



# MELQO-IDE LA Bangladesh Baseline Report

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## Executive summary

Aligned with the government's vision for universal preprimary education in Bangladesh, Save the Children has been implementing one year pre-primary education programs for children aged 5 years through different projects in multiple districts in Bangladesh. In 2014, an extended preschool program for children aged 3-4 years began on a small scale in Meherpur district. The goal was to test a two-year program model (targeting children aged 3-4 years) and document the value added of an extra year of preschool. Furthermore, by offering more years of preschool education, the program expects to provide richer experience that translates to better outcomes in early primary and primary education. The curriculum developed for children aged 3-4 years in conjunction with the Ministry of Primary and Mass Education (MoPME) represents an important effort for Bangladesh where there are still very limited educational initiatives taken for this age group. The program has multiple components: play-based learning center, parent's education program for early learning supports, teachers training, and follow-up supervision.

This baseline study assessed 498 children from intervention and comparison communities using the International Development and Early Learning Assessment (IDELA) supplemented with additional questions and tools developed by the Measuring Early Learning and Quality Outcomes Initiative (MELQO)<sup>1</sup>. The IDELA contains a direct child assessment of early development and skills, along with a questionnaire for caregivers about the home environment. The MELQO tools contain direct child assessment instrument (well aligned with IDELA), a parent report measures of children's early skills in addition to a questionnaire for caregivers about home environments. One of the core objectives of this study was to analyze similarities and differences between children and families in the intervention and comparison groups in order to determine whether they will be an appropriate sample with which to assess program impact later in the year. In addition, any equity findings that could inform programming throughout the year will also be reported. Secondly, this report investigated the effectiveness of the IDELA and MELQO tools in the current context. The main focus in this area was how the tools used captured variