for each of the domains.

## ELOM TOTAL

Figure 33 shows that all programmes<sup>23</sup> contributed to improvement in children’s ELOM Total scores<sup>24</sup>.

Figure 33. Modelled Change in ELOM Total Score for Each Programme from Baseline to Endline.



Children in the Cotlands<sup>25</sup> playgroup programme (the red line), and TUC’s five morning per week centre-based programme (the purple line) experienced significantly greater improvement in

<sup>23</sup> LETCEE(SmartStart) is excluded as programme exposure data was not available.

<sup>24</sup> Note that the position of these lines should not be expected to line up with raw ELOM scores for each programme, as these are adjusted based on the relative contribution and number of sessions attended, along with other covariates.

<sup>25</sup> Cotlands Lydenberg (3 sessions / week) and Cotlands Macassar (2 sessions / week) are combined in all analyses.

ELOM Total scores than the other programmes: 1.34 Standard Deviation (SD) and 1.41 SD respectively<sup>26</sup>.

#### CHANGES IN ELOM TOTAL RELATIVE TO THE ELOM STANDARDS

Both Cotlands and TUC started from a low base (TUC baseline is on the border between *At Risk* and *Falling Behind*). One would expect children with the lowest ELOM scores at baseline to benefit most from an early learning programme; this is evident for these two programmes in particular. Table 22 shows that:

- a. Children in the five programmes started at different points (baseline averages). We do not know the reason for this variation. A number of factors could be involved; for example, prior programme attendance or variations in home learning environments.
- b. Despite improvements in all domains by children in all programmes there was variability in terms of how much they gained.
- c. Children in two playgroup programmes (Cotlands and LETCEE(SmartStart)) improved from being *At Risk* at baseline to *Falling Behind* at endline;
- d. Cotlands and Lesedi children made significant gains to be close to the standard (54.38) at endline;

In one centre-based programme (TUC) Total ELOM scores improved by 23.7 points from *Falling Behind* to *Achieving the ELOM Standard*.

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<sup>26</sup> Note that 1 Standard Deviation on the ELOM Total score standardisation sample distribution = 14.07 standard score points (see the ELOM Technical Manual).

Table 22. Effect of Early Learning Programmes on Children's Early Learning Status at Endline: ELOM Total Score.

Programme	*Baseline Score (based on ELOM profiles for children 50-59 months) <sup>27</sup>	Endline Score (based on ELOM profiles for children 60-69 months) <sup>28</sup>	Extent of Change
<b>Cotlands</b> (Baseline n=61; Endline n=52)	32.6	52.6	20.0
<b>Lesedi</b> (Baseline and Endline n=38)	36.9	50.1	13.2
<b>LETCEE(SmartStart)</b> (Baseline n=45; Endline n=39)	33.9	47.7	13.8
<b>Ntataise</b> (Baseline n=54; Endline n=86)	49.8	66.9	17.1
<b>TUC**</b> (Baseline n=75; Endline n=51)	37.8	61.5	23.7

\*\*indicates programmes that show statistically significant change relative to the amount of growth in the other programmes. \*Differences between baseline and endline sample sizes are due to availability of children between 50 and 69 months.

One might ask why some programmes had higher baseline score than others. It is plausible that this can be attributed to a mix of child, home background, and programme factors. We have not investigated this systematically for the study. However, as noted earlier in this report, 89% of Ntataise children had participated for more than a year in a centre-based programme, which plausibly raised their performance by the time they were assessed at baseline. Although 96% of children at LETCEE (SmartStart) had been in that playgroup programme for more than one year, they were *At Risk* at baseline. This is quite probably because the average poverty level of these deep rural children was much higher (82 % are in quintile 1 sites) than Ntataise's urban children where only 12 % were in the poorest category. Across the sample, TUC and Ntataise had the most children (63 % and 64 % respectively) in quintile 3 sites – substantially less deprived than LETCEE (SmartStart) and Lesedi (36 % quintile 3). Cotlands is of particular interest. Their playgroup children, like LETCEE (SmartStart), were *At Risk* at baseline and their deprivation profiles are similar (more than 90 % of both LETCEE (SmartStart) and Cotlands children were in receipt of the

<sup>27</sup> For children 50-59 months a score of **46.32** is required to achieve the ELOM Standard.

<sup>28</sup> For children 60-69 months a score of **54.38** is required to achieve the ELOM Standard.



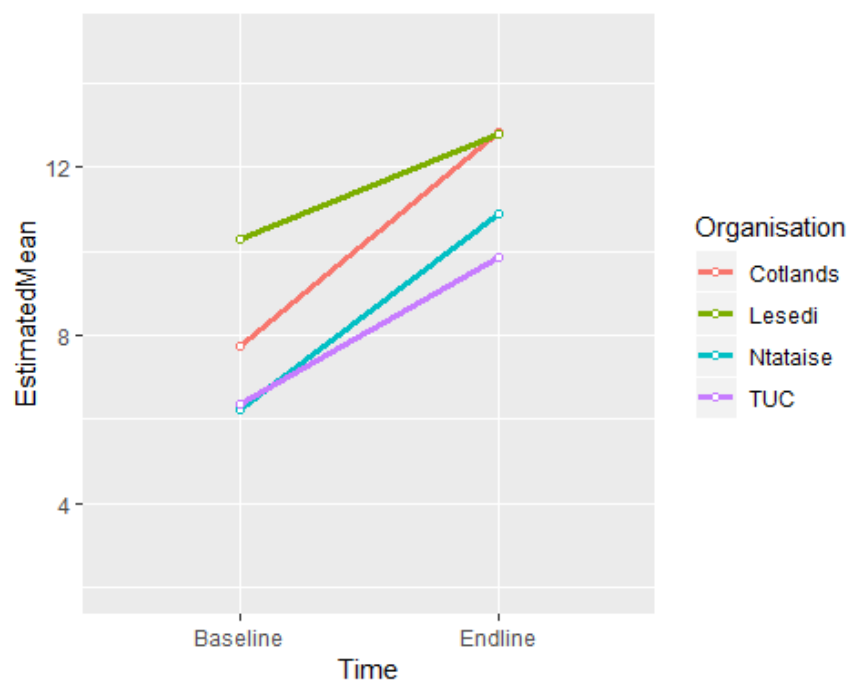
Child Support Grant<sup>29</sup>). For the other programmes, we observe that 42 % in the TUC sample, and 24 % in Lesedi had participated for more than a year. In the absence of attendance data for prior programme years, there is little we can add. Further investigation would be necessary to clarify the baseline variation.

We now proceed to present the findings for programme effects on each ELOM domain.

### GROSS MOTOR DEVELOPMENT

Figure 34 shows that all programmes<sup>30</sup> contributed to improvement in children’s Gross Motor Development scores<sup>31</sup>.

Figure 34. Modelled change in Gross Motor Development score for each programme from Baseline to Endline.



<sup>29</sup> CSG is used here as accurate quintile data is only available for the Cotlands Lydenburg site

<sup>30</sup> LETCEE(Smartstart) is excluded as programme attendance data was not available.

<sup>31</sup> Note that the position of these lines should not be expected to line up with raw ELOM scores for each programme, as these are adjusted based on the relative contribution and number of sessions attended, along with other covariates.

Figure 34 shows that one playgroup programme, Cotlands (the red line), and Ntataise’s Centre-Development programme children (the turquoise line) experienced significantly larger gains, relative to the performance gains in other programmes in GMD: 1.22 SD and 1.12 SD respectively<sup>32</sup>.

#### CHANGES IN ELOM GMD RELATIVE TO THE ELOM STANDARDS

Table 23 shows that all programme children were *Falling Behind* in Gross Motor Development at baseline. All except Lesedi are *Achieving the ELOM standard* at endline.

Table 23. Effect of Early Learning Programmes on Children’s Early Learning Status at Endline: ELOM Gross Motor Development.

Programme	*Baseline Score (based on ELOM profiles for children 50-59 months) <sup>33</sup>	Endline Score (based on ELOM profiles for children 60-69 months) <sup>34</sup>	Extent of Change
<b>Cotlands</b> (Baseline n=61; Endline n=52)	7.4	12.1	4.7
<b>Lesedi</b> (Baseline and Endline n=38)	6.8	10.3	3.5
<b>LETCEE(SmartStart)</b> (Baseline n=45; Endline n=39)	6.7	10.5	3.8
<b>Ntataise</b> (Baseline n=54; Endline n=86)	7.2	13.1	5.9
<b>TUC</b> (Baseline n=75; Endline n=51)	7.8	11.8	4.0

\*Differences between baseline and endline sample sizes are due to availability of children between 50 and 69 months.

Children in all but one programme had improved and were *Achieving the Standard* at endline. Lesedi children were on the borderline of the standard (which is a score of 10.54). Gross Motor Development does not appear to be of concern at endline.

<sup>32</sup> Note that 1 Standard Deviation on the Gross Motor Development score standardisation sample distribution = 4.19 points (see ELOM Technical Manual).

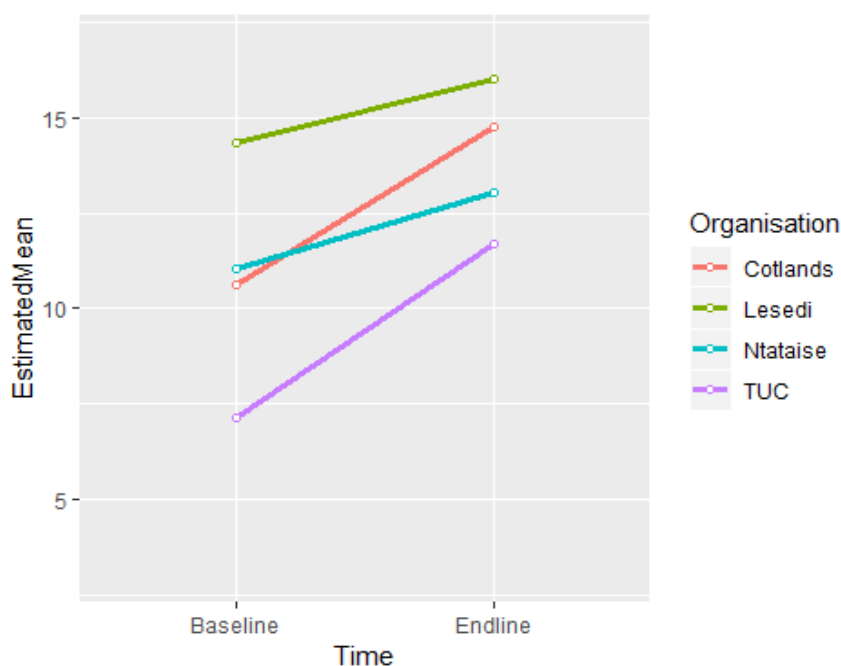
<sup>33</sup> For children 50-59 months a score of **8.62** is required to achieve the ELOM Standard.

<sup>34</sup> For children 60-69 months a score of **10.54** is required to achieve the ELOM Standard.

## FINE MOTOR CONTROL AND VISUAL MOTOR INTEGRATION

Figure 35 shows that all programmes<sup>35</sup> contributed to improvement in children’s Fine Motor Control and Visual Motor Integration scores by endline<sup>36</sup>.

Figure 35. Modelled change in Fine Motor Control and Visual Motor Integration Score for each Programme from Baseline to Endline.



## CHANGES IN ELOM FINE MOTOR COORDINATION AND VISUAL MOTOR INTEGRATION RELATIVE TO THE ELOM STANDARDS

Table 24 shows that Cotlands, LETCEE (SmartStart) and TUC children were *At Risk* on Fine Motor Coordination and Visual Motor Integration at baseline (Lesedi children were on the borderline). Children in the playgroup programmes had improved to move into the *Falling Behind* category at endline, while the two centre-based children were *Achieving the Standard*. TUC children made the greatest gains. Cotlands and TUC children experienced significantly larger gains, relative to the performance gains in the other programmes: 1.21 SD and 1.34 SD respectively<sup>37</sup>.

<sup>35</sup> LETCEE(Smartstart) is excluded as programme attendance data was not available.

<sup>36</sup> Note that the position of these lines should not be expected to line up with raw ELOM scores for each programme, as these are adjusted based on the relative contribution and number of sessions attended, along with other covariates.

<sup>37</sup> Note that 1 Standard Deviation on the Fine Motor Control and Visual Motor Integration score standardisation sample distribution = 3.39 points (see ELOM Technical Manual).

Table 24. Effect of Early Learning Programmes on Children’s Early Learning Status at Endline: ELOM Fine Motor Coordination and Visual Motor Integration.

Programme	*Baseline Score (based on ELOM profiles for children 50-59 months) <sup>38</sup>	Endline Score (based on ELOM profiles for children 60-69 months) <sup>39</sup>	Extent of Change
<b>Cotlands</b> (Baseline n=61; Endline n=52)	8.3	12.5	4.2
<b>Lesedi</b> (Baseline and Endline n=38)	9.6	11.5	1.9
<b>LETCEE(SmartStart)</b> (Baseline n=45; Endline n=39)	8.5	10.9	2.4
<b>Ntataise</b> (Baseline n=54; Endline n=86)	12.0	14.7	2.7
<b>TUC</b> (Baseline n=75; Endline n=51)	8.3	14.3	6.0

\*Differences between baseline and endline sample sizes are due to availability of children between 50 and 69 months.

As noted above, and despite considerable advances in some, FMC / VMI has proved challenging for the playgroup programmes in particular. TUC children have moved substantially from being *At Risk to Achieving the Standard*.

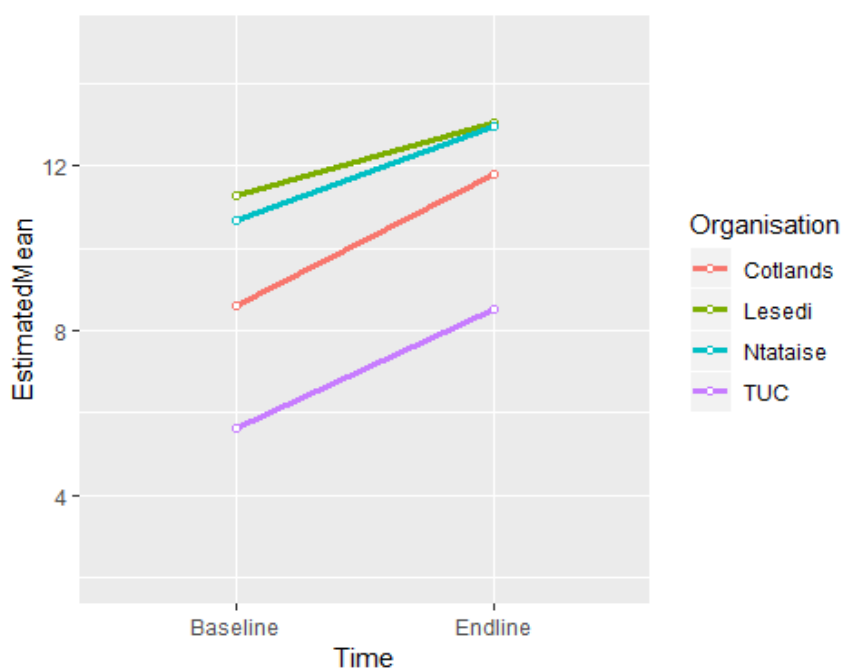
<sup>38</sup> For children 50-59 months a score of 12.32 is required to achieve the ELOM Standard.

<sup>39</sup> For children 60-69 months a score of 14.13 is required to achieve the ELOM Standard.

## EMERGENT NUMERACY AND MATHEMATICS

Figure 36 shows that all programmes<sup>40</sup> contributed to improvement in children’s Fine Motor Control and Visual Motor Integration scores<sup>41</sup>.

Figure 36. Modelled Change in Emergent Numeracy and Mathematics Score for each Programme from Baseline to Endline.



After controlling for the factors in the model, none of the programmes performed significantly differently from each other in terms of change between baseline and endline score (Cotlands = 0.77 SD; TUC = 0.7 SD; Lesedi = 0.43 SD; Ntataise = 0.56 SD<sup>42</sup>).

## CHANGES IN ELOM EMERGENT NUMERACY AND MATHEMATICS RELATIVE TO THE ELOM STANDARDS

Table 25 below shows that on the Emergent Numeracy and Mathematics domain at baseline, Cotlands and LETCEE (SmartStart) were *At Risk* while Lesedi and TUC children were *Falling Behind*

<sup>40</sup> LETCEE(Smartstart) is excluded as programme attendance data was not available.

<sup>41</sup> Note that the position of these lines should not be expected to line up with raw ELOM scores for each programme, as these are adjusted based on the relative contribution and number of sessions attended, along with other covariates.

<sup>42</sup> Note that 1 Standard Deviation on the Emergent Numeracy and Mathematics score standardisation sample distribution = 4.1 points (see ELOM Technical Manual).

the expected standard. Ntataise children were already *Achieving the Standard* for their age at both baseline and endline. Improvements are evident for all programmes.

Table 25. Effect of Early Learning Programmes on Children’s Early Learning Status at Endline: ELOM Emergent Numeracy and Mathematics.

Programme	*Baseline Score (based on ELOM profiles for children 50-59 months) <sup>43</sup>	Endline Score (based on ELOM profiles for children 60-69 months) <sup>44</sup>	Extent of Change
<b>Cotlands</b> (Baseline n=61; Endline n=52)**	6.3	10	3.7
<b>Lesedi</b> (Baseline and Endline n=38)	8.2	10.6	2.4
<b>LETCEE(SmartStart)</b> (Baseline n=45; Endline n=39)	6.3	9.6	3.3
<b>Ntataise</b> (Baseline n=54; Endline n=86)	11.3	14	2.7
<b>TUC**</b> (Baseline n=75; Endline n=51)	6.8	10.3	3.5

\*\*indicates programmes that show statistically significant change relative to the amount of growth in the other programmes. \*Differences between baseline and endline sample sizes are due to availability of children between 50 and 69 months.

## COGNITION AND EXECUTIVE FUNCTIONING

Figure 37 shows that all programmes<sup>45</sup> contributed to improvement in children’s Cognition and Executive Functioning scores<sup>46</sup>. Also, it shows considerable programme variation in the change between baseline and endline in the Cognitive and Executive Functioning domain. TUC children show the greatest change in this domain (1.04 SD<sup>47</sup>), performing (statistically) significantly better than children in other programmes, and moving into the expected standard at endline.

<sup>43</sup> For children 50-59 months a score of 9.33 is required to achieve the ELOM Standard.

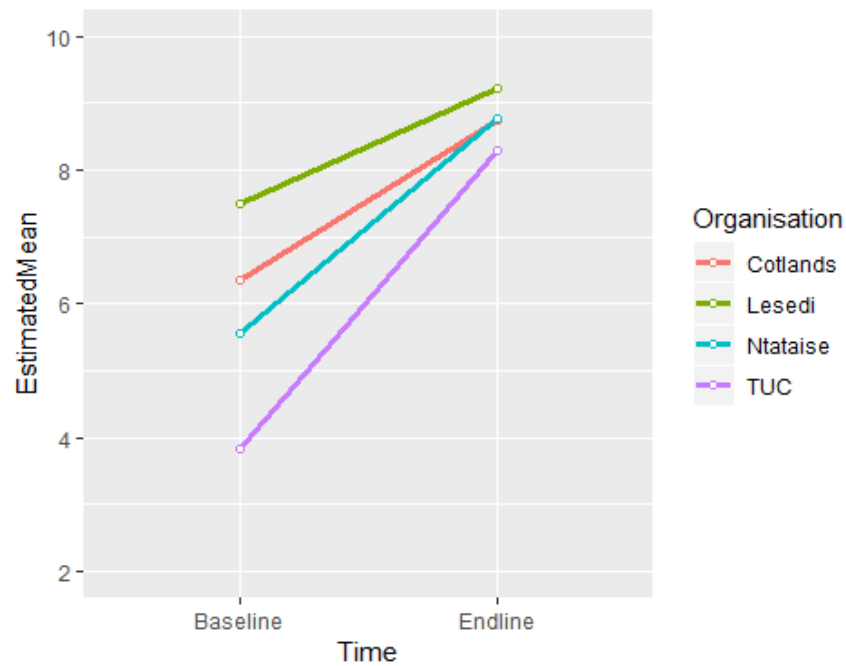
<sup>44</sup> For children 60-69 months a score of 10.24 is required to achieve the ELOM Standard.

<sup>45</sup> LETCEE(Smartstart) is excluded as programme attendance data was not available.

<sup>46</sup> Note that the position of these lines should not be expected to line up with raw ELOM scores for each programme, as these are adjusted based on the relative contribution and number of sessions attended, along with other covariates.

<sup>47</sup> Note that 1 Standard Deviation on the Cognition and Executive Functioning score standardisation sample distribution = 4.27 points (see ELOM Technical Manual).

Figure 37. Modelled change in Cognition and Executive Functioning Score for each Programme from Baseline to Endline.



#### CHANGES IN ELOM COGNITION AND EXECUTIVE FUNCTIONING RELATIVE TO THE ELOM STANDARDS

Table 26 shows that, while improving, Cotlands and Lesedi children continue to *Fall Behind* from baseline to endline, while LETCEE (SmartStart) children have improved from being *At Risk* to *Falling Behind* at endline. Ntataise children remain within the standard. TUC children have improved the most on average from *Falling Behind* to *Achieving the Standard* at endline.

Table 26. Effect of Early Learning Programmes on Children’s Early Learning Status at Endline: Cognitive and Executive Functioning.

Programme	*Baseline Score (based on ELOM profiles for children 50-59 months) <sup>48</sup>	Endline Score (based on ELOM profiles for children 60-69 months) <sup>49</sup>	Extent of Change
<b>Cotlands</b> (Baseline n=61; Endline n=52)**	4.7	7.5	2.8
<b>Lesedi</b> (Baseline and Endline n=38)	4.7	6.5	1.8
<b>LETCEE(SmartStart)</b> (Baseline n=45; Endline n=39)	3.6	6.1	3.1
<b>Ntataise</b> (Baseline n=54; Endline n=86)	7.0	10.7	3.7
<b>TUC**</b> (Baseline n=75; Endline n=51)	5.9	11	5.1

\*\*indicates programmes that show statistically significant change relative to the amount of growth in the other programmes. \*Differences between baseline and endline sample sizes are due to availability of children between 50 and 69 months.

## EMERGENT LITERACY AND LANGUAGE

Here we present the findings on the final ELOM domain. Figure 38 shows that all programmes<sup>50</sup> contributed to improvement in children’s Emergent Literacy and Language scores<sup>51</sup>.

<sup>48</sup> For children 50-59 months a score of 7.17 is required to achieve the ELOM Standard.

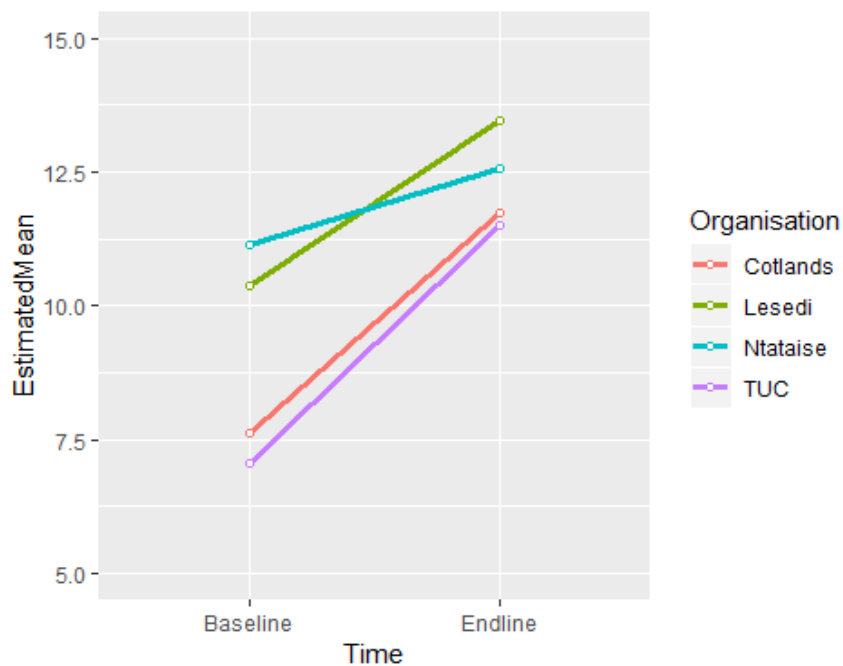
<sup>49</sup> For children 60-69 months a score of 9.27 is required to achieve the ELOM Standard.

<sup>50</sup> LETCEE(Smartstart) is excluded as programme attendance data was not available.

<sup>51</sup> Note that the position of these lines should not be expected to line up with raw ELOM scores for each programme, as these are adjusted based on the relative contribution and number of sessions attended, along with other covariates.



Figure 38. Modelled Change in Emergent Literacy and Language Score for each Programme from Baseline to Endline.



In terms of growth, only Ntataise perform (statistically) significantly worse than the others (Cotlands = 0.89 SD; TUC = 0.96 SD; Lesedi = 0.67 SD; Ntataise = 0.31 SD<sup>52</sup>). This is expected, as these children started at the highest level of performance at baseline, and changed the least (Table 27).

<sup>52</sup> Note that 1 Standard Deviation on the Emergent Literacy and Language score standardisation sample distribution = 4.64 points (see ELOM Technical Manual).

## CHANGES IN ELOM EMERGENT LITERACY AND LANGUAGE RELATIVE TO THE ELOM STANDARDS

Improvement is evident across programmes. Those programmes where children are *Falling Behind*, would only need to improve by about 1 standard score point to *Achieve the Standard*.

Table 27. Effect of Early Learning Programmes on Children’s Early Learning Status at Endline: Emergent Literacy and Language.

Programme	*Baseline Score (based on ELOM profiles for children 50-59 months) <sup>53</sup>	Endline Score (based on ELOM profiles for children 60-69 months) <sup>54</sup>	Extent of Change
<b>Cotlands</b> (Baseline n=61; Endline n=52)**	5.9	10.2	4.3
<b>Lesedi</b> (Baseline and Endline n=38)	7.7	11.2	3.5
<b>LETCEE(SmartStart)</b> (Baseline n=45; Endline n=39)	8.9	10.7	1.8
<b>Ntataise</b> (Baseline n=54; Endline n=86)	12.5	14.6	2.1
<b>TUC**</b> (Baseline n=75; Endline n=51)	9.1	14.0	4.9

\*\*indicates programmes that show statistically significant change relative to the amount of growth in the other programmes. \*Differences between baseline and endline sample sizes are due to availability of children between 50 and 69 months.

## PREDICTORS OF PROGRAMME OUTCOMES

In this section we address our second main research question: *What programme, child, and home environment factors predict change in ELOM scores in children participating in early learning programmes?*

Table 28 below includes only results for variables that showed statistically significant relationships with ELOM scores. Where relationships between variables did not reach statistical significance, they were excluded.

A *Home Learning Opportunities* variable was constructed for the study that included two inter-correlated variables ( $\alpha = .80$ ): 1) the caregiver’s reported time available for child activities during

<sup>53</sup> For children 50-59 months a score of 10.26 is required to achieve the ELOM Standard.

<sup>54</sup> For children 60-69 months a score of 11.65 is required to achieve the ELOM Standard.

both the week and the weekend, and 2) the reported frequency of early learning activities conducted with the child at home (see Section 2 of the HLE in Appendix D). This variable failed to predict ELOM Total and Domain scores and is therefore not included in Table 28, which summarises the results of all programme<sup>55</sup>, child and home environment factors included in our models<sup>56</sup>. The effect sizes presented in each case are the averages for the variable.

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<sup>55</sup> LETCEE(Smartstart) is excluded as programme attendance data was not available.

<sup>56</sup> Cohen's d statistic was calculated to derive standardised effect sizes. Effect size informs us as to the practical significance of the finding (Cohen, 1988).

Table 28. Summary of Main Findings: Programme, Child and Home Factors.

Key	Effect size	Comment on effect size
	Small	Only statistically significant effects are shown (95% confidence). Effect size are based on Cohen’s convention (Small: 0.2-0.49; Medium: 0.5-0.79; Large: => 0.8). Note that a ‘small effect size’ may have great practical importance – as is the case here.
	Small to moderate	
	Large	

	Component	Domains					ELOM Total	Elaboration
		CEF	ELL	ENM	FMCVMI	GMD		
Programme Level	The 4 programmes							All programmes improved performance between baseline and endline assessment on ELOM Total scores. Cotlands and TUC children improved the most from baseline to endline (an increase of 1.34 SD and 1.41 SD respectively). There is no statistical difference between them. They were followed by Ntataise ( $p < .00038$ ; $d = 0.37$ ) and Lesedi ( $p < .00002$ ; $d = 0.48$ ). NOTE: this refers to ELOM total and not domain scores
	Practitioner satisfaction with support provided by their organisations							Greater satisfaction of practitioners with the support of their organisations produced significantly greater performance on FMCVMI. Very few organisations were dissatisfied with their support, so this result represents the fact that the few who were dissatisfied were likely to produce lower FMCVMI results ( $p < .021$ ; $d = 0.93$ ).
Child Level	Child age							Improvement in ELOM scores were associated with increased age over the course of the study

	Component	Domains					ELOM Total	Elaboration
		CEF	ELL	ENM	FMCVMI	GMD		
	Growth status							Children with higher height-for-age scores (healthier and less likely to be malnourished) performed significantly better on all ELOM domains and on the ELOM Total score ( $p < .05$ ; $d = 0.54$ [Total, GMD, ENM]; $d = 0.40$ [FMCVMI, CEF, ELL]). One standard deviation of change in height-for-age produces a 3.17 point change on the ELOM Total standard score.
	Programme exposure from baseline to endline							Children with higher programme exposure, regardless of programme type, performed significantly better than children with lower programme exposure on the FMCVMI subscale of the ELOM ( $p = 0.0139$ ; $d = 0.35$ ). Programme exposure also emerged as a significant contributor to the overall picture of child performance on the ELOM total and ELL ( $p < .05$ ). Exposure to approximately 11 sessions of programming results in 1 point of change on the ELOM Total standard score; 154 sessions results in a change of 1 standard deviation.
	Years of programme enrolment							Children who had been in their programmes for three years performed significantly better than children with fewer years on GMD and ELL ( $p < .05$ ; $d = 0.35$ ). This produces 1.25 points of additional performance on GMD and 1.56 points on ELL, or approximately 0.3 standard deviations. This may also be a product of programmes which traditionally don't discriminate between children of different ages.
Home Level	Home learning environment							Children with greater learning resources at home performed significantly better on FMCVMI and CEF ( $p < .05$ ; $d = 0.33$ ). This effect represents a combination of more books in the home, and a variety of different types of toys to play with, such as store-bought toys, home-made toys, or the use of household objects as toys.

## CONCLUSIONS

### THE BIG PICTURE

Findings from this first large-scale outcome study of playgroup and centre-development models in South Africa provides useful pointers for early learning programme development, particularly as implementation of the National Integrated ECD Policy and NDP provisions for early childhood development deepens.

It needs to be stressed once more that the programme sites where children were assessed for this study were all selected because they were rated as well functioning by each of the organisations included in the study. They are therefore neither representative of the range of quality within each programme, nor of South African playgroup and centre-based provision. The same programmes as those studied here, poorly delivered, cannot be expected to deliver similar outcomes.

Overall, the study findings are very promising. All programmes contributed to improvement in children's ELOM Total standard scores between baseline and endline and the greatest gains were observed in the two programmes in which children had the lowest baseline scores. This is consistent with international research findings. These were one of the five-morning a week centre-based programmes and a two or three-morning a week playgroup. The latter finding adds to international evidence that limited (but quality) early learning programme exposure can make a significant difference to poor children (Rao et al., 2012).

The level from which programme children start at baseline is predictive of the extent of gain they are likely to make over the course of the intervention. Those that start from a low base, and particularly poorer children, are likely to grow more during the intervention than those who are better off and start the programme with higher scores (Barnett & Boocock, 1998; Pianta, Barnett, Burchinal & Thornburg, 2009). Our study findings confirm this observation.

This is the first study of the effectiveness of a part-time playgroup model in South Africa, and it suggests that sound quality, carefully controlled and supported playgroups, with school readiness targeted curricula, can make a significant difference for the poorest children, although they will not necessarily enable them to reach the ELOM Standard. Given the challenge of meeting the

needs of all young children in South Africa in the short to medium term, this is a very encouraging finding.

Despite improvements in all domains by children in all programmes, there was variability in terms of how much children gained and the probability of their reaching the ELOM standard. FMC/VMI was a weak area for the all children, regardless of programme type. Despite gains, playgroup children remained in the *Falling Behind* category at endline while both centre-development programmes had *Achieved the ELOM Standard* by endline. Children in two playgroup programmes moved from *At Risk* to *Falling Behind* for ENM, while in one playgroup programme, children moved from *Falling Behind* to *Achieving the ELOM Standard*. Children in one centre-based programme met the standard at both baseline and endline, while the other centre-based programme, where children were *Falling Behind* at baseline, achieved the most growth, with the children *Achieving the ELOM Standard* by endline. The other centre-based programme *Achieved the ELOM Standard* at both baseline and endline and was thus unlikely to change as much. While change is evident, CEF is an area of concern for the playgroup programmes in particular. Considerable gains in ELL were evident in one playgroup programme, with their children moving from *At Risk* to *Falling Behind* (1 standard score point off the ELOM Standard). Children in both centre-development programmes had *Achieved the Standard* by endline (one making significant gains).

Given the diversity of programmes and sites, findings about challenges in these domains suggest the need for a particular curriculum and/or practitioner training focus on FMC/VMI, CEF and ENM.

## **PREDICTORS OF CHANGE**

### **PROGRAMME LEVEL**

One playgroup and one centre-development programme realised the greatest changes in ELOM Total scores of the five. The contribution of specific programme level factors to changes in ELOM outcomes was measured, including practitioner satisfaction with resources and support, and practitioner ECD qualifications and experience. Practitioner satisfaction with support had a large effect on improvement on FMC/VMI. Practitioner qualifications and experience did not contribute to the outcomes.

## HOME ENVIRONMENT LEVEL

The NIECD includes provisions for supporting parenting and DSD is also rolling out a parenting training programme in partnership with the NGO sector. The effect of home factors shown to be significant in the international literature on ELOM outcomes was assessed. This included caregiver education levels, home learning resources and opportunities, as well as socio-economic status as indicated by quintile. The only significant finding was that availability of educational resources in the home, in the form of play materials and books, predicted CEF and FMC scores. None of the other variables were a significant predictor of change. In part this is likely due to their restricted score range. In addition, findings from caregiver reports reveal that, on average, parents and other primary caregivers had less than two hours for activities with their children during the course of the entire week. Across programmes, significant proportions of caregivers, or other family members, never engaged in key activities such as reading, telling stories or singing to their children. This finding indicates that, without significant changes to prevailing parenting practices and life circumstances of parents, programmes relying largely on parent input to achieve child education outcomes are unlikely to be successful.

## CHILD LEVEL

Children who attended more programme sessions, regardless of programme type, improved more on ELL, FMC/VMI, and ELOM total. While this holds for playgroups as well as for centre-based programmes, ensuring regular attendance is all the more critical when programmes deliver the service in one or two sessions per week (international evidence indicates a minimum of 15 hours per week is necessary).

We attempted to source the number of hours that children actually attended (from programme records), but the data obtained from participating organisations was uneven and not regarded as reliable. This important variable could therefore not be included in the model. Measuring programme exposure in hours is an important area for further study, particularly in relation to plans for the pre-Grade R year, and international benchmarks on the number of recommended hours of early learning input per week.

A point of concern for programming which aims to provide access to early learning programmes for children in the poorer quintiles 1 to 3 is the high dropout rate. As indicated above playgroups experienced higher attrition than centres (25 % and 19 % respectively). Some of the playgroup



drop out was due to children enrolling in centre programmes, which is a positive outcome, but there were also dropouts due to family re-location, which is common in very poor communities. For the centre development programmes (a quarter of Ntataise children dropped out), unaffordability of fees and relocation were the primary reasons. ECD programming strategy should seek both to mitigate gaps in participation by facilitating transfers between ECD services in different areas and to find ways of reducing the burden of fees on poor parents if the most vulnerable children are to have meaningful access.

The literature suggests that two or more years' exposure to a programme is more beneficial than one. In this study, children who attended for three years showed greater gains on GMD and ELL than those who attended for fewer than three years. Given the reported lack of language stimulation at home, longer participation in a programme is indicated to compensate. This finding suggests that children who have a group-based early learning opportunity prior to the pre-Grade R year are likely to derive greater benefit during that year.

As would be expected in line with the literature on early learning outcomes (Boyden, Dawes, Dornan & Tredoux 2019), children with higher height-for-age scores performed significantly better on all ELOM domains and on the ELOM Total score. This reemphasises that achieving good educational and developmental outcomes requires earlier interventions to ensure adequate health and nutrition and supports the NIECD focus on health and nutrition and the first 1000 days.

In sum, there are positive gains from all investigated channels of early learning programme delivery (including sessional playgroups), especially for those children who were most behind at baseline. Nevertheless, for many children, there are still gaps in terms of particular domains, such as early numeracy and mathematics, cognitive and executive functioning, and fine motor coordination. A concerted focus on these areas in programming is indicated. Higher programme exposure was revealed as significant for performance, and ensuring regular attendance, especially for sessional programmes, is critical. In this regard, feeding and other incentives may be valuable (as is the case with the study playgroup programmes). Children's height for age has a significant effect on their readiness for school across all ELOM domains, re-emphasising the importance of the health and nutrition contributors to early learning, and the importance of addressing this from the first 1000 days. Finally, parents or primary caregivers were reported to have little time to engage with young children. Programmes depending largely on parent input

are thus unlikely to be very successful in changing children's early learning outcomes. Where programmes are designed to include parent input, it is crucial that parent implementation of the learnings over the duration of the programme are monitored. Increased time in stimulating activities, and increased frequency in early language activities, would be the goal.

## STUDY LIMITATIONS

Internal validity is compromised by selection effects. All the programmes had enrolled the children prior to commencement of the study, and caregivers will have chosen a playgroup or a centre-based programme for a variety of reasons including motivation, their perceptions of the service, cost, and their proximity to the child's home. The children in the study groups may therefore differ for these reasons. Internal validity is compromised by selection effects. A quasi-experimental field study such as this, while providing clear evidence of relationships between predictors and early learning outcomes, does not employ a randomised experimental design in which children are assigned to one or other of the programmes under study and to a no programme control (the so-called counter-factual). That is the most powerful approach to determining whether programmes cause the observed outcomes. However, such a design is not always practical as was the case here. Future studies of early learning programme impact should strive to use randomised trial experimental designs. An example would be a design in which an organisation adds an ingredient believed to increase impact to some randomly selected programme sites while the standard intervention is delivered in the remainder. The outcomes of the two would then be compared.

Overall, study attrition was high. Twenty-two per cent (22%) of children assessed at baseline could not be followed up. Ninety-one per cent (91%) of these had dropped out of their programmes and 9% were absent on the day of assessment. Attrition will have compromised random sampling of the children within programmes, particularly Lesedi. Bias is probable but, on investigation, there were no differences between children who remained in the study and those who dropped out or who could not be assessed at endline on two key variables at baseline: ELOM Total score and age. On this basis, attrition did not compromise the statistical model, but other unobserved factors may have contributed to bias.

Children attending either Cotlands two or their three morning per week programmes were combined to simplify analysis for this report. Future analyses will examine the effects of each dose on child outcomes.

All programmes were requested to provide their attendance data (number of sessions and hours children attended). As we have noted, data on hours of attendance was not reliable, and number of sessions attended was used. Unfortunately, missing or unreliable attendance figures for LETCEE (SmartStart) prevented that programme's inclusion in the multi-level model. Measuring programme exposure in hours is an important area for further study, particularly in relation to plans for the pre-Grade R year and international benchmarks on the number of recommended hours of early learning input per week.

While we regard the use of the SASPRI datazone approach to site quintile allocation as an improvement on relying on school quintiles, this is still a proxy for the child's home background and economic well-being. The skewed and restricted range of study children's site quintiles is likely to have constrained our ability to observe a relationship between child deprivation levels and ELOM outcomes. Almost all the study children were on the Child Support Grant and 60% were in sites that fell into the two poorest quintiles. We were not able to obtain data on household expenditure and income, which would have permitted better estimates of the socio-economic status of the children. This should be considered in future studies.

Study programmes used very different internal systems for rating their practitioners (PQA) and other aspects of programme quality. We therefore lacked a common programme quality indicator to use across the study sites, and their ratings were not used in our modelling. Exploration of the limited data to hand would be possible for inclusion in a learning brief.

Finally, although controversial (Maloney, & Larrivee, 2007), some might regard it as desirable in a study of this nature to be able to indicate the relationship between ELOM score gain and the equivalent in months of the child's age (known as age equivalent scores). For example, an improvement of 0.5 SD from baseline to endline is equivalent to an advance of a certain number of months in age. Normally, this would require that we know what to expect regarding increases in ELOM scores by, for example, two-month intervals. As our ELOM age validation norm sample does not have sufficient children in each two-month band from 50-69 months to establish the necessary distribution this is currently not possible.

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## APPENDICES

### APPENDIX A: CONSENT FORMS

#### CHILD CONSENT FORM



#### INFORMED CONSENT FOR PARENT / GUARDIAN PARTICIPATION: INNOVATION EDGE EARLY CHILDHOOD DEVELOPMENT STUDY

**Principal Researcher:** Professor Andrew Dawes

**Address:** Psychology Department, University of Cape Town, Private Bag X3 Rondebosch 7700.

**Contact numbers to call should you want further information:**

Andrew Dawes: 082 422 99 40

Linda Biersteker: 083 7240 977

#### **Instructions:**

Please read carefully. Ask somebody to help if you cannot understand.

We are conducting research on early childhood programmes on behalf of an organisation called the Innovation Edge. The programmes we are studying include the one your child is attending. In this document we ask if you will give permission for your child's development to be measured as part of the research. In order to do this, one of our staff (an Assessor) will need to measure your child's development. This will be done two times: at the beginning and end of 2018 (March and September or October).

The Assessor will measure your child's:

1. Physical development and coordination of movements;
2. Ability to understand instructions and solve simple problems;
3. Language development;
4. Ability to count.
5. Height

The assessment will take about 45 minutes. All children will be told that they can stop the assessment at any time if they do not want to continue.

The child's teacher will assess his or her behaviour in the group at the end of 2018.

We will not report the results of the tests to anyone and everything will be kept confidential. However, if we see that there is a serious health problem with a child, we will inform ----- so that the parent can get help. At the end of the research we will write a report for ----- . Your child's name will not appear

in that report. The child scores may be used for research purposes. On the next page we ask you whether you agree that your child can be assessed or not.

## CONSENT FORM

PLEASE READ:

I understand that my child will be participating in a research study. I understand that the tests will not harm my child and that they will measure the child's height, language ability, counting, and ability to solve some problems. I understand that this will be done in March and September or October 2018.

The child's teacher will provide a rating of the child's behaviour in her group in 2018.

I understand that the results will be used for research. I understand that the results of my child's tests will remain confidential.

I understand that I am not being forced to give permission for my child to be assessed. I also understand that my child will not be forced to participate and nothing will happen to him or her if they do not want to. I understand that my child will not be excluded from the ECD programme if I do not agree to let my child participate. I also understand that neither I nor my child will be given anything for participating in the research.

PLEASE PRINT YOUR NAME HERE:

.....

IF YOU **AGREE** THAT YOUR CHILD CAN PARTICIPATE, MAKE AN X HERE:

IF YOU **DO NOT AGREE** THAT YOUR CHILD CAN PARTICIPATE, MAKE AN X HERE:

PLEASE SIGN HERE:

PLEASE FILL IN TODAY'S DATE HERE: DAY ..... MONTH .....  
2018

**VERY IMPORTANT: PLEASE RETURN THIS FORM TO YOUR CHILD'S TEACHER AT THE NEXT SESSION. IF YOU DO NOT SEND IT BACK WE SHALL ASSUME THAT YOU HAVE NO OBJECTIONS TO YOUR CHILD'S PARTICIPATION.**

**Thank you very much for completing the form.**

CAREGIVER CONSENT FORM



**INFORMED CONSENT FOR PARENT / GUARDIAN PARTICIPATION: INNOVATION EDGE  
EARLY CHILDHOOD DEVELOPMENT STUDY**

(To be completed prior to the commencement of the parent interview)

**Principal Researcher:** Professor Andrew Dawes

**Address:** Psychology Department, University of Cape Town, Private Bag X3 Rondebosch 7700.

**Contact numbers to call should you want further information:**

Andrew Dawes: 082 422 99 40

Linda Biersteker: 083 7240 977

**Instructions:**

Good day. My name is .....(interviewer name) .....

We are conducting research on early childhood programmes on behalf of an organisation called the Innovation Edge. They include the one your child is attending. In this document we ask if you will give permission for us to ask you short questions about your education and activities you and your family do with your child at home.

The interview should not take more than 10 minutes of your time. We use your responses in a report on our research, but your name will not appear. Everything you tell me will remain confidential.

On the next page we ask you whether you agree to be interviewed or not.

## CONSENT FORM

PLEASE READ:

I understand that I will be interviewed about my education and about activities I and my family do with my child at home.

I understand that I am not being forced to agree to this interview and that nothing will happen to me or my child if I do not want to be interviewed. I understand that my child will not be excluded from the ECD programme if I do not want to be interviewed. I also understand that neither I nor my child will be given anything for participating in the research.

I understand that my answers to the questions will not be told to anyone. What I say will remain confidential, I understand that my answers will be used for research purposes.

PLEASE PRINT YOUR NAME HERE:

.....

IF YOU <b>AGREE</b> TO BE INTERVIEWED, <u>MAKE AN X</u> HERE:	
---	--

IF YOU <b>DO NOT AGREE</b> TO BE INTERVIEWED, <u>MAKE AN X</u> HERE:	
--	--

PLEASE SIGN HERE:

PLEASE FILL IN TODAY'S DATE HERE: DAY..... MONTH .....  
2018

**Thank you very much for completing the form.**

## APPENDIX B: LETTER TO ECD CENTRE MANAGERS

Dear

Your centre is currently enrolled in the ----- programme. ----- is participating in a research study on the outcomes of early childhood centre support programmes on behalf of an organisation called the Innovation Edge.

This letter is to request your permission for one of the research staff to visit your centre to assess the development of some of the children. Parents will be asked to give consent for their children to be assessed. Also, parents will be asked to participate in a short 15 minute interview.

If you agree, a trained assessor will visit your centre to measure the development of selected children aged 4 – 5 years (only some of the children will be assessed).

This will be done two times: March and October/November 2018. The Assessor will measure the children's:

1. Physical development and coordination of movements;
2. Ability to understand instructions and solve simple problems;
3. Language development;
4. Ability to count.
5. Height

The assessment will take about 45 minutes. All children will be told that they can stop the assessment at any time if they do not want to continue. We will need a quiet space for the assessor to test the child in and if necessary will put up a gazebo outside.

The child's teacher will need to complete a short rating scale on his or her behaviour in the group in November 2018.

The results of the tests will be kept confidential and will not be reported to anyone. However, if there is a serious health problem with a child, centre management will be informed so you can refer the parent for help. At the end of the research the research team will write a report for Innovation Edge but it will not include the name of your centre or the children. Nothing will happen to you should your centre not wish to participate, nor will your centre receive anything for your participation.

We would very much appreciate your allowing testing to take place at your centre as it will provide information on how effectively our support programme is helping prepare children for school.

Signed

-----



## APPENDIX C: ASSESSOR BRIEFING NOTES

### Notes for ELOM Assessors

Thank you for agreeing to participate in this project! Your skills as trained ELOM assessors are valuable and much needed for projects such as these.

#### Introduction to the Project:

The ELOM Team are evaluating the developmental outcomes of children participating in a range of playgroups, mobile units and day mother groups. Children from the Free State, KwaZulu-Natal, Mpumalanga and the Western Cape are being assessed for this evaluation in March and again in October of this year 2018.

#### Reporting:

You will report to the Programme Manager, Elizabeth Girdwood for the duration of this contract. Her mobile number is 083 649 7487 and her email address is [elizabethgirdwood@gmail.com](mailto:elizabethgirdwood@gmail.com).

#### Materials and Equipment:

Before you set out for fieldwork, make sure you are equipped with the following:

- Tablet loaded with the latest ELOM form.  
*To do this:*
  1. Connect to WIFI
  2. Open ODK Collect
  3. Select GET BLANK FORM at the bottom of the list
  4. Press OK at login request
  5. Tick most recent form and click GET FORM on the bottom right
- Complete ELOM kit
- ELOM manual in the home language of the children you will be assessing
- Spirit level for measuring children's heights
- Blank A4 Paper
- Playgroup/Day mother/Centre addresses and contact numbers
- List of children to be assessed
- Gazebo (if needed)
- Transport stipend

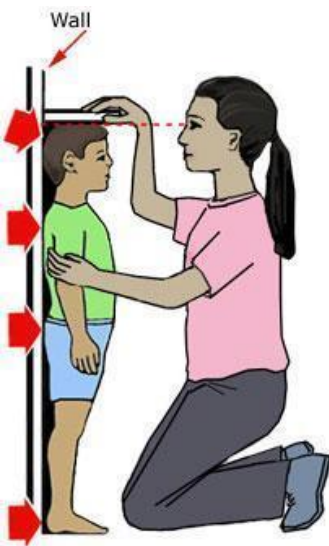
#### Daily Operations:

1. The night before you set out, make sure your tablet is fully charged and you have downloaded the ELOM SS from ODK Collect (see above). **Make sure your tablet is set to the correct time and date.** Make sure you are using the correct ELOM form only.
2. You will visit one site per day and assess 3 to 4 children.
  - a. Make sure the children that you are assess are the correct age **(50 – 63 months old)**.
  - b. Make sure you assess the children in their home language.
  - c. Make sure you are given signed parental consent forms for these children by the organisations. Please keep these forms for us.
3. At each franchisee, make note of the following and report back to the programme manager:

- a. How many children, in total, does each team look after?
- b. Does the playgroup/day mother/mobile unit have any assistants?
4. **Please measure the height of each child that you assess!** We have written clear instructions for how to do this – please see Appendix A.
5. At the end of each day, upload the assessments to the ELOM database when you have WIFI.

#### **Appendix A: Measuring Height Accurately**

1. Take the height measurement on an even floor surface and against a flat surface such as a wall or door frame. Fasten the tape measure to the wall or a door frame with the 1cm at the bottom and the higher measurements at the top with prestick or tape.
2. Remove the child's shoes, bulky clothing, and hair ornaments, and ensure that their hair style does not interfere with the measurement.



3. Have the child stand with feet flat, together, and against the wall. Make sure legs are straight, arms are at sides, and shoulders are level.
4. Make sure the child is looking straight ahead and that the line of sight is parallel with the floor.
5. Take the measurement while the child stands with head, shoulders, buttocks, and heels touching the flat surface (wall). (See illustration.) Depending on the overall body shape of the child, all points may not touch the wall.
6. Use the spirit level to form a right angle with the wall and lower it until it firmly touches the crown of the head. Ensure that it is level – you will know this when the air bubble is in the middle of the liquid.
7. Make sure your eyes are at the same level as the headpiece.
8. Note where the spirit level meets the wall and measure from the base on the floor to the spirit level wall to get the height measurement.
9. Accurately record the height to the nearest 0.1 centimetre.

**Notes for caregiver interviews (these will be done in October ONLY)**

As with the children, the ELOM team would like to see how the primary caregivers of children change over the course of the programme year (2018).

Once you have assessed the children, please arrange to meet the child's primary caregiver with the day mother/playgroup leader to conduct the interview. The interviews will take around 15 minutes to complete.

The interview guide/manual will be emailed to you. Please print this and take it to every interview to use as your manual. You will capture the data using your tablets. In order to download the form, please do the following:

Before you begin the interview, please make sure that:

- You interview the **primary caregiver** of the new child
- The child is NEW to the programme; they were enrolled in **2018**.
- The caregiver signs the consent form in their home language *before* you start the interview. Please reassure them that this does not prejudice them or their child in ANY way. Keep these consent forms together with the child consent forms.

## APPENDIX D: HOME LEARNING ENVIRONMENT QUESTIONNAIRE

Administrative Information	
Date of Assessment (day/ month/ year)	
Name of Assessor	
Name and Surname of Main Caregiver	
Name and Surname of Child	First name:  Surname:
Child SmartStarter ID	

Assessor Instructions
<i>When asking the questions, refer to the child who participates in the SmartStart programme.</i>
<i>Begin the introduction by saying: “Thank you for agreeing to talk to me. I am interested in what you do with your child at home. This won’t take long. I just have a few questions.”</i>
<i>Please note the response format per question – when using a tablet, you may have to:</i> <ul style="list-style-type: none"><li>● <i>Select an answer from a dropdown selection</i></li><li>● <i>Input a particular number</i></li><li>● <i>Input a particular text item (e.g. “friend”)</i></li></ul>

SECTION 1 Caregiver Information		
Caregiver Question	Response	
<i>Background</i>		
1.1: How old are you?	(specify number) _ years	
1.2: What is your relationship to <i>(child's name)</i> ?	(select) <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt <input type="checkbox"/> Grandmother <input type="checkbox"/> Other relative _____ (specify) <input type="checkbox"/> Other _____ (specify)	
1.3: How many children do you look after in your household?	(specify number) _ children	
<i>Caregiver Education</i>		
1.4: What is the highest school grade you have completed?	(select) <input type="checkbox"/> Grade 1 <input type="checkbox"/> Grade 2 <input type="checkbox"/> Grade 3 <input type="checkbox"/> Grade 4 <input type="checkbox"/> Grade 5 <input type="checkbox"/> Grade 6 <input type="checkbox"/> Grade 7 <input type="checkbox"/> Grade 8 <input type="checkbox"/> Grade 9 <input type="checkbox"/> Grade 10 <input type="checkbox"/> Grade 11 <input type="checkbox"/> Grade 12 <input type="checkbox"/> Other _____ (specify)	
1.5: Have you completed any post-school training?	(select) <input type="checkbox"/> Yes <input type="checkbox"/> No	
1.5.1: IF YES, was this a certificate, diploma, or degree?	(select) <input type="checkbox"/> Certificate <input type="checkbox"/> Diploma <input type="checkbox"/> Degree	
1.6: I am now going to ask you how much time you have in the day to play and talk with your child.		
1.6.1: How much time do you have between Monday and Friday to play with, read to and talk with your child?		
VERY LITTLE TIME (less than an hour)	SOME TIME (about 2 hours)	LOTS OF TIME (more than 2 hours)
1.6.2: NOW, think about the weekend. On the weekend, how much time do you have to play with, read to and talk with your child??		

VERY LITTLE TIME (less than an hour)	SOME TIME (about 2 hours)	LOTS OF TIME (more than 2 hours)
---	------------------------------	-------------------------------------

Thank you. Now I will ask you about books and playthings at home.

SECTION 2 HOME LEARNING ENVIRONMENT 2.1: Resources (MICS)		
<b>2.1.1: How many children's books or picture books do you have for (child's name)?</b>	(select) <input type="checkbox"/> None OR (specify number) _____	
<b>I am interested in learning about the things that (child's name) plays with when he/she is at home. Does she play with:</b>		
<b>2.1.2: Homemade toys (such as dolls, cars, or other toys made at home)?</b> (IF YES, probe to learn specifically what the child plays with to ascertain a response)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know (specify)	
<b>2.1.3: Toys from a shop or manufactured toys?</b> (IF YES, probe to learn specifically what the child plays with to ascertain a response)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know (specify)	
<b>2.1.4: Household objects (such as bowls or pots, bottle tops) or objects found outside (such as sticks, rocks, seeds or leaves)?</b> (IF YES, probe to learn specifically what the child plays with to ascertain a response)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know (specify)	
SECTION 2 HOME LEARNING ENVIRONMENT 2.2: (MICS and HLE)		
<b>Assessor Instructions:</b> Read each item to the respondent and mark the response (never, sometimes, many times) with X.		
<b>I am now going to ask you about activities you or any household member did with (child's name) in the past week (past 7 days).</b>		
<b>Tell me if it never happened, if it happened sometimes, or if it happened often in the past week</b>		
<b>2.2.1: In the past week, how often did you or any household member read books to or look at picture books with (child's name)?</b>		
<b>Was it never, sometimes or many times?</b>		
NEVER	SOME TIMES	MANY TIMES
<b>If somebody</b> read books to (child's name) or looked at picture books with (child's name), who was that?	Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father	

		<input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother <input type="checkbox"/> Other person in the house _____ (specify)
<b>2.2.2: <u>In the past week</u>, how often did you or any household member tell stories to (<i>child's name</i>)?</b>		
<b><i>Was it never, sometimes or many times?</i></b>		
NEVER	SOME TIMES	MANY TIMES
<b>Who</b> told stories to ( <i>child's name</i> )?		Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother <input type="checkbox"/> Other person in the house _____ (specify)
<b>2.2.3: <u>In the past week</u>, how often did you or any household member sing songs to (<i>child's name</i>) or with (<i>child's name</i>) including lullabies (songs when the child is going to sleep)?</b>		
<b><i>Was it never, sometimes or many times?</i></b>		
NEVER	SOME TIMES	MANY TIMES
<b>Who</b> sang songs or lullabies to ( <i>child's name</i> )?		Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother <input type="checkbox"/> Other person in the house _____ (specify)
<b>2.2.4: <u>In the past week</u>, how often did you or any household member take (<i>child's name</i>) outside the home, compound, yard or enclosure?</b>		
<b><i>Was it never, sometimes or many times?</i></b>		
NEVER	SOME TIMES	MANY TIMES
<b>Who</b> took ( <i>child's name</i> ) outside the home, compound, yard or enclosure?		Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother <input type="checkbox"/> Other person in the house _____ (specify)
<b>2.2.5: <u>In the past week</u>, how often did you or any household member play with (<i>child's name</i>)?</b>		
<b><i>Was it never, sometimes or many times?</i></b>		

NEVER	SOME TIMES	MANY TIMES
<b>Who Played with (<i>child's name</i>)?</b>		Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother <input type="checkbox"/> Other person in the house _____ (specify)
<b>2.2.6: In the past week, how often did you or any household member tell (<i>child's name</i>) the names of things?</b>		
<b>Was it never, sometimes or many times?</b>		
NEVER	SOME TIMES	MANY TIMES
<b>Who told (<i>child's name</i>) the names of things?</b>		Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother <input type="checkbox"/> Other person in the house _____ (specify)
<b>2.2.7: In the past week, how often did you or any household member count things with (<i>child's name</i>)?</b>		
<b>Was it never, sometimes or many times?</b>		
NEVER	SOME TIMES	MANY TIMES
<b>Who counted things with (<i>child's name</i>)?</b>		Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother <input type="checkbox"/> Other person in the house _____ (specify)
<b>2.2.8: In the past week, how often did you or any household member draw or paint things with (<i>child's name</i>)?</b>		
<b>Was it never, sometimes or many times?</b>		
NEVER	SOME TIMES	MANY TIMES
<b>Who drew or painted things with (<i>child's name</i>)?</b>		Select [multiple allowed] <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Aunt or uncle <input type="checkbox"/> Grandparent <input type="checkbox"/> Sister or brother



	<input type="checkbox"/> Other person in the house _____ (specify)
--	---

<b>SECTION 3</b> <b>Your child's ECD programme</b>	
<b>3.1: How did you find out about the ECD programme your child attends?</b> <i>(do not prompt)</i>	(select one) <input type="checkbox"/> From a family member friend or other community member <input type="checkbox"/> It was advertised in my community <input type="checkbox"/> (Name of ECD provider)I invited me to participate <input type="checkbox"/> I observed other children attending <input type="checkbox"/> Other, specify _____
<b>3.2: Please tell me the most important reason you send your child / children to this ECD programme?</b> <i>(do not prompt)</i>	Mark only the most important reason given: <input type="checkbox"/> It prepares child for school <input type="checkbox"/> It provides child care while busy / at work <input type="checkbox"/> It provides the child with food <input type="checkbox"/> It provides a chance to be with other children <input type="checkbox"/> I work at this programme and my child attends with me <input type="checkbox"/> The (name of ECD programme) helps me learn about how to help my child's development
<b>3.3: Your child is in an ECD programme in your community. Are there any other early learning a child care services in your community? Please tell me what they are.</b> <i>(Assessor: do not prompt; tick the answer given)</i>	
1. Playgroups run by other people or organisations	<input type="checkbox"/>
2. Crèches	<input type="checkbox"/>
3. Preschools	<input type="checkbox"/>
4. Child minder / day mother groups	<input type="checkbox"/>
5. Mobile playgroup or toy library	<input type="checkbox"/>
6. Is there any thing else that young children attend in your community?	
<i>(Assessor: if the answer given is actually one of the options above, tick that option above. If it is a service not listed above, write the parent's response in English and in capital letters here)</i>	
<b>3.3.1: If the mother says YES to any of the above questions (3.3), ask: Why did you choose this ECD programme and not one of the other services you have mentioned?</b> <i>(Assessor: do not prompt; tick the answer given)</i>	
1. I was visited by (this ECD programme) and decided to send my child	<input type="checkbox"/>
2. I heard about (name of ECD programme) from somebody and decided to send my child	<input type="checkbox"/>
3. It is convenient to take the child	<input type="checkbox"/>
4. I cannot afford to send my child to another service	<input type="checkbox"/>
5. I know the person who runs the class / group (friend or relative)	<input type="checkbox"/>
6. Other reasons <i>(Assessor: write the parent's response clearly in English and in capital letters here):</i>	

***Thank you very much for talking to me***

## APPENDIX E: PRACTITIONER INTERVIEW

<b>Programme Details</b>	
How many children are enrolled in this class?	
Number of practitioners responsible for the group (if one is absent today enter the number that normally works with this group)?	
What time does the programme start?	Hh:mm
What time does it end?	Hh:mm
Did the programme start on time today?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you charge fees?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes what is monthly fee?	
What is the fee income in an average month during this year (2018)?	
How adequate is your learning space for setting out interest areas for all the children, putting out the kit, and for displaying posters and children's work?	<input type="checkbox"/> Completely inadequate (1) <input type="checkbox"/> Quite inadequate (2) <input type="checkbox"/> Adequate (3) <input type="checkbox"/> Good (4) <input type="checkbox"/> Excellent (5)
What equipment and materials do you use for offering the daily activities?	(multiple select) <input type="checkbox"/> Bought materials <input type="checkbox"/> Toy kit <input type="checkbox"/> Improvised materials (made or found) <input type="checkbox"/> Additional materials (not improvised; donated or bought) <input type="checkbox"/> Toy and book library
Are there sufficient materials for all the children to do the activities?	<input type="checkbox"/> Completely inadequate (1) <input type="checkbox"/> Quite inadequate (2) <input type="checkbox"/> Adequate (3) <input type="checkbox"/> Good (4) <input type="checkbox"/> Excellent (5)
<b>Practitioner Details</b>	
What is your date of birth?	(dd/mm/yy)
How long have you worked in ECD?	(years)
Do you receive a salary? If yes, what type?	<input type="checkbox"/> No salary <input type="checkbox"/> Salary <input type="checkbox"/> EPWP <input type="checkbox"/> CWP

	<input type="checkbox"/> Other
What is the highest school grade you have completed?	(Grade 1 – 12)
What is the highest ECD qualification that you have?	<input type="checkbox"/> Certification by your programme <input type="checkbox"/> NQF Level 4 <input type="checkbox"/> NQF Level 5 <input type="checkbox"/> Other (specify)
<b>Support</b>	
When did you first enrol for the [support programme]?	Dd/mm/yy
How many times has the [programme name] [supervisor, trainer, coach] visited your centre since January 2018?	
How would you rate the level of support you receive from the [supervisor, trainer, coach]?	<input type="checkbox"/> Not at all satisfied <input type="checkbox"/> Slightly satisfied <input type="checkbox"/> Neutral <input type="checkbox"/> Very satisfied <input type="checkbox"/> Extremely satisfied
How many [support] sessions have you attended since January 2018?	
Have any other staff in your centre participated in the [support programme]? If yes how many?	<input type="checkbox"/> Yes <input type="checkbox"/> No

## APPENDIX F: SUMMARY OF QUALITY DATA

	Daily Routine is Followed	Learning Area Setup	Available Resources	Range of Activities	Story	Child Engagement	Building Language and Literacy	Focus on Maths Concepts
<b>Ntataise</b>	"general" (5)	-	Make believe; Art area; Walls of playrooms; Book area; Construction Area; Educational Toy area; Play Area; Outdoor equipment (39)	-	-	-	-	-
<b>Lesedi</b>	"Follow daily routine" (4)	"Learning environment happy, exciting, safe and clean?"(4)	-	"Good variety of activities provided weekly and changed weekly?"(4)	-	"PF's ability to manage child behaviour positively?" (4)	"Focus on early literacy and early numeracy?" (4)	"Focus on early literacy and early numeracy?" (4)
<b>TUC</b>	"Presence of daily programme"(3?)	"5 thematic areas set up"	"Ability to set up classroom using TUC resources"	"Lesson plan linked to practitioner guide"	-	"Explains and demonstrates activities"	"Introduces new words and concepts"	-
<b>SS</b>	"Consistent use of the SS routine" (16)	-	"A stimulating and adequately resourced learning environment" (12)	-	"Interactive storytelling which introduces children to new language and learning" (8)	"Opportunities for child-directed, open-ended play, supported and directed by adults" (10)	"Positive and plentiful adult-child interactions which encourage a rich use of language" (10)	-
<b>Cotlands</b>	"Discussion is linked to ELG LP"; "Maths activity is implemented per the LP"; "Game is being played per the LP" (6)	"All 7 learning areas are set up" (2)	"Sufficient resources are available" (2)	"ELF demonstrated/teaches each learning area" (2)	"Story is read/told in an animated way" (2)	"ELFA engages with all children at the stations" (2)	"ELFA reinforces maths and language concepts' (2)	"Maths concept is reinforced throughout the ELG" (2)

## APPENDIX G: STATISTICAL APPENDIX

### ANOVA RESULTS

#### *#total*

##	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
## totaltest	1	2	6312.088	6321.296	-3154.044			
## totaltest2	2	3	6254.198	6268.009	-3124.099	1 vs 2	59.8904	<.0001
## totaltest3	3	4	5836.009	5854.425	-2914.005	2 vs 3	420.1883	<.0001
## totaltest4	4	5	5762.047	5785.067	-2876.023	3 vs 4	75.9622	<.0001

#### *#gmd*

##	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
## gmdtest	1	2	4336.396	4345.604	-2166.198			
## gmdtest2	2	3	4328.357	4342.168	-2161.178	1 vs 2	10.03991	0.0015
## gmdtest3	3	4	4105.279	4123.695	-2048.640	2 vs 3	225.07755	<.0001
## gmdtest4	4	5	4049.054	4072.074	-2019.527	3 vs 4	58.22479	<.0001

#### *#fmcvmi*

##	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
## fmcvmitest	1	2	4139.041	4148.249	-2067.521			
## fmcvmitest2	2	3	4106.579	4120.391	-2050.290	1 vs 2	34.46199	<.0001
## fmcvmitest3	3	4	3890.152	3908.568	-1941.076	2 vs 3	218.42702	<.0001
## fmcvmitest4	4	5	3834.795	3857.814	-1912.397	3 vs 4	57.35753	<.0001

#### *#enm*

##	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
## enmtest	1	2	4410.242	4419.450	-2203.121			
## enmtest2	2	3	4301.492	4315.304	-2147.746	1 vs 2	110.7496	<.0001
## enmtest3	3	4	4153.901	4172.317	-2072.951	2 vs 3	149.5907	<.0001
## enmtest4	4	5	4095.135	4118.155	-2042.568	3 vs 4	60.7661	<.0001

#### *#cef*

##	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
## ceftest	1	2	4307.053	4316.261	-2151.526			
## ceftest2	2	3	4231.043	4244.855	-2112.521	1 vs 2	78.01042	<.0001
## ceftest3	3	4	4034.617	4053.033	-2013.308	2 vs 3	198.42580	<.0001
## ceftest4	4	5	3999.951	4022.971	-1994.976	3 vs 4	36.66551	<.0001

#### *#ell*

##	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
## elltest	1	2	4396.059	4405.267	-2196.030			
## elltest2	2	3	4340.180	4353.992	-2167.090	1 vs 2	57.87901	<.0001
## elltest3	3	4	4209.078	4227.494	-2100.539	2 vs 3	133.10208	<.0001
## elltest4	4	5	4132.057	4155.077	-2061.029	3 vs 4	79.02077	<.0001

## ELOM TOTAL

### Linear mixed-effects model fit by maximum likelihood

```
## Data: total_Long
##      AIC      BIC    LogLik
## 3937.464 4047.661 -1942.732
##
## Random effects:
## Formula: ~1 | practitioner
##      (Intercept)
## StdDev:    2.976465
##
## Formula: ~1 | child %in% practitioner
##      (Intercept) Residual
## StdDev:    9.887116 7.161644
##
```

### Model Parameters

```
## Fixed effects: total ~ time + age + quintile + organisation + legacy_exposure +
height_for_age + practitioner_child_ratio + satisfaction_resources +
satisfaction_support + practitioner_experience + ecd_qualification +
caregiver_education + hle_time + hle_resources + years_in_programme +
time:organisation
```

	Value	Std.Error	DF	t-value
## (Intercept)	-41.21277	13.634957	252	-3.022581
## timetotal_post	18.90309	1.397420	252	13.527136
## age	1.03940	0.205246	204	5.064162
## quintile	0.45533	1.021206	204	0.445875
## organisationLesedi	12.37837	4.105584	33	3.015007
## organisationNtataise	4.27833	5.345117	33	0.800419
## organisationTUC	-10.21654	6.338239	33	-1.611889
## legacy_exposure	0.09117	0.050012	204	1.822983
## height_for_age	3.17030	0.737068	204	4.301238
## practitioner_child_ratio	0.29849	0.150474	204	1.983674
## satisfaction_resources	-0.23059	0.464998	33	-0.495903
## satisfaction_support	1.25499	1.204609	33	1.041820
## practitioner_experience	0.08629	0.162960	33	0.529525
## ecd_qualification	1.03802	1.512934	33	0.686096
## caregiver_education	-0.00777	0.262887	204	-0.029563
## hle_time	-0.25590	0.401440	204	-0.637446
## hle_resources	0.98089	0.518988	204	1.890015
## years_in_programme2nd year in programme	-0.01508	2.199187	204	-0.006858
## years_in_programme3rd year in programme	3.94352	2.129242	204	1.852077
## years_in_programmeDo Not Know	2.35425	12.051077	204	0.195356
## timetotal_post:organisationLesedi	-8.14734	2.153569	252	-3.783181
## timetotal_post:organisationNtataise	-5.19062	1.777515	252	-2.920155
## timetotal_post:organisationTUC	0.93552	1.855934	252	0.504070

### Significance Tests



```

##                               p-value
## (Intercept)                   0.0028
## timetotal_post                 0.0000
## age                           0.0000
## quintile                       0.6562
## organisationLesedi             0.0049
## organisationNtataise           0.4292
## organisationTUC                0.1165
## legacy_exposure                0.0698
## height_for_age                 0.0000
## practitioner_child_ratio       0.0486
## satisfaction_resources          0.6232
## satisfaction_support            0.3051
## practitioner_experience         0.6000
## ecd_qualification              0.4974
## caregiver_education            0.9764
## hle_time                       0.5245
## hle_resources                  0.0602
## years_in_programme2nd year in programme 0.9945
## years_in_programme3rd year in programme 0.0655
## years_in_programmeDo Not Know  0.8453
## timetotal_post:organisationLesedi 0.0002
## timetotal_post:organisationNtataise 0.0038
## timetotal_post:organisationTUC   0.6147

```

### Standardized Within-Group Residuals

```

##           Min           Q1           Med           Q3           Max
## -2.599870044 -0.487403680 -0.004449687  0.491307514  2.358582218
##
## Number of Observations: 512
## Number of Groups:
##           practitioner child %in% practitioner
##                   41                   256

```

### ANOVA

```

##           numDF denDF   F-value p-value
## (Intercept)      1   252 2904.8435 <.0001
## time              1   252  616.9666 <.0001
## age               1   204  52.3872 <.0001
## quintile          1   204   0.5513  0.4587
## organisation      3    33  12.4043 <.0001
## legacy_exposure   1   204   8.0931  0.0049
## height_for_age    1   204 22.5337 <.0001
## practitioner_child_ratio 1  204   3.2921  0.0711
## satisfaction_resources 1   33   0.0312  0.8609
## satisfaction_support 1   33   0.4011  0.5309
## practitioner_experience 1   33   0.2276  0.6364
## ecd_qualification  1   33   0.7631  0.3887
## caregiver_education 1  204   0.1222  0.7271
## hle_time           1  204   0.0634  0.8014
## hle_resources      1  204   3.3851  0.0672
## years_in_programme 3  204   1.5986  0.1909
## time:organisation  3  252   9.5846 <.0001

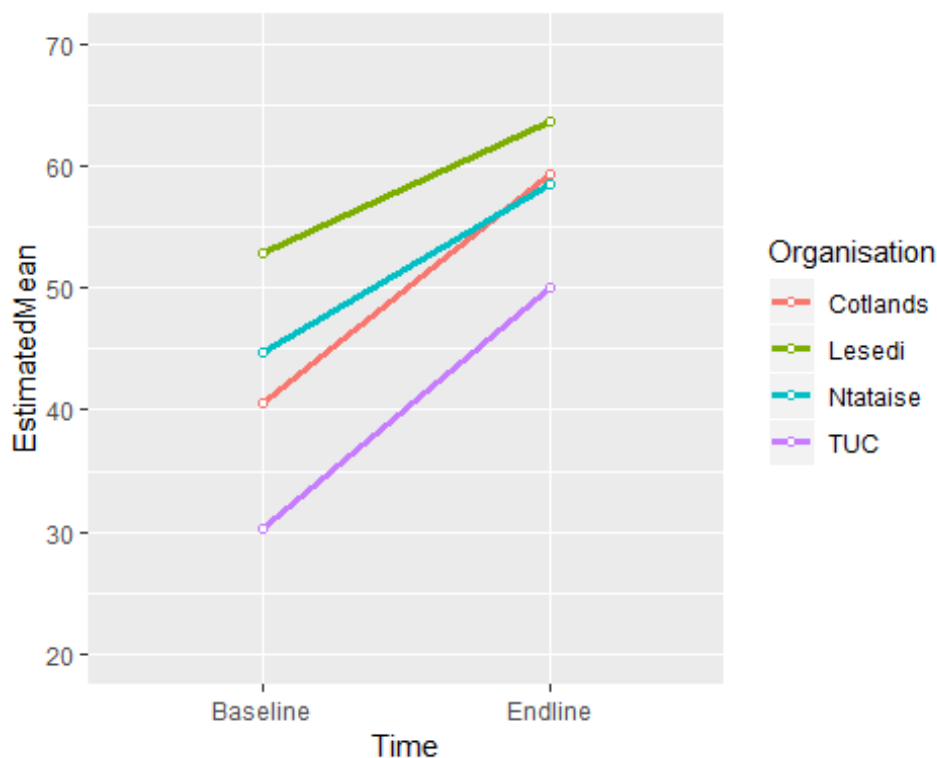
```

### emmeans

```

## organisation time      emmean   SE df Lower.CL upper.CL
## Cotlands total_pre    40.5 4.61 33   31.1   49.9
## Lesedi total_pre     52.9 5.93 33   40.8   64.9
## Ntataise total_pre    44.8 3.93 33   36.8   52.8
## TUC total_pre        30.3 4.70 33   20.7   39.9
## Cotlands total_post   59.4 4.61 33   50.0   68.8
## Lesedi total_post    63.6 5.93 33   51.6   75.7
## Ntataise total_post   58.5 3.93 33   50.5   66.5
## TUC total_post       50.1 4.70 33   40.6   59.7
##
## Results are averaged over the Levels of: years_in_programme
## d.f. method: containment
## Confidence Level used: 0.95

```



## GROSS MOTOR DEVELOPMENT

### Linear mixed-effects model fit by maximum likelihood

```

## Data: gmd_Long
##      AIC      BIC    LogLik
## 2760.365 2870.561 -1354.182
##
## Random effects:
## Formula: ~1 | practitioner
##      (Intercept)
## StdDev: 1.239609
##
## Formula: ~1 | child %in% practitioner
##      (Intercept) Residual
## StdDev: 1.704562 2.894779

```

```
##
```

## Model Parameters

```
## Fixed effects: gmd ~ time + age + quintile + organisation + legacy_exposure +  
height_for_age + practitioner_child_ratio + satisfaction_resources +  
satisfaction_support + practitioner_experience + ecd_qualification +  
caregiver_education + hle_time + hle_resources + years_in_programme +  
time:organisation
```

##	Value	Std.Error	DF	t-value
## (Intercept)	-8.158112	3.673638	252	-2.220717
## timegmd_post	5.098000	0.564845	252	9.025478
## age	0.249804	0.050816	204	4.915836
## quintile	-0.132811	0.283187	204	-0.468987
## organisationLesedi	2.536390	1.339880	33	1.892997
## organisationNtataise	-1.520317	1.522733	33	-0.998413
## organisationTUC	-1.385003	1.679096	33	-0.824850
## legacy_exposure	0.013141	0.012367	204	1.062623
## height_for_age	0.637269	0.180677	204	3.527124
## practitioner_child_ratio	0.087451	0.042164	204	2.074063
## satisfaction_resources	-0.090976	0.140471	33	-0.647650
## satisfaction_support	0.069337	0.364946	33	0.189993
## practitioner_experience	0.000854	0.048647	33	0.017550
## ecd_qualification	0.129774	0.441668	33	0.293826
## caregiver_education	-0.002827	0.065124	204	-0.043412
## hle_time	-0.135426	0.098637	204	-1.372974
## hle_resources	0.110667	0.126757	204	0.873059
## years_in_programme2nd year in programme	0.322392	0.545819	204	0.590657
## years_in_programme3rd year in programme	1.247656	0.536464	204	2.325701
## years_in_programmeDo Not Know	-0.668734	3.039671	204	-0.220002
## timegmd_post:organisationLesedi	-2.574250	0.870485	252	-2.957258
## timegmd_post:organisationNtataise	-0.420472	0.718482	252	-0.585223
## timegmd_post:organisationTUC	-1.601750	0.750180	252	-2.135155

## Significance Tests

##	p-value
## (Intercept)	0.0273
## timegmd_post	0.0000
## age	0.0000
## quintile	0.6396
## organisationLesedi	0.0672
## organisationNtataise	0.3253
## organisationTUC	0.4154
## legacy_exposure	0.2892
## height_for_age	0.0005
## practitioner_child_ratio	0.0393
## satisfaction_resources	0.5217
## satisfaction_support	0.8505
## practitioner_experience	0.9861
## ecd_qualification	0.7707
## caregiver_education	0.9654
## hle_time	0.1713
## hle_resources	0.3837
## years_in_programme2nd year in programme	0.5554
## years_in_programme3rd year in programme	0.0210
## years_in_programmeDo Not Know	0.8261
## timegmd_post:organisationLesedi	0.0034
## timegmd_post:organisationNtataise	0.5589

```
## timegmd_post:organisationTUC 0.0337
```

### Standardized Within-Group Residuals

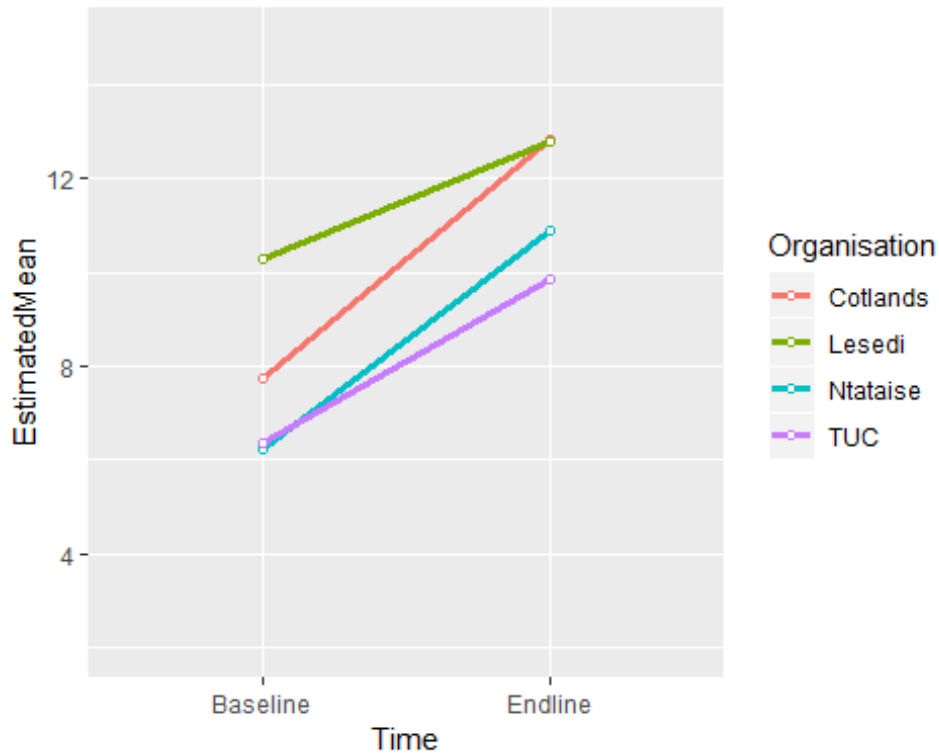
```
##           Min           Q1           Med           Q3           Max
## -2.42354946 -0.61896226 -0.02489999  0.58663288  2.58837569
##
## Number of Observations: 512
## Number of Groups:
##           practitioner child %in% practitioner
##                   41                   256
```

### ANOVA

	numDF	denDF	F-value	p-value
## (Intercept)	1	252	1171.8739	<.0001
## time	1	252	245.1294	<.0001
## age	1	204	30.0975	<.0001
## quintile	1	204	1.1411	0.2867
## organisation	3	33	1.3447	0.2767
## legacy_exposure	1	204	3.6463	0.0576
## height_for_age	1	204	16.1908	0.0001
## practitioner_child_ratio	1	204	3.9398	0.0485
## satisfaction_resources	1	33	0.4719	0.4969
## satisfaction_support	1	33	0.0802	0.7788
## practitioner_experience	1	33	0.0171	0.8968
## ecd_qualification	1	33	0.0649	0.8005
## caregiver_education	1	204	0.0096	0.9219
## hle_time	1	204	1.6168	0.2050
## hle_resources	1	204	0.7731	0.3803
## years_in_programme	3	204	2.0727	0.1050
## time:organisation	3	252	3.9909	0.0084

### emmeans

	emmean	SE	df	Lower.CL	upper.CL
## organisation time					
## Cotlands gmd_pre	7.74	1.25	33	5.20	10.28
## Lesedi gmd_pre	10.27	1.69	33	6.84	13.71
## Ntataise gmd_pre	6.22	1.07	33	4.04	8.40
## TUC gmd_pre	6.35	1.23	33	3.85	8.85
## Cotlands gmd_post	12.84	1.25	33	10.30	15.38
## Lesedi gmd_post	12.80	1.69	33	9.36	16.23
## Ntataise gmd_post	10.90	1.07	33	8.71	13.08
## TUC gmd_post	9.85	1.23	33	7.35	12.35
##					
## Results are averaged over the Levels of: years_in_programme					
## d.f. method: containment					
## Confidence Level used: 0.95					



## FMCVMI

### Linear mixed-effects model fit by maximum likelihood

```
## Data: fmcvmi_Long
##      AIC      BIC    LogLik
## 2621.048 2731.245 -1284.524
##
## Random effects:
## Formula: ~1 | practitioner
##      (Intercept)
## StdDev: 0.0004561862
##
## Formula: ~1 | child %in% practitioner
##      (Intercept) Residual
## StdDev: 1.884178 2.445459
##
```

### Model Parameters

```
## Fixed effects: fmcvmi ~ time + age + quintile + organisation + legacy_exposure +
height_for_age + practitioner_child_ratio + satisfaction_resources +
satisfaction_support + practitioner_experience + ecd_qualification +
caregiver_education + hle_time + hle_resources + years_in_programme +
time:organisation
```

	Value	Std.Error	DF	t-value
## (Intercept)	-10.501365	2.8591936	252	-3.672842
## timefmcvmi_post	4.090909	0.4771717	252	8.573244
## age	0.231947	0.0453874	204	5.110390
## quintile	0.292197	0.2075491	204	1.407845
## organisationLesedi	3.699346	0.7967056	33	4.643304
## organisationNtataise	0.382893	1.1187483	33	0.342251
## organisationTUC	-3.505513	1.3893076	33	-2.523209
## legacy_exposure	0.027573	0.0111136	204	2.481051
## height_for_age	0.469589	0.1653699	204	2.839625

```

## practitioner_child_ratio          0.063246 0.0305162 204 2.072542
## satisfaction_resources             -0.051577 0.0887215 33 -0.581339
## satisfaction_support               0.612757 0.2282894 33 2.684125
## practitioner_experience            -0.000416 0.0316546 33 -0.013145
## ecd_qualification                 0.326750 0.3000559 33 1.088964
## caregiver_education               -0.043562 0.0580203 204 -0.750800
## hle_time                           -0.103441 0.0898112 204 -1.151759
## hle_resources                     0.300985 0.1168038 204 2.576846
## years_in_programme2nd year in programme 0.409783 0.4891437 204 0.837755
## years_in_programme3rd year in programme 0.864412 0.4647586 204 1.859916
## years_in_programmeDo Not Know      2.211971 2.6804425 204 0.825226
## timefmcvmi_post:organisationLesedi -2.421659 0.7353709 252 -3.293112
## timefmcvmi_post:organisationNtataise -2.096078 0.6069612 252 -3.453397
## timefmcvmi_post:organisationTUC    0.459508 0.6337388 252 0.725074

```

### Significance Tests

```

##                                     p-value
## (Intercept)                        0.0003
## timefmcvmi_post                    0.0000
## age                                 0.0000
## quintile                            0.1607
## organisationLesedi                  0.0001
## organisationNtataise                0.7343
## organisationTUC                     0.0166
## legacy_exposure                    0.0139
## height_for_age                      0.0050
## practitioner_child_ratio            0.0395
## satisfaction_resources               0.5650
## satisfaction_support                 0.0113
## practitioner_experience              0.9896
## ecd_qualification                   0.2841
## caregiver_education                 0.4536
## hle_time                            0.2508
## hle_resources                       0.0107
## years_in_programme2nd year in programme 0.4031
## years_in_programme3rd year in programme 0.0643
## years_in_programmeDo Not Know       0.4102
## timefmcvmi_post:organisationLesedi  0.0011
## timefmcvmi_post:organisationNtataise 0.0006
## timefmcvmi_post:organisationTUC    0.4691

```

### Standardized Within-Group Residuals

```

##           Min           Q1           Med           Q3           Max
## -2.70970870 -0.58273601 -0.04656371  0.57101235  2.21857248
##
## Number of Observations: 512
## Number of Groups:
##           practitioner child %in% practitioner
##                   41                   256

```

### ANOVA

```

##           numDF denDF  F-value p-value
## (Intercept)      1   252 4880.300 <.0001
## time              1   252  198.107 <.0001
## age               1   204   60.414 <.0001

```

```

## quintile          1  204  0.471  0.4933
## organisation     3   33 10.640 <.0001
## legacy_exposure  1  204 11.765 0.0007
## height_for_age   1  204  9.063 0.0029
## practitioner_child_ratio 1 204 2.749 0.0988
## satisfaction_resources 1 33 0.011 0.9187
## satisfaction_support 1 33 7.313 0.0107
## practitioner_experience 1 33 0.001 0.9749
## ecd_qualification 1 33 1.775 0.1919
## caregiver_education 1 204 0.021 0.8853
## hle_time         1  204  0.477 0.4906
## hle_resources    1  204  6.902 0.0093
## years_in_programme 3  204  1.313 0.2714
## time:organisation 3  252 10.541 <.0001

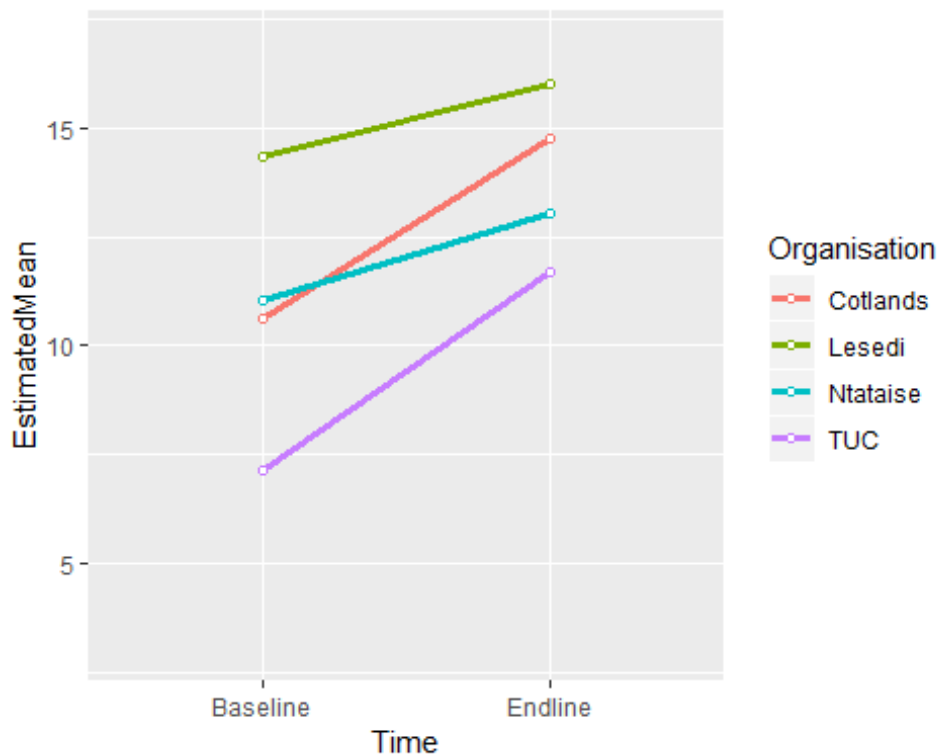
```

**emmeans**

```

## organisation time      emmean    SE df Lower.CL upper.CL
## Cotlands    fmcvmi_pre  10.65 1.002 33    8.61    12.69
## Lesedi      fmcvmi_pre  14.35 1.235 33   11.83    16.86
## Ntataise    fmcvmi_pre  11.03 0.848 33    9.31    12.76
## TUC         fmcvmi_pre   7.14 1.039 33    5.03    9.26
## Cotlands    fmcvmi_post 14.74 1.002 33   12.70    16.78
## Lesedi      fmcvmi_post 16.02 1.235 33   13.50    18.53
## Ntataise    fmcvmi_post 13.03 0.848 33   11.30    14.75
## TUC         fmcvmi_post 11.69 1.039 33    9.58    13.81
##
## Results are averaged over the levels of: years_in_programme
## d.f. method: containment
## Confidence Level used: 0.95

```



## ENM

### Linear mixed-effects model fit by maximum likelihood

```
## Data: enm_Long
##      AIC      BIC    LogLik
## 2832.941 2943.137 -1390.47
##
```

```
## Random effects:
```

```
## Formula: ~1 | practitioner
```

```
##      (Intercept)
```

```
## StdDev: 0.0003051826
```

```
##
```

```
## Formula: ~1 | child %in% practitioner
```

```
##      (Intercept) Residual
```

```
## StdDev: 3.010955 2.663647
```

```
##
```

### Model Parameters

```
## Fixed effects: enm ~ time + age + quintile + organisation + legacy_exposure +
height_for_age + practitioner_child_ratio + satisfaction_resources +
satisfaction_support + practitioner_experience + ecd_qualification +
caregiver_education + hle_time + hle_resources + years_in_programme +
time:organisation
```

##	Value	Std.Error	DF	t-value
## (Intercept)	-4.515977	3.965324	252	-1.138867
## timeenm_post	3.183091	0.519746	252	6.124325
## age	0.163387	0.063031	204	2.592170
## quintile	-0.058049	0.288230	204	-0.201398
## organisationLesedi	2.683596	1.060097	33	2.531463
## organisationNtataise	2.062676	1.531483	33	1.346848
## organisationTUC	-2.983024	1.909964	33	-1.561822
## legacy_exposure	0.020068	0.015434	204	1.300290
## height_for_age	0.866429	0.229654	204	3.772755
## practitioner_child_ratio	0.043082	0.042379	204	1.016602
## satisfaction_resources	0.029546	0.123210	33	0.239801
## satisfaction_support	0.054793	0.317032	33	0.172830
## practitioner_experience	0.067528	0.043960	33	1.536134
## ecd_qualification	0.146972	0.416697	33	0.352708
## caregiver_education	0.007312	0.080574	204	0.090749
## hle_time	-0.079757	0.124723	204	-0.639470
## hle_resources	0.155696	0.162209	204	0.959851
## years_in_programme2nd year in programme	-0.410709	0.679288	204	-0.604617
## years_in_programme3rd year in programme	0.490165	0.645424	204	0.759446
## years_in_programmeDo Not Know	1.876657	3.722411	204	0.504151
## timeenm_post:organisationLesedi	-1.422591	0.800982	252	-1.776059
## timeenm_post:organisationNtataise	-0.892979	0.661115	252	-1.350716
## timeenm_post:organisationTUC	-0.301285	0.690282	252	-0.436467

### Significance Tests

##	p-value
## (Intercept)	0.2558
## timeenm_post	0.0000
## age	0.0102
## quintile	0.8406
## organisationLesedi	0.0163
## organisationNtataise	0.1872
## organisationTUC	0.1279



```

## legacy_exposure 0.1950
## height_for_age 0.0002
## practitioner_child_ratio 0.3105
## satisfaction_resources 0.8120
## satisfaction_support 0.8638
## practitioner_experience 0.1340
## ecd_qualification 0.7266
## caregiver_education 0.9278
## hle_time 0.5232
## hle_resources 0.3383
## years_in_programme2nd year in programme 0.5461
## years_in_programme3rd year in programme 0.4485
## years_in_programmeDo Not Know 0.6147
## timeenm_post:organisationLesedi 0.0769
## timeenm_post:organisationNtataise 0.1780
## timeenm_post:organisationTUC 0.6629

```

### Standardized Within-Group Residuals

```

##          Min          Q1          Med          Q3          Max
## -2.54604981 -0.55886489 -0.03283594  0.56387361  2.23307596
##
## Number of Observations: 512
## Number of Groups:
##          practitioner child %in% practitioner
##                   41                   256

```

### ANOVA

```

##          numDF denDF  F-value p-value
## (Intercept)      1   252 1842.5047 <.0001
## time              1   252  113.4180 <.0001
## age               1   204   38.5181 <.0001
## quintile          1   204    2.7680 0.0977
## organisation      3    33   20.7648 <.0001
## legacy_exposure   1   204    3.8032 0.0525
## height_for_age    1   204   17.3404 <.0001
## practitioner_child_ratio 1  204    1.5164 0.2196
## satisfaction_resources 1   33    1.0010 0.3243
## satisfaction_support 1   33    0.1769 0.6768
## practitioner_experience 1   33    2.2279 0.1450
## ecd_qualification  1   33    0.0966 0.7579
## caregiver_education 1  204    0.0631 0.8019
## hle_time           1   204    0.1665 0.6837
## hle_resources      1   204    0.7827 0.3774
## years_in_programme 3   204    0.7217 0.5401
## time:organisation  3   252    1.3652 0.2539

```

### emmeans

```

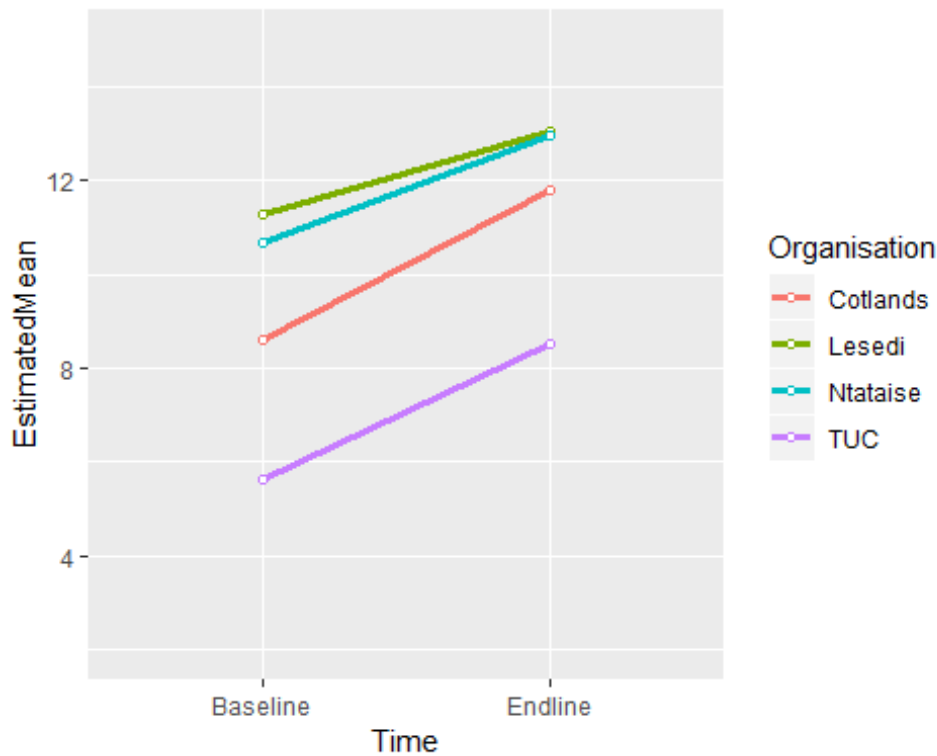
## organisation time emmean SE df Lower.CL upper.CL
## Cotlands enm_pre 8.62 1.38 33 5.82 11.42
## Lesedi enm_pre 11.30 1.70 33 7.85 14.76

```

```

## Ntataise   enm_pre  10.68 1.17 33    8.31   13.05
## TUC        enm_pre   5.64 1.43 33    2.72    8.55
## Cotlands   enm_post  11.80 1.38 33    9.00   14.60
## Lesedi     enm_post  13.06 1.70 33    9.61   16.52
## Ntataise   enm_post  12.97 1.17 33   10.60   15.34
## TUC        enm_post   8.52 1.43 33    5.60   11.43
##
## Results are averaged over the levels of: years_in_programme
## d.f. method: containment
## Confidence Level used: 0.95

```



## CEF

### Linear mixed-effects model fit by maximum likelihood

```

## Data: cef_Long
##      AIC      BIC    LogLik
## 2735.146 2845.342 -1341.573
##
## Random effects:
## Formula: ~1 | practitioner
##      (Intercept)
## StdDev:    0.651169
##
## Formula: ~1 | child %in% practitioner
##      (Intercept) Residual
## StdDev:    2.843228 2.336915
##

```

### Model Parameters

```

## Fixed effects: cef ~ time + age + quintile + organisation + Legacy_exposure +
height_for_age + practitioner_child_ratio + satisfaction_resources +
satisfaction_support + practitioner_experience + ecd_qualification +
caregiver_education + hle_time + hle_resources + years_in_programme +

```

```

time:organisation
##                               Value Std.Error DF   t-value
## (Intercept)                 -12.838393  3.891548 252  -3.299046
## timecef_post                  2.404727  0.455992 252   5.273619
## age                           0.238272  0.059927 204   3.976061
## quintile                      0.388214  0.287748 204   1.349148
## organisationLesedi            1.159305  1.118939  33   1.036075
## organisationNtataise         -0.795154  1.514918  33  -0.524882
## organisationTUC              -2.508514  1.833962  33  -1.367811
## legacy_exposure              0.018858  0.014621 204   1.289731
## height_for_age                0.627779  0.216231 204   2.903282
## practitioner_child_ratio     0.033289  0.042355 204   0.785957
## satisfaction_resources        -0.091334  0.127772  33  -0.714822
## satisfaction_support           0.350539  0.330351  33   1.061112
## practitioner_experience       0.037942  0.045034  33   0.842505
## ecd_qualification            0.269585  0.421475  33   0.639622
## caregiver_education          0.017762  0.076705 204   0.231557
## hle_time                     -0.005964  0.117654 204  -0.050689
## hle_resources                 0.329858  0.152444 204   2.163804
## years_in_programme2nd year in programme -0.504663  0.642616 204  -0.785326
## years_in_programme3rd year in programme  0.241364  0.618200 204   0.390429
## years_in_programmeDo Not Know -0.654945  3.515919 204  -0.186280
## timecef_post:organisationLesedi -0.691977  0.702731 252  -0.984698
## timecef_post:organisationNtataise  0.820666  0.580020 252   1.414892
## timecef_post:organisationTUC      2.045412  0.605609 252   3.377443

```

### Significance Tests

```

##                               p-value
## (Intercept)                   0.0011
## timecef_post                   0.0000
## age                            0.0001
## quintile                       0.1788
## organisationLesedi             0.3077
## organisationNtataise           0.6032
## organisationTUC                0.1806
## legacy_exposure                0.1986
## height_for_age                 0.0041
## practitioner_child_ratio       0.4328
## satisfaction_resources          0.4797
## satisfaction_support            0.2963
## practitioner_experience         0.4056
## ecd_qualification              0.5268
## caregiver_education            0.8171
## hle_time                       0.9596
## hle_resources                  0.0316
## years_in_programme2nd year in programme 0.4332
## years_in_programme3rd year in programme 0.6966
## years_in_programmeDo Not Know  0.8524
## timecef_post:organisationLesedi 0.3257
## timecef_post:organisationNtataise 0.1583
## timecef_post:organisationTUC    0.0008

```

### Standardized Within-Group Residuals

```

##                               Min          Q1          Med          Q3          Max
## -1.93154580 -0.53971778 -0.04646201  0.45614905  2.58064587
##

```

```
## Number of Observations: 512
```

```
## Number of Groups:
##      practitioner child %in% practitioner
##                41                256
```

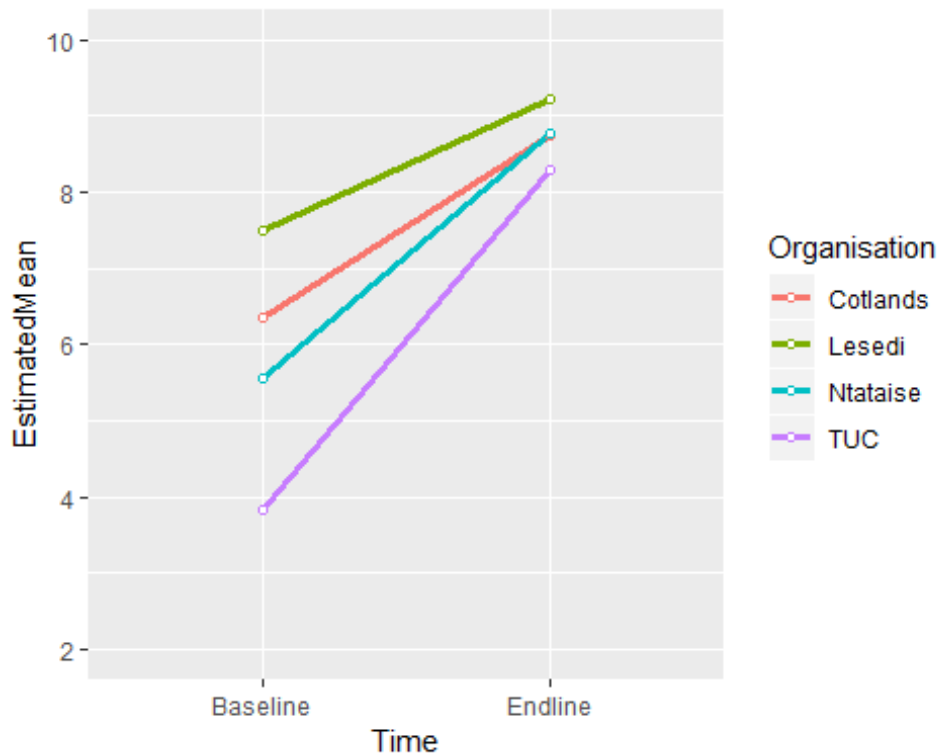
### ANOVA

	numDF	denDF	F-value	p-value
## (Intercept)	1	252	895.9049	<.0001
## time	1	252	223.1331	<.0001
## age	1	204	23.4433	<.0001
## quintile	1	204	2.7662	0.0978
## organisation	3	33	4.6932	0.0077
## legacy_exposure	1	204	3.0254	0.0835
## height_for_age	1	204	9.2694	0.0026
## practitioner_child_ratio	1	204	0.5128	0.4748
## satisfaction_resources	1	33	0.0186	0.8923
## satisfaction_support	1	33	0.8108	0.3744
## practitioner_experience	1	33	0.8628	0.3597
## ecd_qualification	1	33	0.8978	0.3503
## caregiver_education	1	204	0.4267	0.5144
## hle_time	1	204	0.1842	0.6683
## hle_resources	1	204	4.3124	0.0391
## years_in_programme	3	204	0.5137	0.6733
## time:organisation	3	252	6.8606	0.0002

### emmeans

## organisation	time	emmean	SE	df	Lower.CL	upper.CL
## Cotlands	cef_pre	6.35	1.33	33	3.65	9.05
## Lesedi	cef_pre	7.51	1.68	33	4.10	10.92
## Ntataise	cef_pre	5.56	1.13	33	3.26	7.85
## TUC	cef_pre	3.84	1.37	33	1.06	6.62
## Cotlands	cef_post	8.76	1.33	33	6.06	11.46
## Lesedi	cef_post	9.22	1.68	33	5.81	12.64
## Ntataise	cef_post	8.78	1.13	33	6.49	11.08
## TUC	cef_post	8.29	1.37	33	5.51	11.07

## Results are averaged over the levels of: years\_in\_programme  
## d.f. method: containment  
## Confidence Level used: 0.95



ELL

### Linear mixed-effects model fit by maximum likelihood

```
## Data: ell_Long
##      AIC      BIC    LogLik
## 2797.918 2908.115 -1372.959
##
## Random effects:
## Formula: ~1 | practitioner
##      (Intercept)
## StdDev: 1.043173
##
## Formula: ~1 | child %in% practitioner
##      (Intercept) Residual
## StdDev: 2.124503 2.877123
##
```

### Model Parameters

```
## Fixed effects: ell ~ time + age + quintile + organisation + legacy_exposure +
height_for_age + practitioner_child_ratio + satisfaction_resources +
satisfaction_support + practitioner_experience + ecd_qualification +
caregiver_education + hle_time + hle_resources + years_in_programme +
time:organisation
##
##              Value Std.Error DF  t-value
## (Intercept) -7.957713  3.799246 252 -2.094551
## timeell_post  4.126364  0.561400 252  7.350128
## age          0.179293  0.055202 204  3.247960
## quintile     0.217567  0.288582 204  0.753917
## organisationLesedi  2.770299  1.269068  33  2.182940
## organisationNtataise  3.528654  1.534522  33  2.299512
## organisationTUC    -0.552868  1.760658  33 -0.314012
## legacy_exposure  0.017295  0.013438 204  1.286984
## height_for_age  0.572062  0.197245 204  2.900270
```

```

## practitioner_child_ratio      0.084382  0.042648 204  1.978554
## satisfaction_resources        -0.048199  0.136144  33 -0.354031
## satisfaction_support           0.200640  0.353316  33  0.567877
## practitioner_experience       -0.016049  0.047429  33 -0.338385
## ecd_qualification             0.205248  0.435856  33  0.470908
## caregiver_education          -0.013228  0.070742 204 -0.186989
## hle_time                      0.140848  0.107549 204  1.309623
## hle_resources                 0.026994  0.138654 204  0.194684
## years_in_programme2nd year in programme 0.590582  0.591778 204  0.997979
## years_in_programme3rd year in programme 1.558821  0.577154 204  2.700876
## years_in_programmeDo Not Know 0.166293  3.259459 204  0.051019
## timeell_post:organisationLesedi -1.036864  0.865176 252 -1.198443
## timeell_post:organisationNtataise -2.691307  0.714100 252 -3.768812
## timeell_post:organisationTUC     0.333636  0.745604 252  0.447471

```

### Significance Tests

```

##                               p-value
## (Intercept)                   0.0372
## timeell_post                   0.0000
## age                            0.0014
## quintile                       0.4518
## organisationLesedi             0.0363
## organisationNtataise           0.0279
## organisationTUC                0.7555
## legacy_exposure                0.1996
## height_for_age                 0.0041
## practitioner_child_ratio       0.0492
## satisfaction_resources          0.7256
## satisfaction_support            0.5740
## practitioner_experience         0.7372
## ecd_qualification              0.6408
## caregiver_education            0.8519
## hle_time                       0.1918
## hle_resources                   0.8458
## years_in_programme2nd year in programme 0.3195
## years_in_programme3rd year in programme 0.0075
## years_in_programmeDo Not Know 0.9594
## timeell_post:organisationLesedi 0.2319
## timeell_post:organisationNtataise 0.0002
## timeell_post:organisationTUC    0.6549

```

### Standardized Within-Group Residuals

```

##           Min           Q1           Med           Q3           Max
## -2.3996092 -0.5961152  0.1011189  0.6062278  2.5869463
##
## Number of Observations: 512
## Number of Groups:
##           practitioner child %in% practitioner
##                               41                               256

```

### ANOVA

```

##           numDF denDF  F-value p-value
## (Intercept)      1   252 1610.1464 <.0001
## time              1   252  143.9952 <.0001
## age               1   204   23.0245 <.0001

```

```

## quintile          1  204  0.0101  0.9202
## organisation     3   33 16.9956 <.0001
## legacy_exposure  1  204  5.3142  0.0222
## height_for_age   1  204 11.3436  0.0009
## practitioner_child_ratio 1  204  2.2314  0.1368
## satisfaction_resources 1   33  0.5096  0.4803
## satisfaction_support 1   33  0.0974  0.7569
## practitioner_experience 1   33  0.1587  0.6929
## ecd_qualification 1   33  0.6679  0.4196
## caregiver_education 1  204  0.0231  0.8793
## hle_time         1  204  1.7444  0.1881
## hle_resources    1  204  0.0541  0.8164
## years_in_programme 3  204  2.5375  0.0578
## time:organisation 3  252  8.4167 <.0001

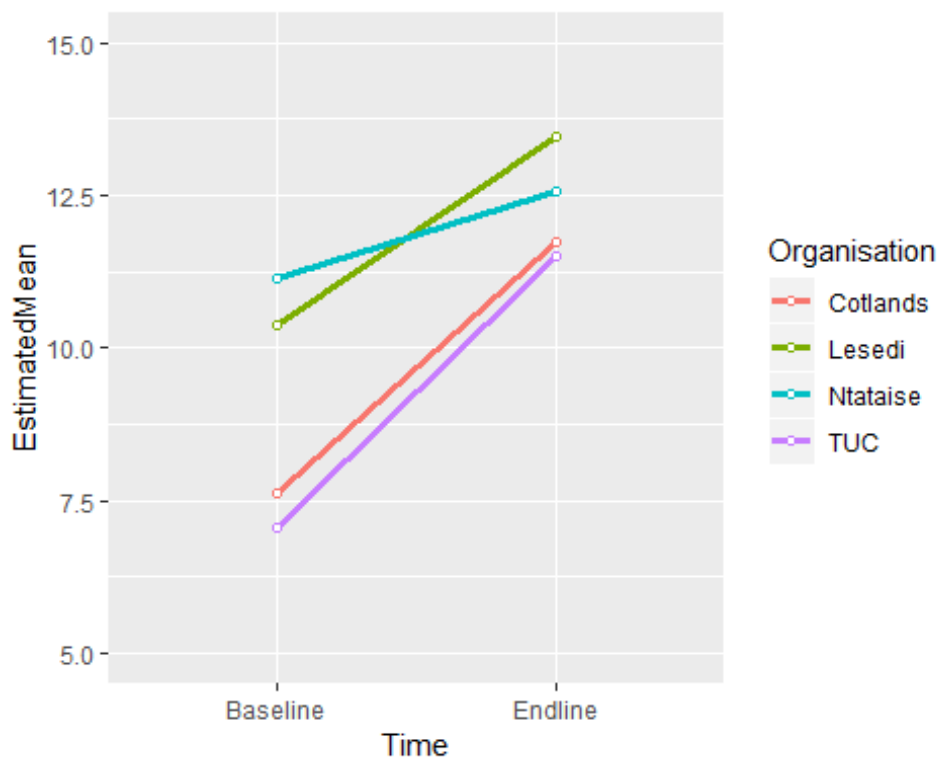
```

**emmeans**

```

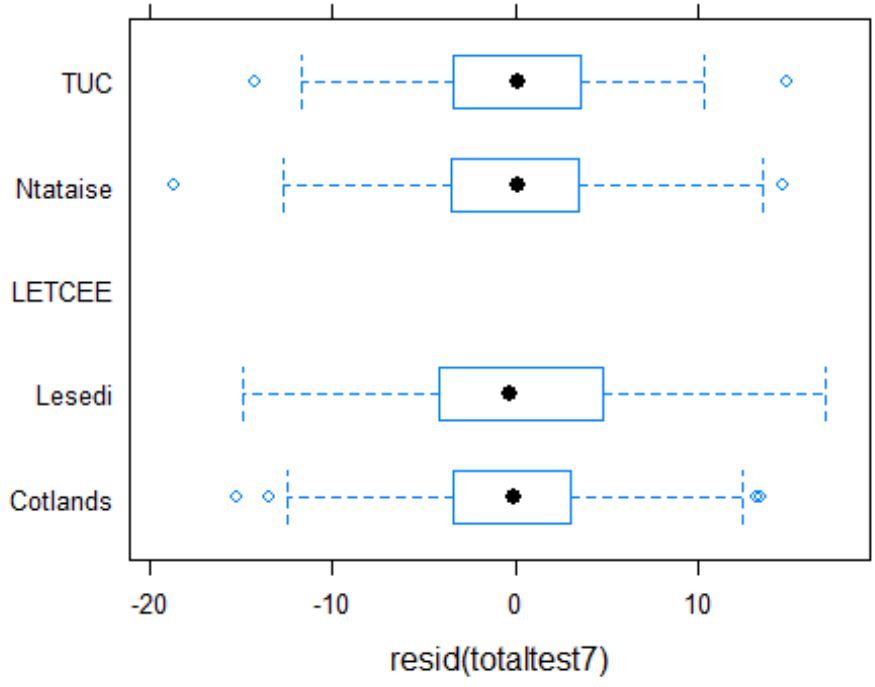
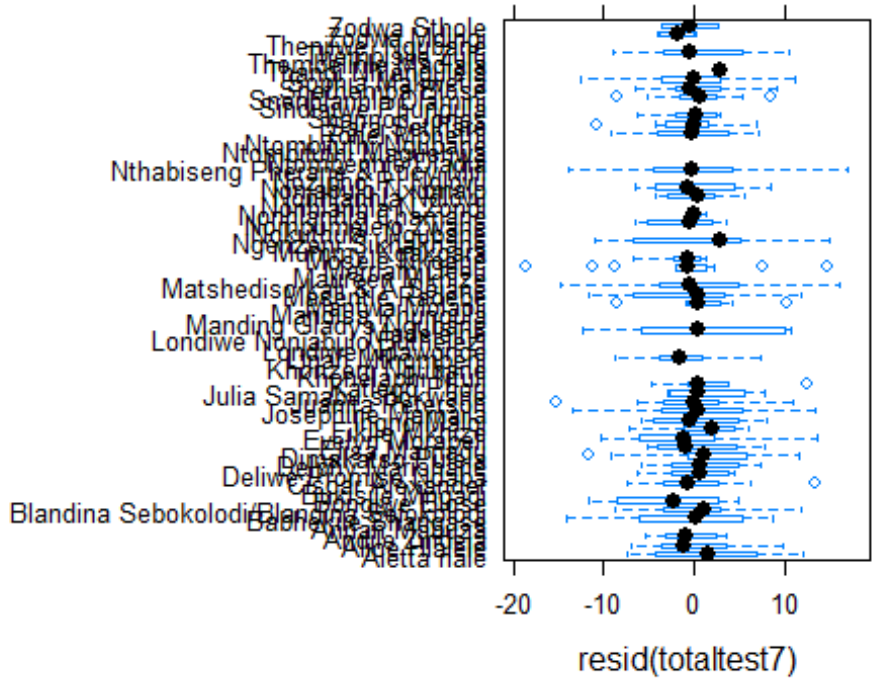
## organisation time emmean SE df Lower.CL upper.CL
## Cotlands ell_pre 7.61 1.29 33 4.98 10.24
## Lesedi ell_pre 10.38 1.70 33 6.92 13.83
## Ntataise ell_pre 11.13 1.10 33 8.89 13.38
## TUC ell_pre 7.05 1.30 33 4.41 9.69
## Cotlands ell_post 11.73 1.29 33 9.10 14.36
## Lesedi ell_post 13.47 1.70 33 10.01 16.92
## Ntataise ell_post 12.57 1.10 33 10.32 14.82
## TUC ell_post 11.51 1.30 33 8.87 14.15
##
## Results are averaged over the levels of: years_in_programme
## d.f. method: containment
## Confidence Level used: 0.95

```



# APPENDIX H: STATISTICAL ASSUMPTION TESTS

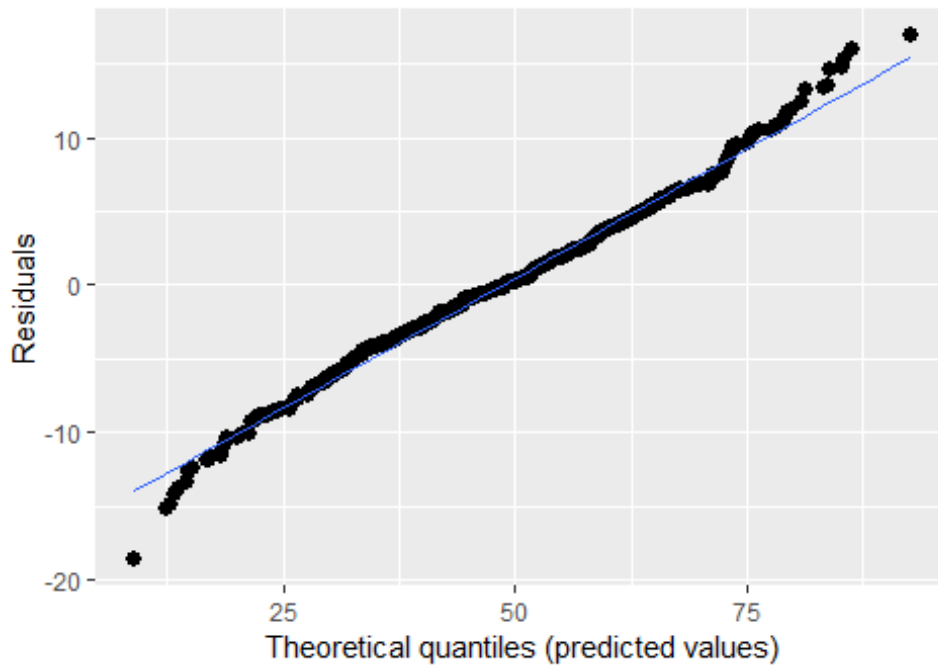
ELOM TOTAL





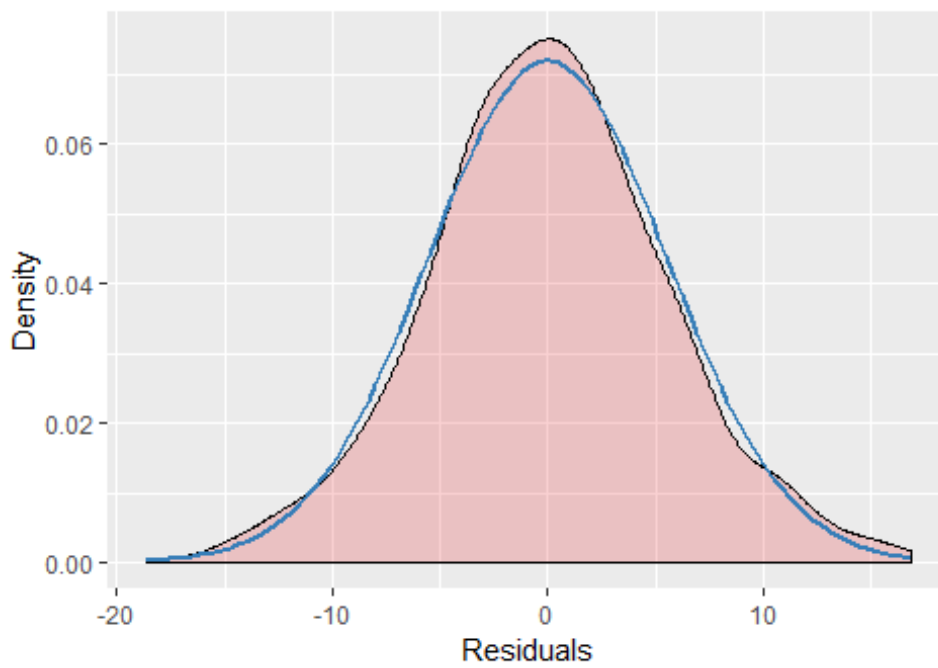
### Non-normality of residuals and outliers

Dots should be plotted along the line



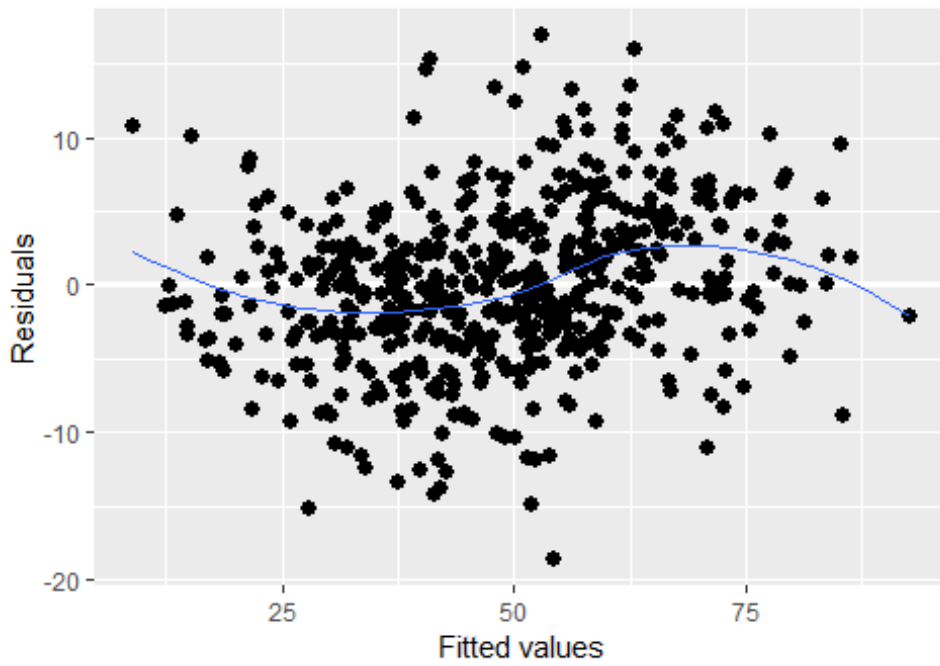
### Non-normality of residuals

Distribution should look like normal curve

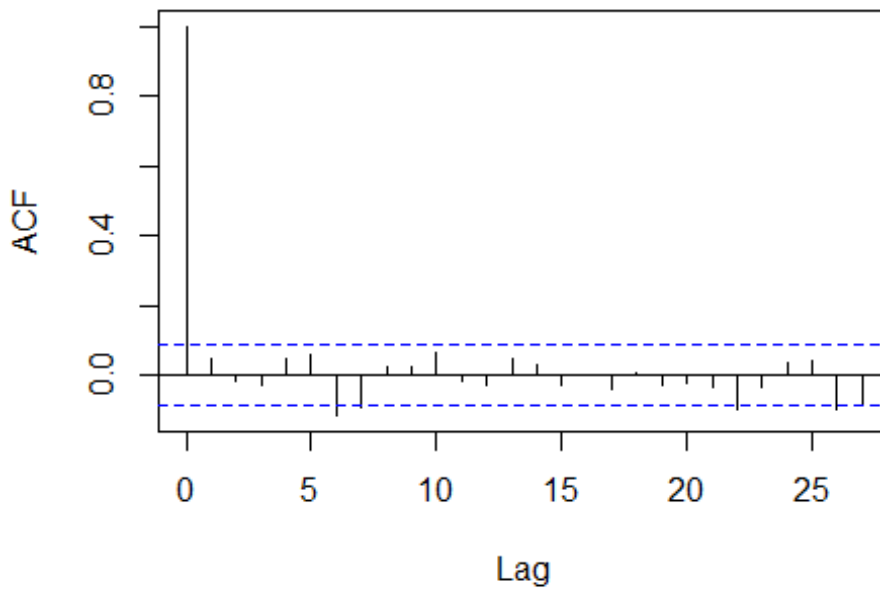


### Homoscedasticity (constant variance of residuals)

Amount and distance of points scattered above/below line is equal



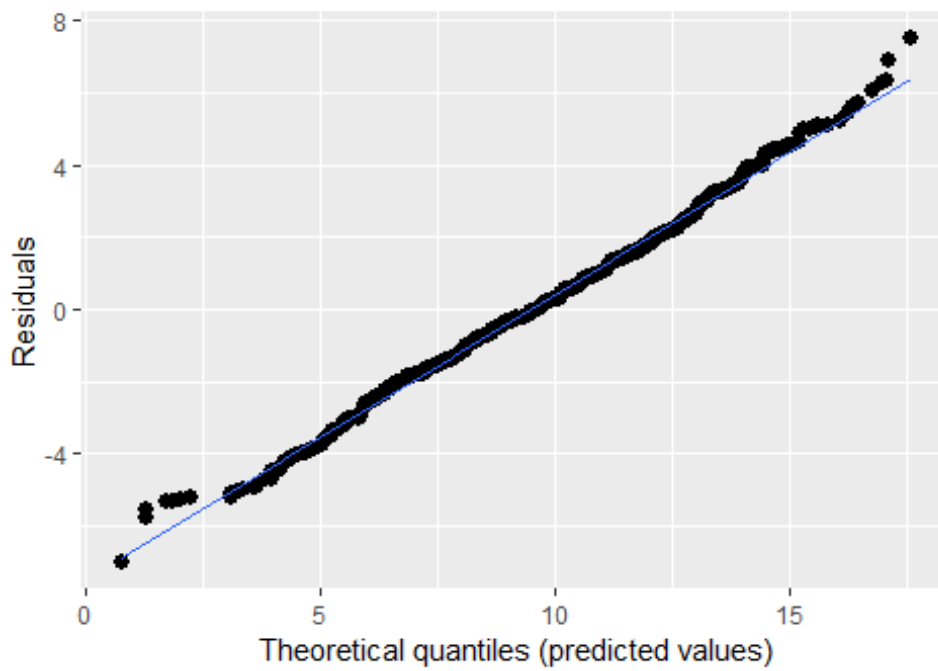
### Series resid(totaltest7)





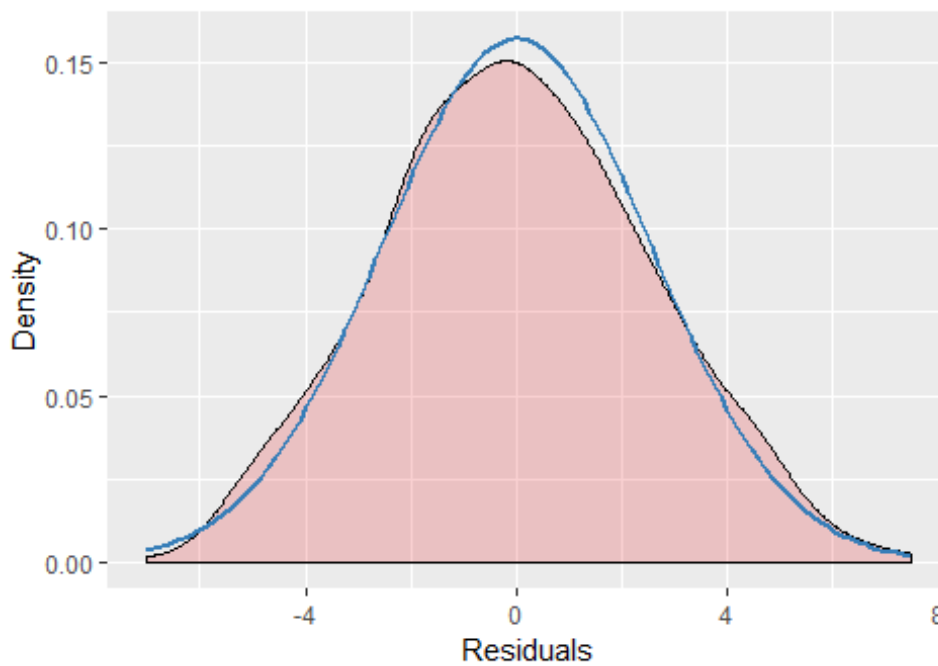
### Non-normality of residuals and outliers

Dots should be plotted along the line



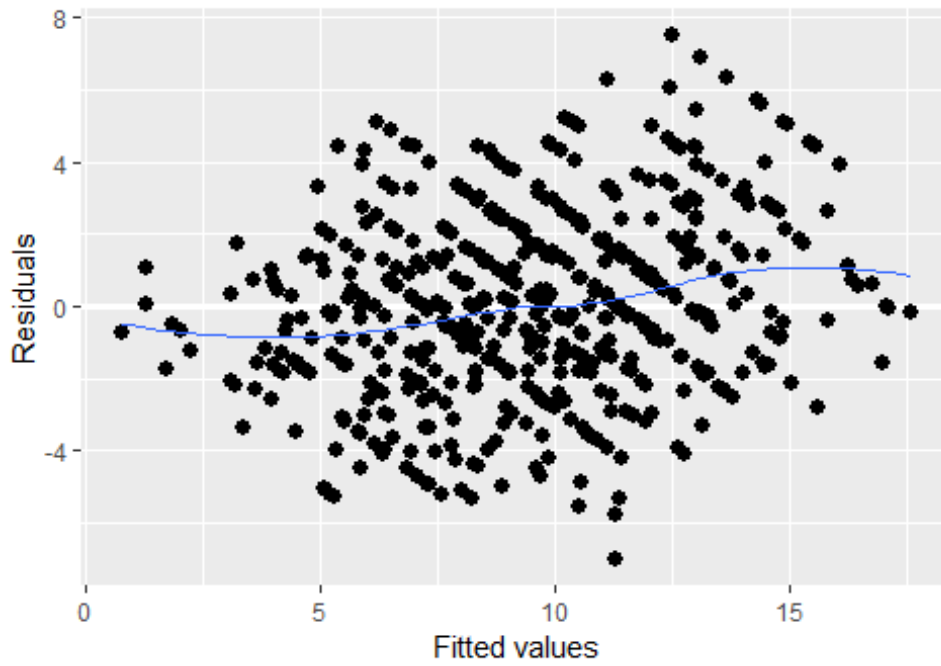
### Non-normality of residuals

Distribution should look like normal curve

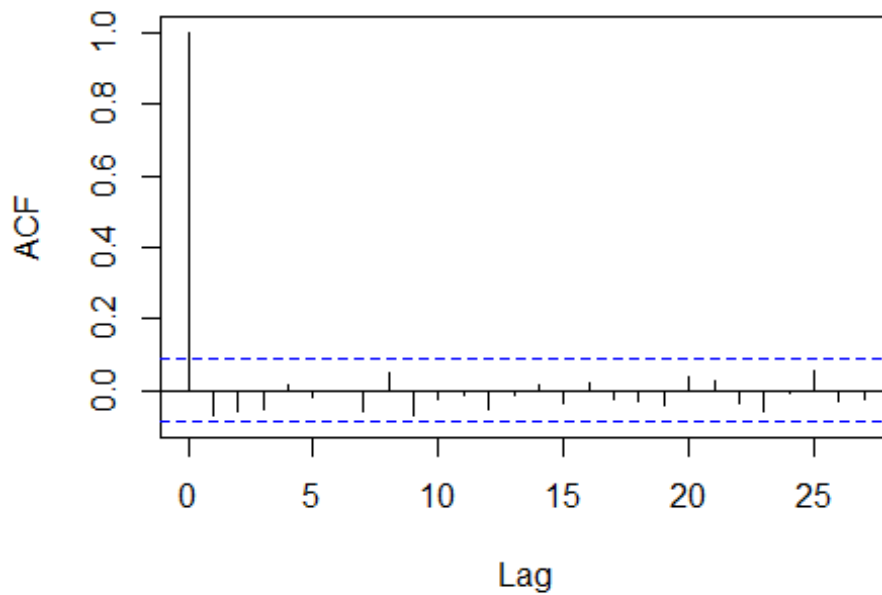


### Homoscedasticity (constant variance of residuals)

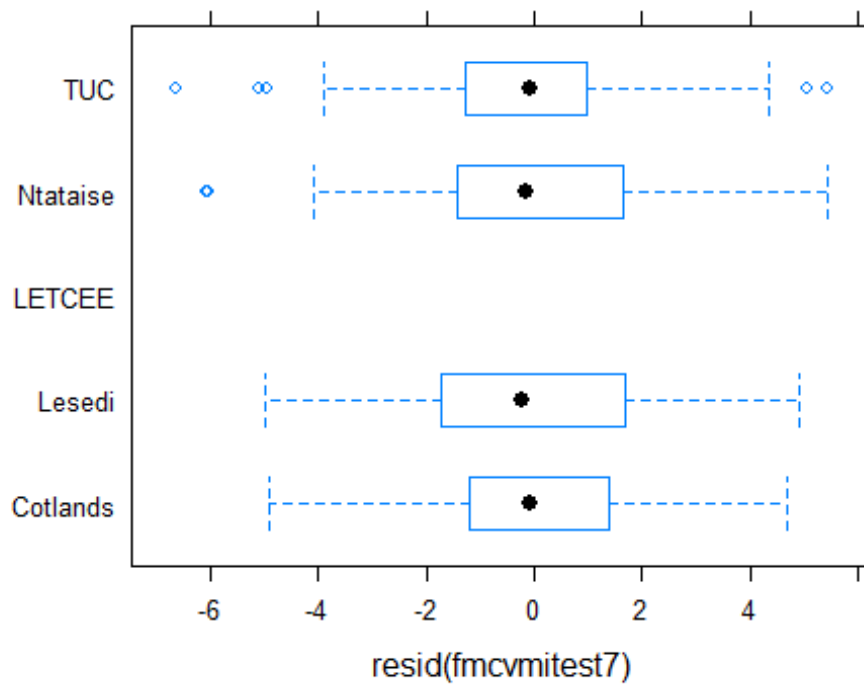
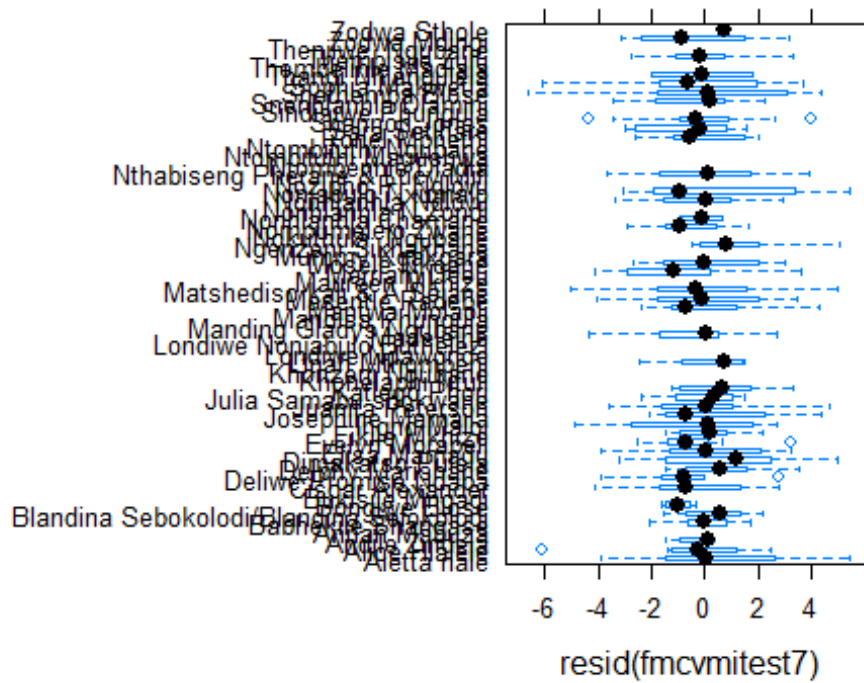
Amount and distance of points scattered above/below line is equal o



### Series resid(gmdtest7)

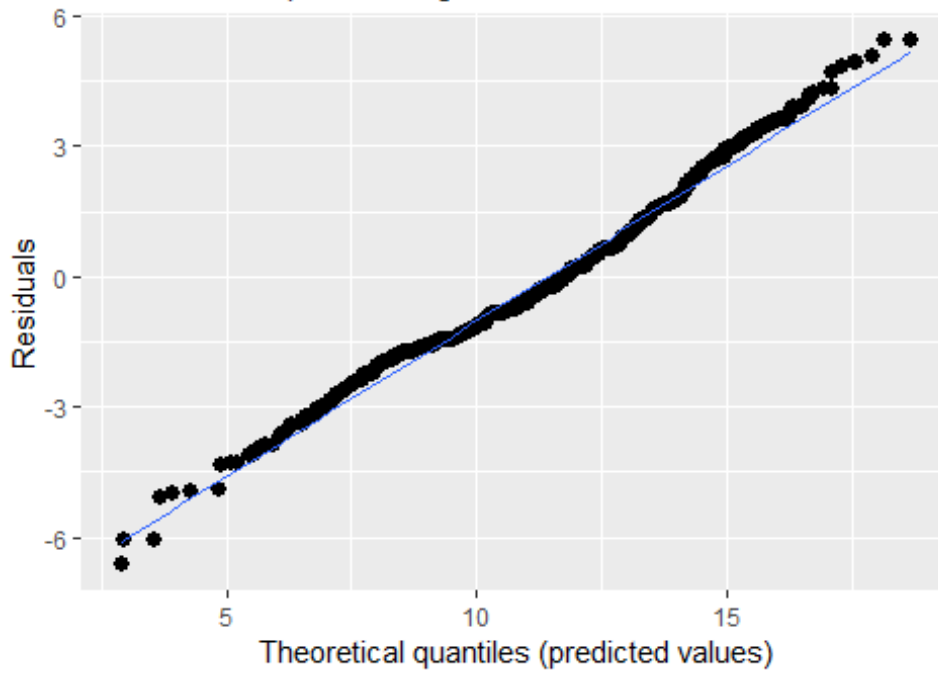


# FINE MOTOR CONTROL & VISUAL MOTOR INTEGRATION



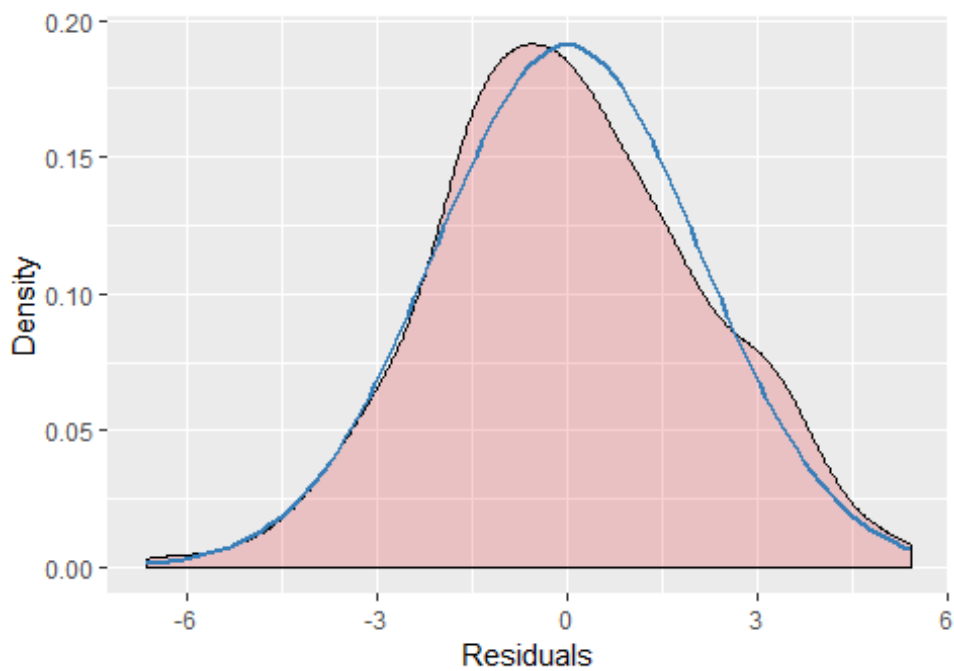
### Non-normality of residuals and outliers

Dots should be plotted along the line



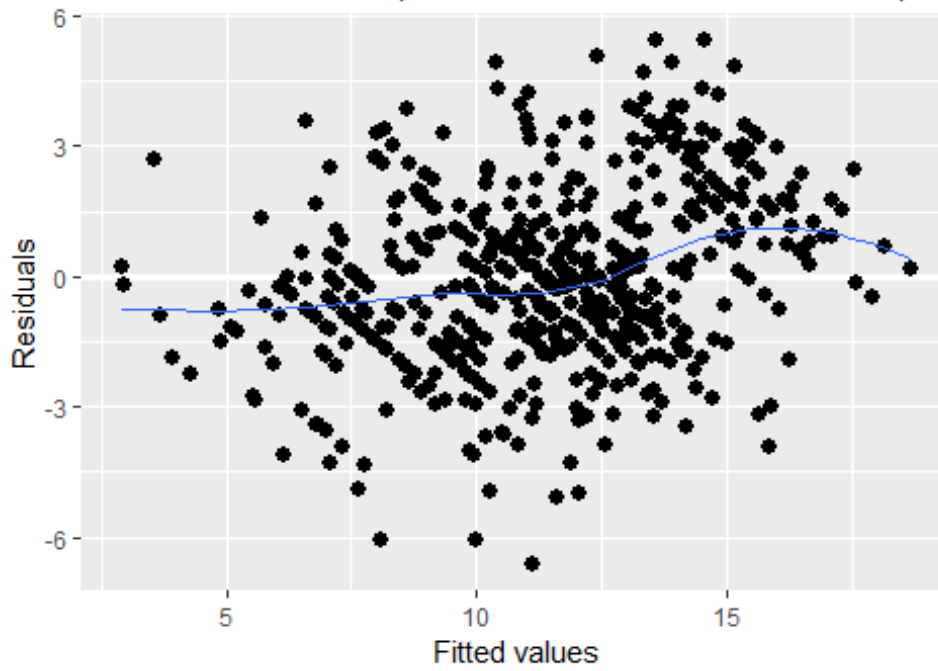
### Non-normality of residuals

Distribution should look like normal curve

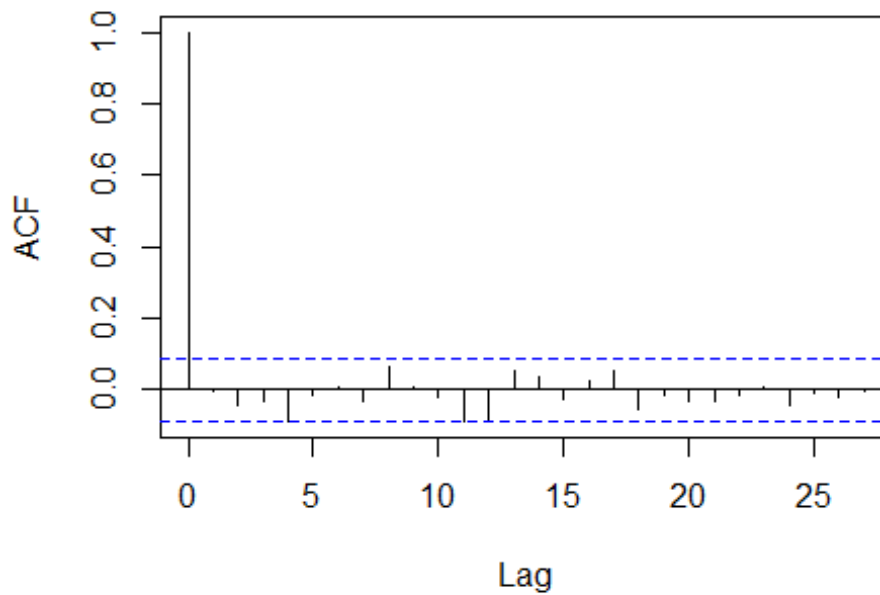


### Homoscedasticity (constant variance of residuals)

Amount and distance of points scattered above/below line is equal o

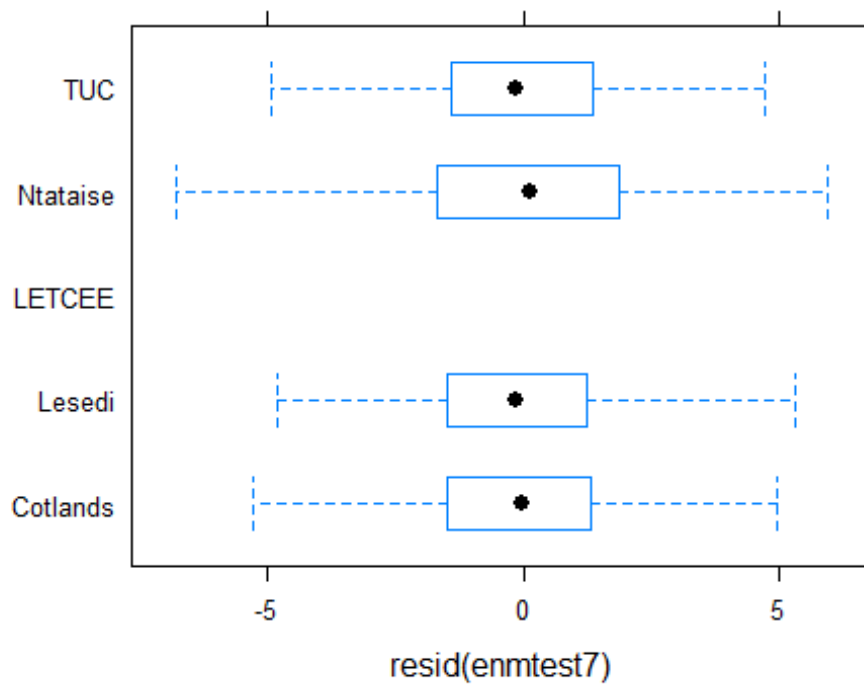
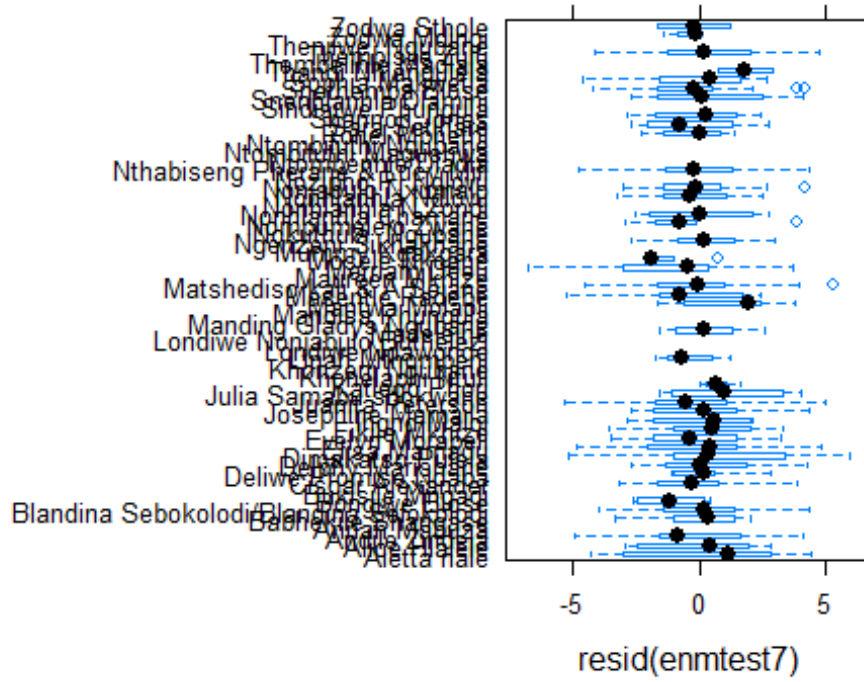


### Series resid(fmcvmitest7)



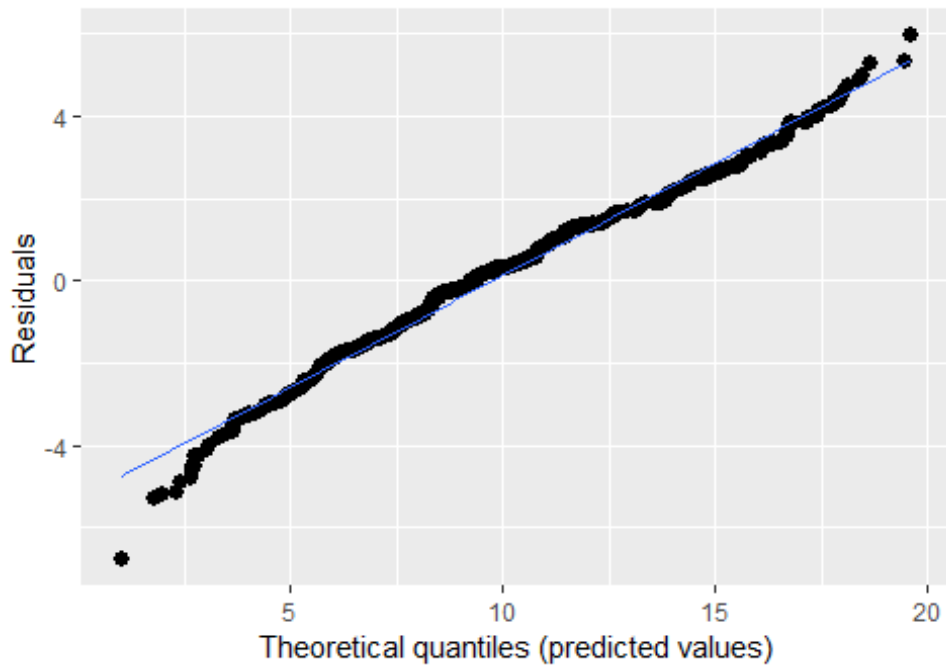


EMERGENT NUMERACY AND MATHEMATICS



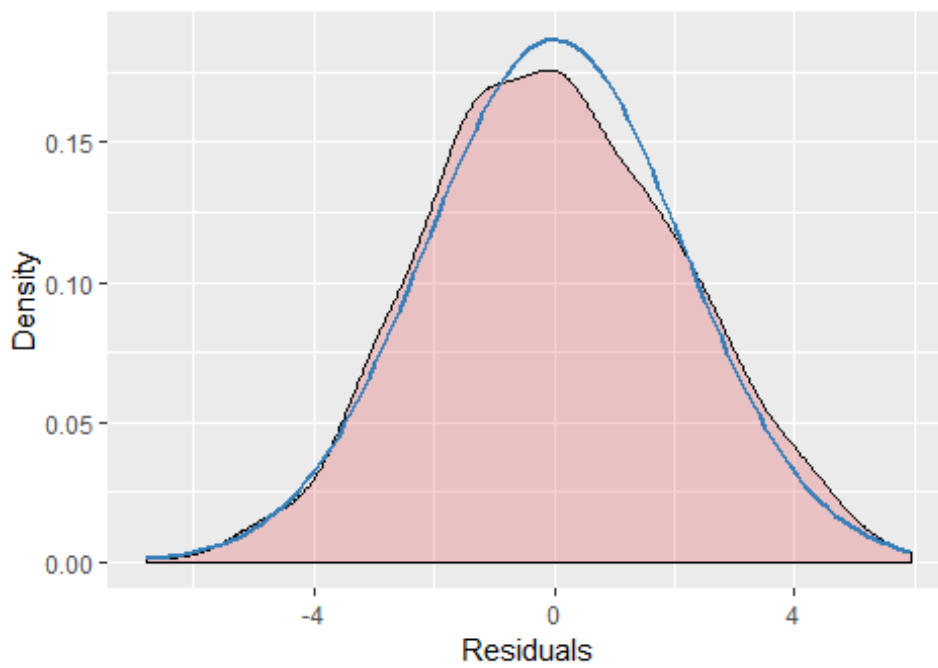
### Non-normality of residuals and outliers

Dots should be plotted along the line



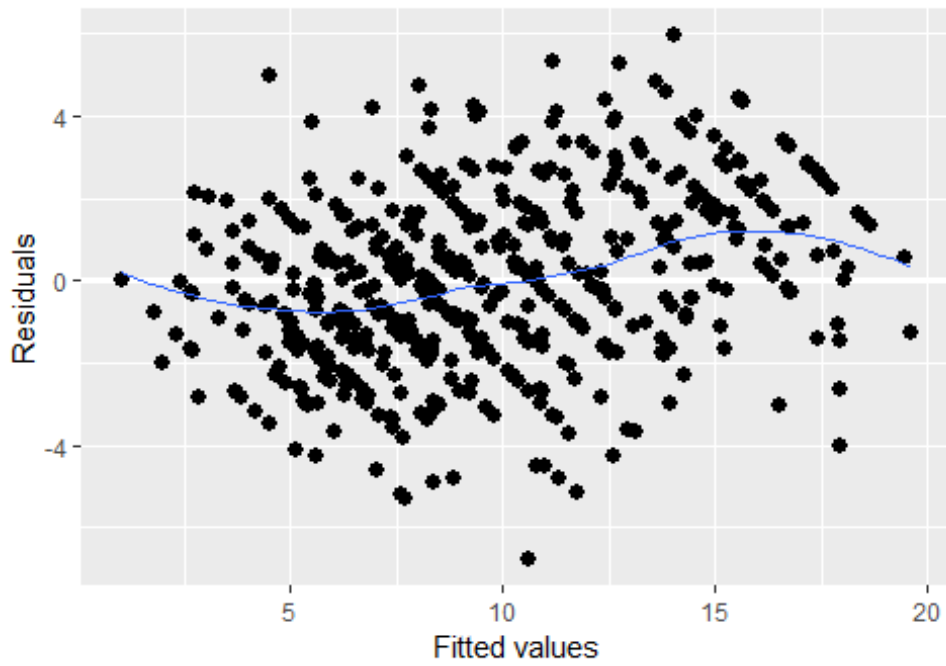
### Non-normality of residuals

Distribution should look like normal curve

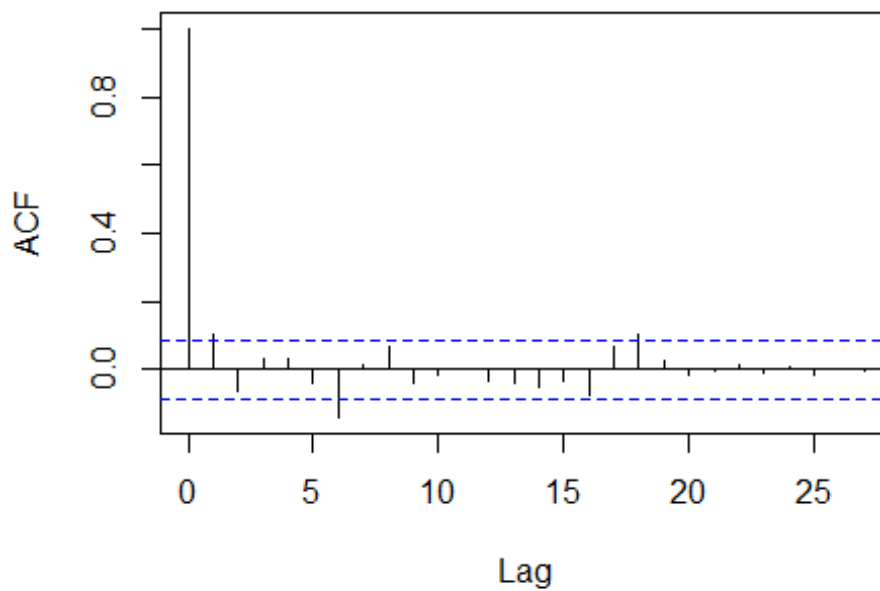


### Homoscedasticity (constant variance of residuals)

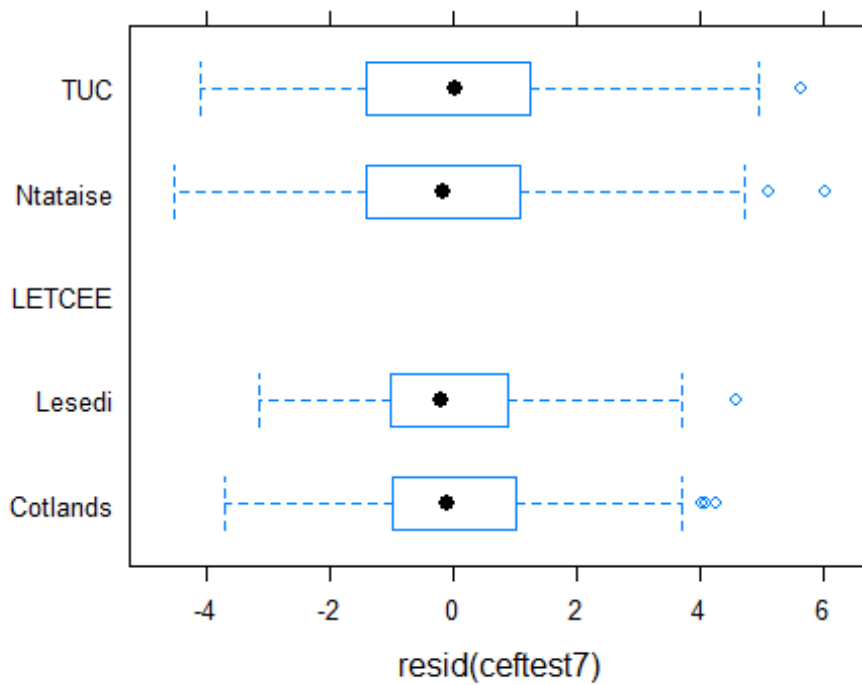
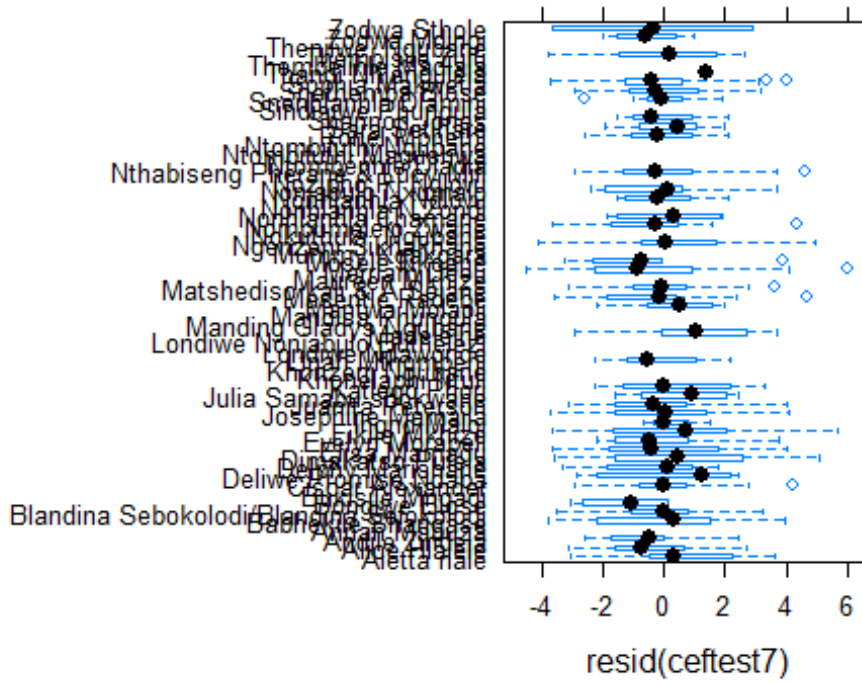
Amount and distance of points scattered above/below line is equal o



### Series resid(enmtest7)

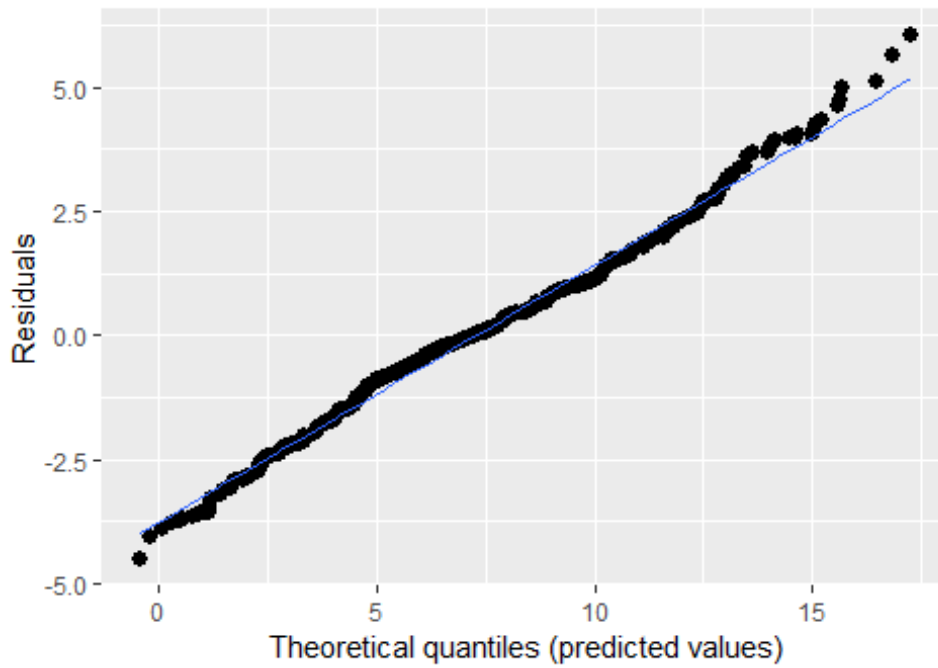


COGNITION & EXECUTIVE FUNCTIONING



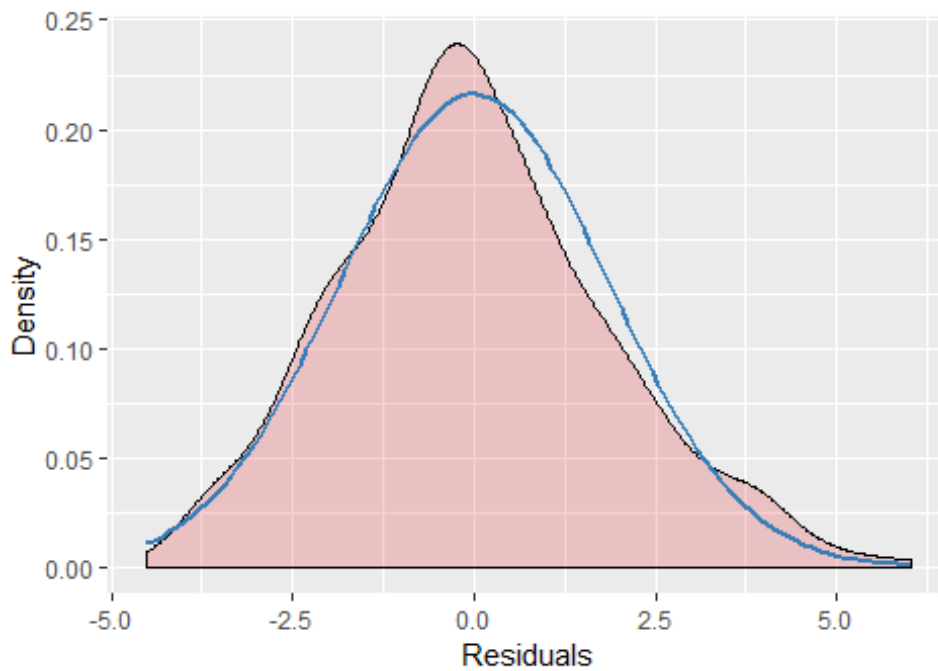
### Non-normality of residuals and outliers

Dots should be plotted along the line



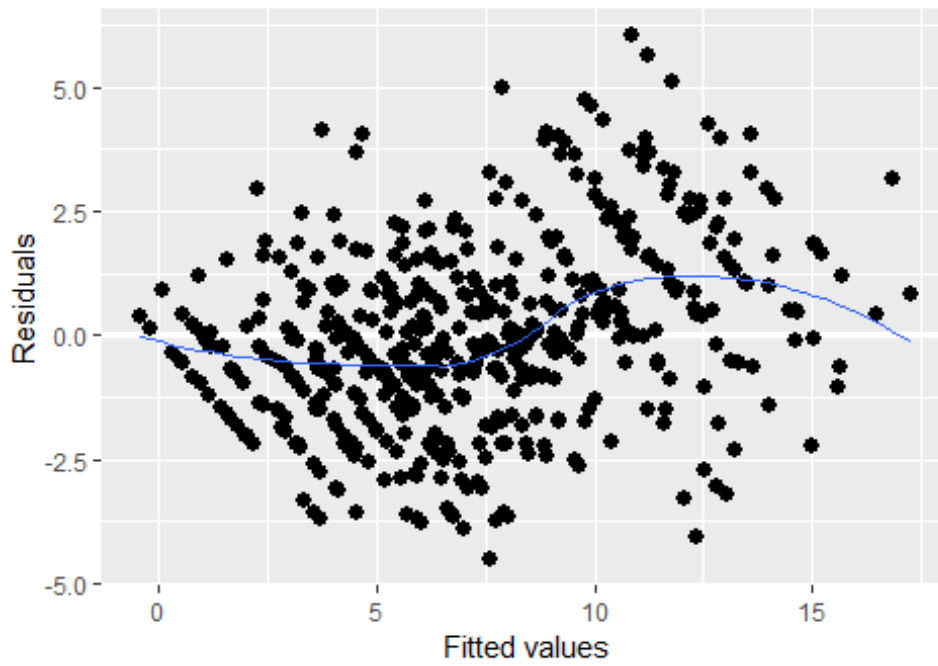
### Non-normality of residuals

Distribution should look like normal curve

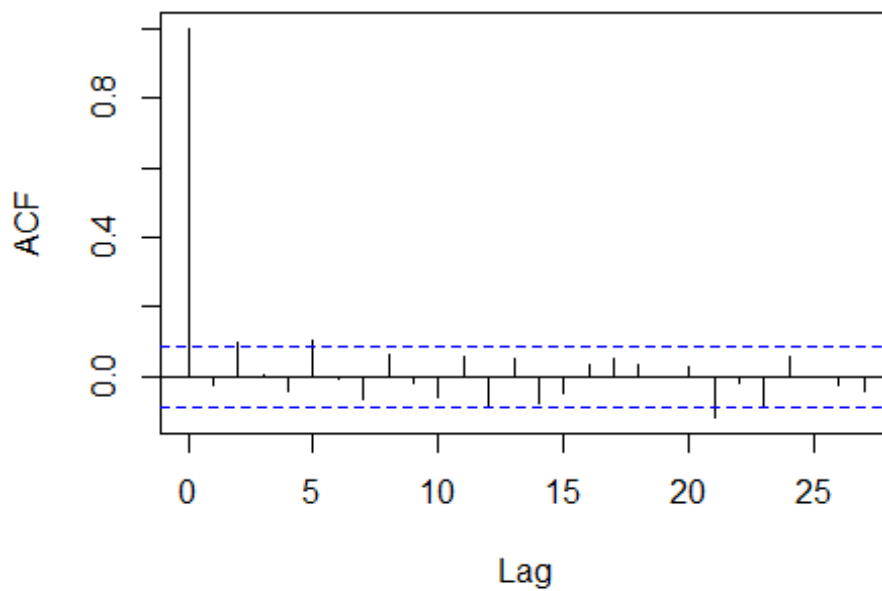


### Homoscedasticity (constant variance of residuals)

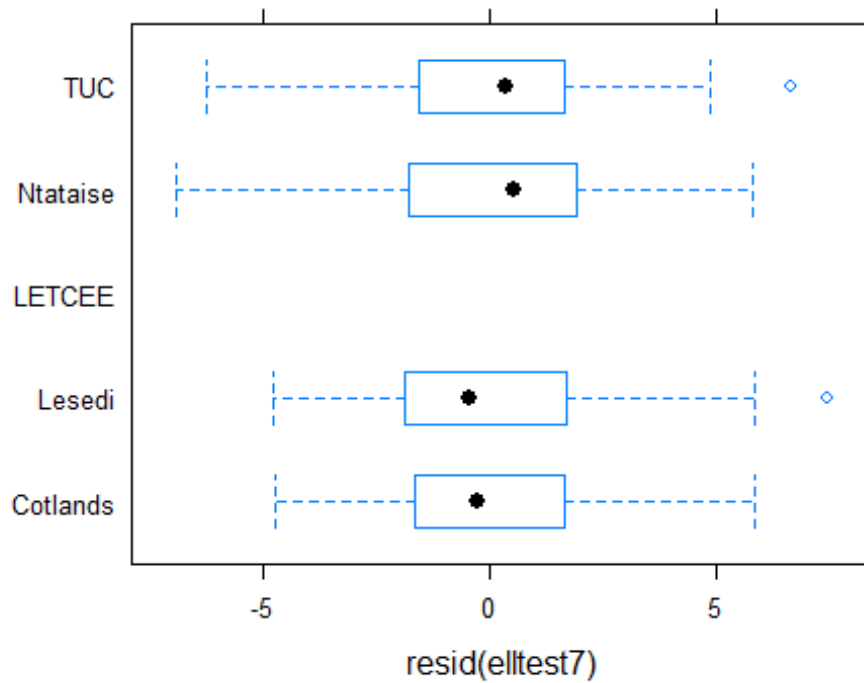
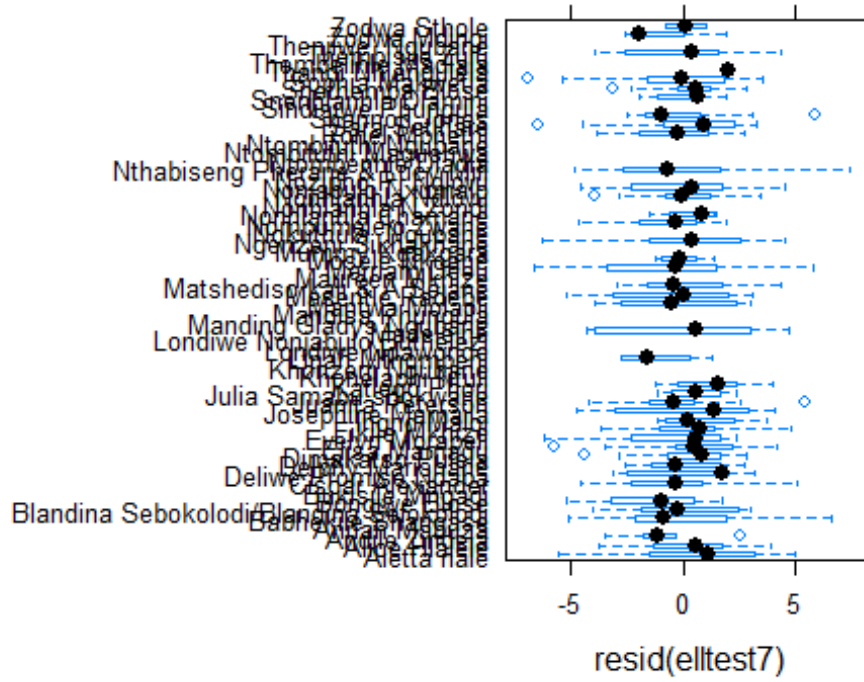
Amount and distance of points scattered above/below line is equal



### Series resid(ceftest7)

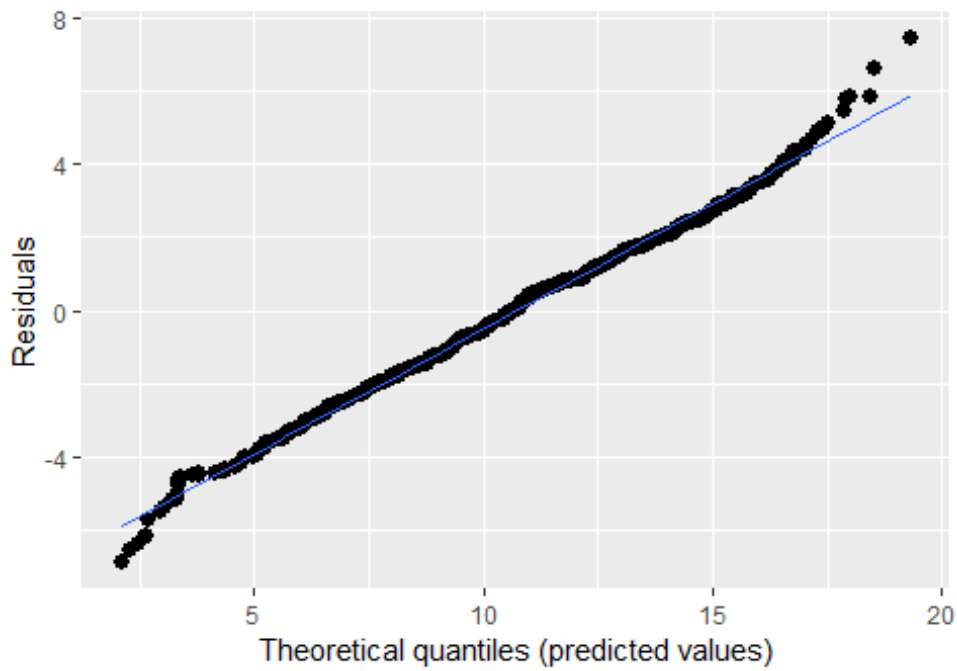


EMERGENT LITERACY AND LANGUAGE



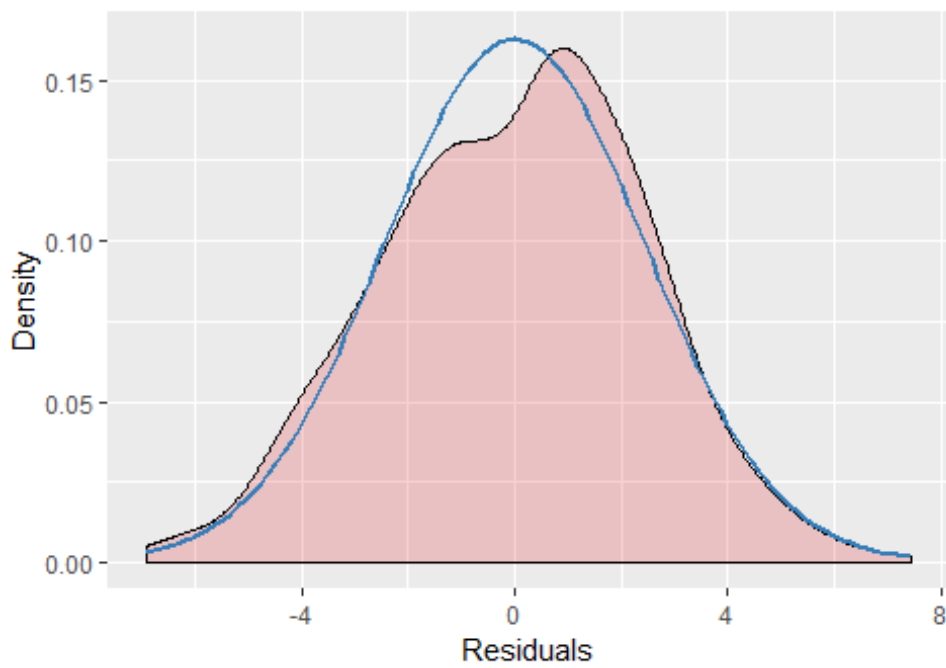
### Non-normality of residuals and outliers

Dots should be plotted along the line



### Non-normality of residuals

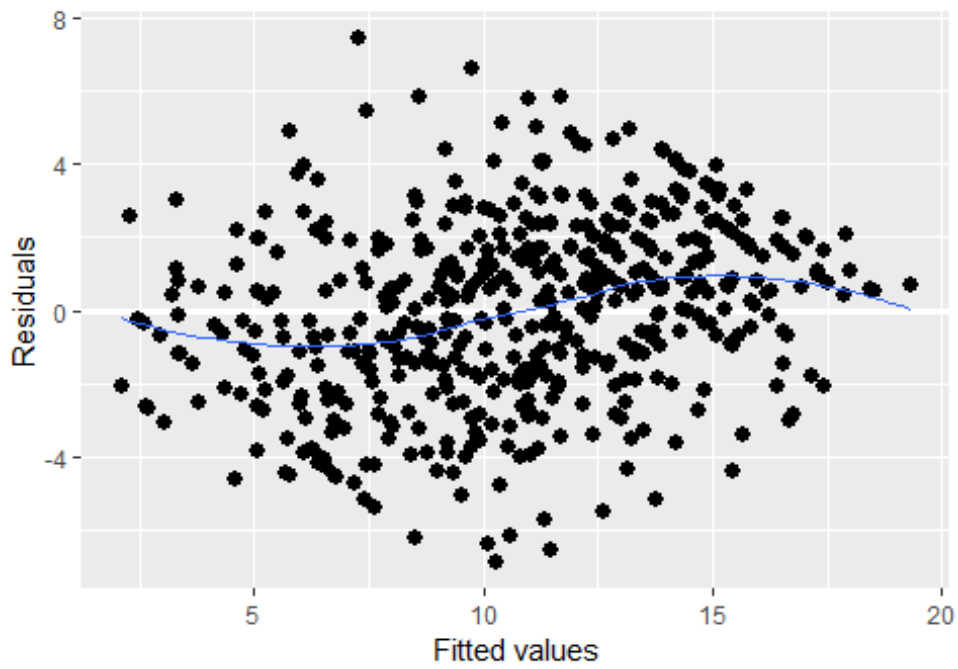
Distribution should look like normal curve





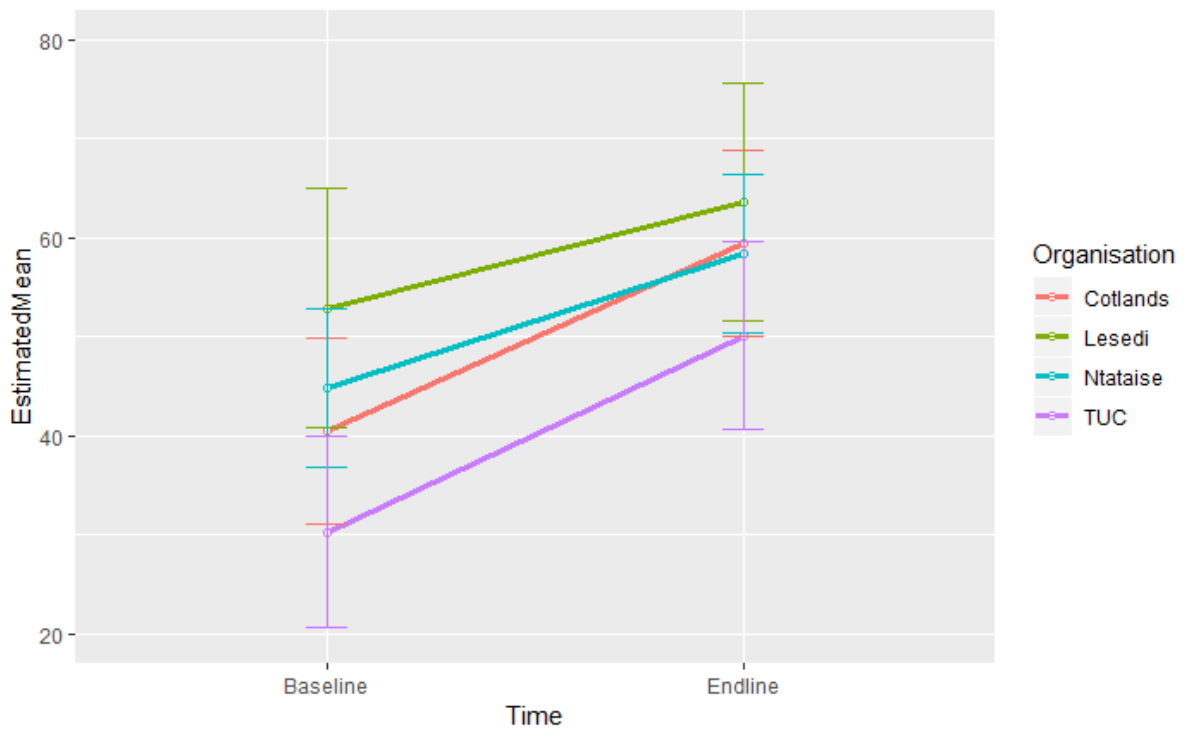
### Homoscedasticity (constant variance of residuals)

Amount and distance of points scattered above/below line is equal o

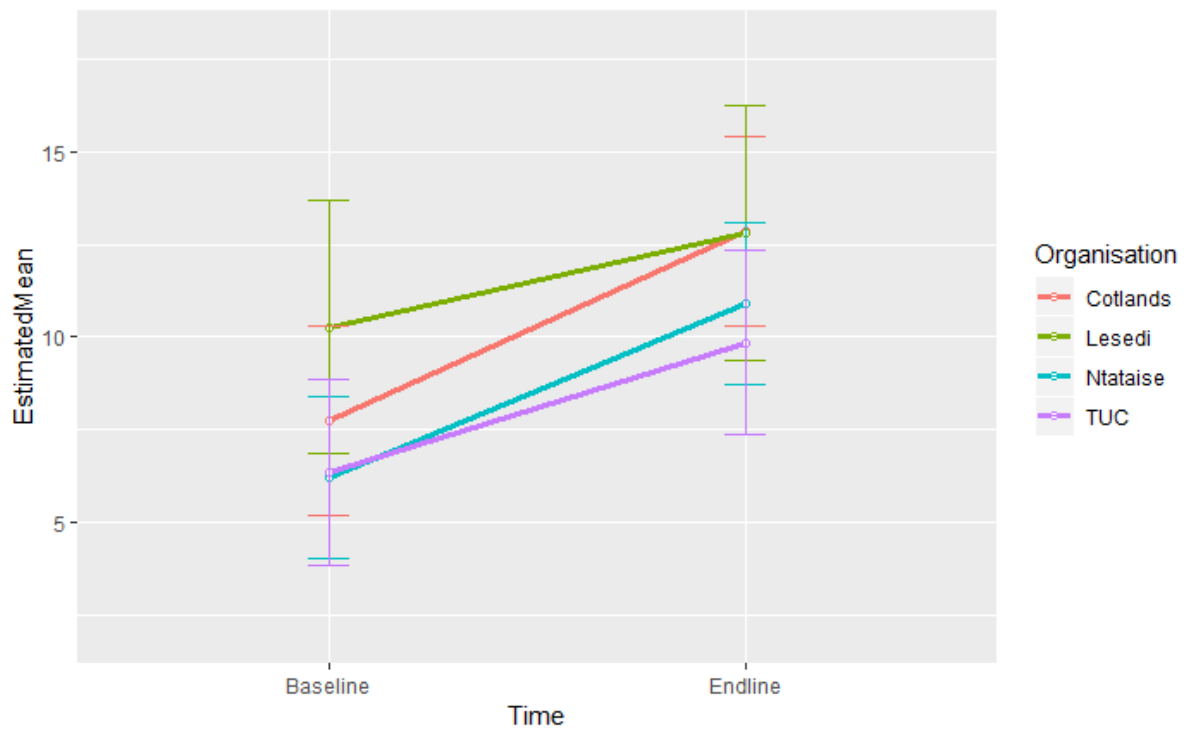


### EMMean Figures with Confidence Intervals

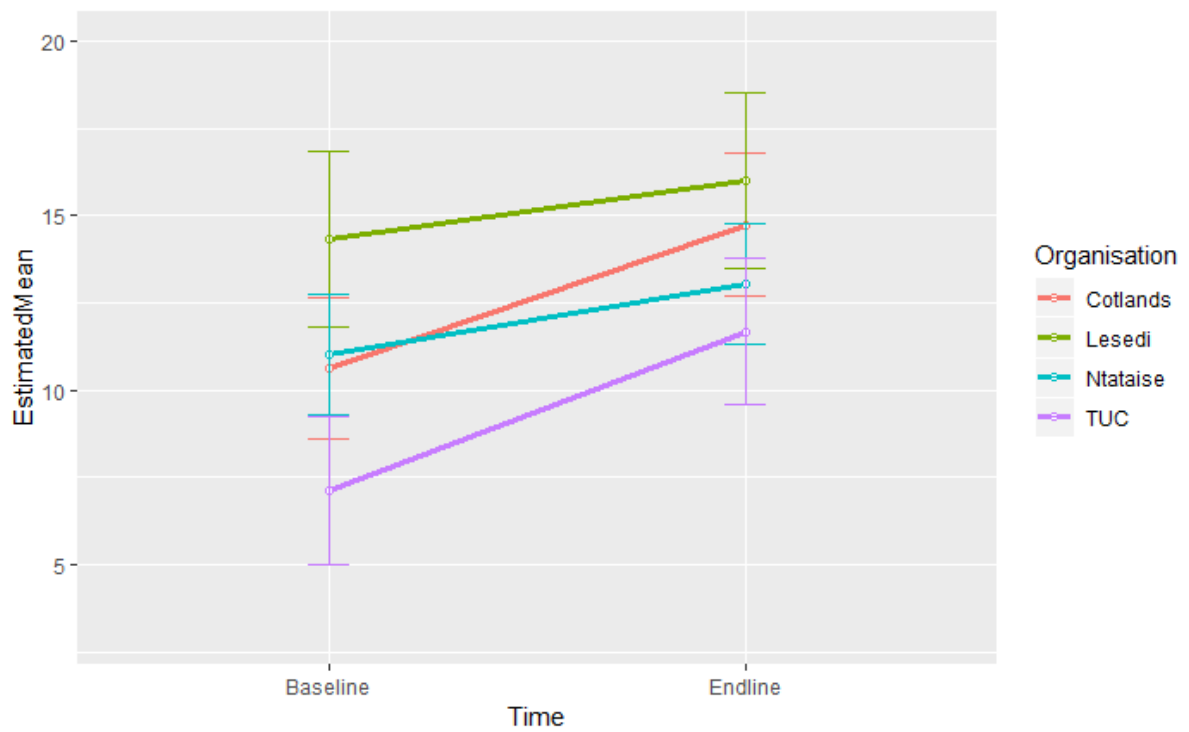
#### ELOM TOTAL



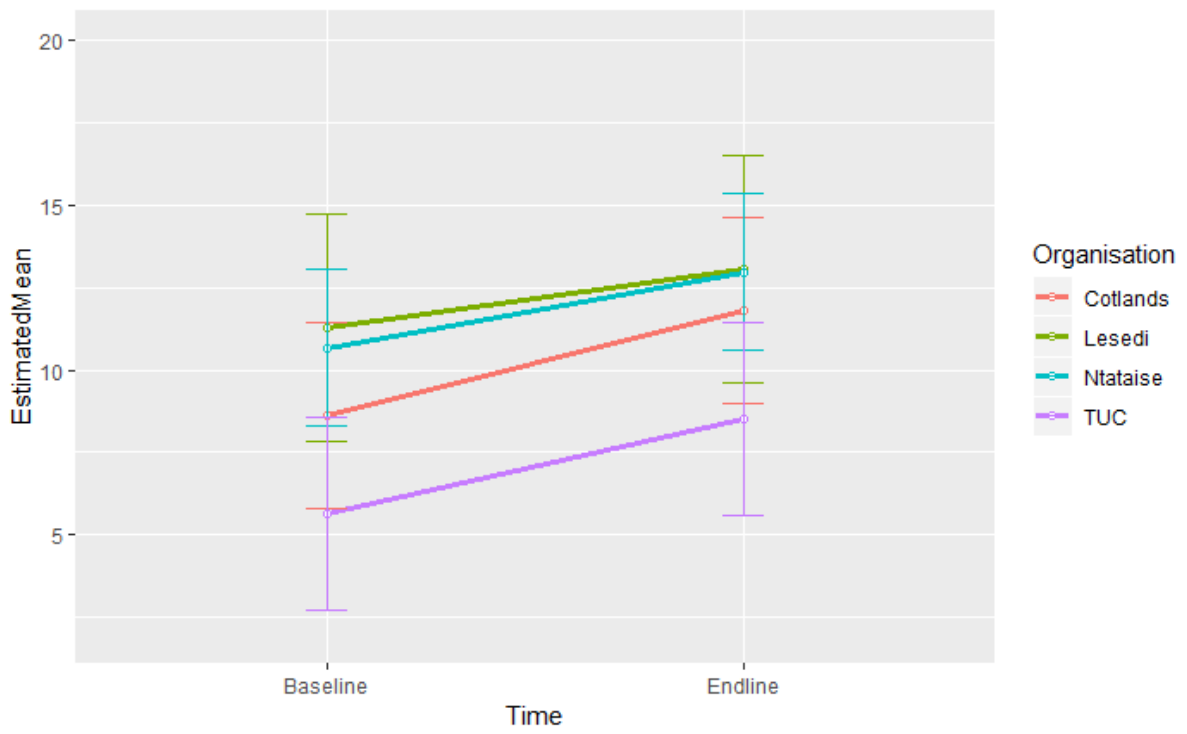
### GMD



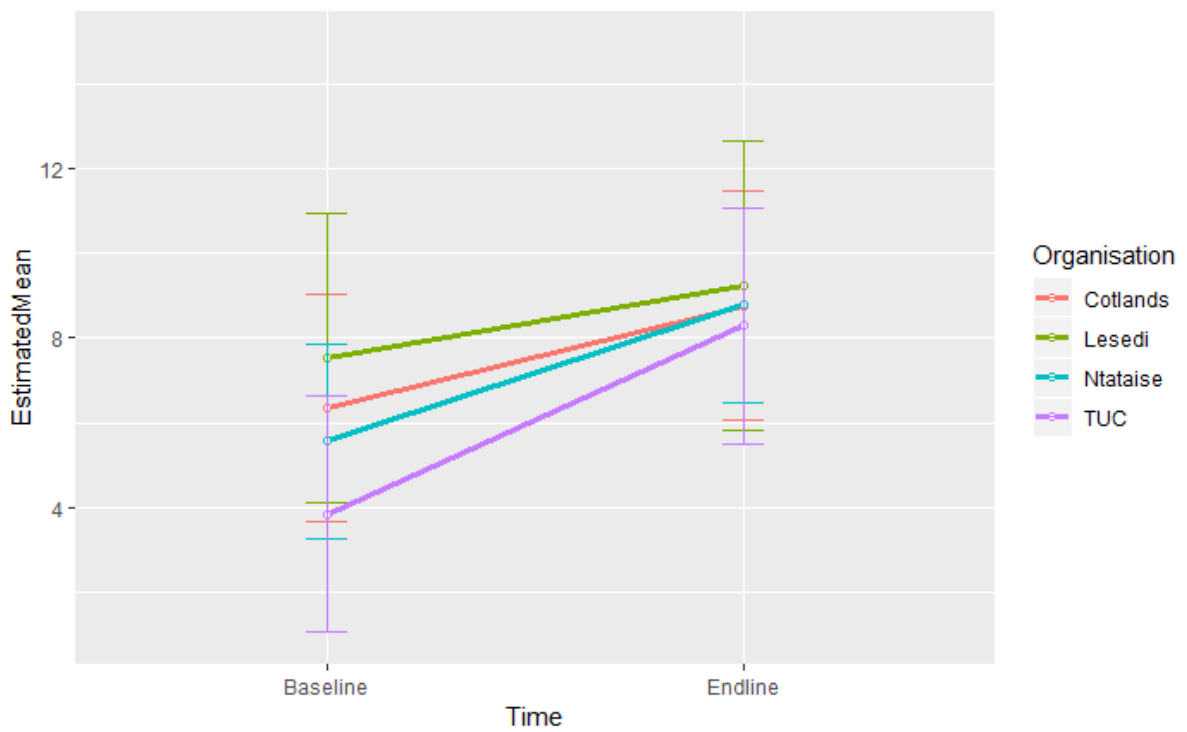
### FMCVMI



### ENM



### CEF



ELL

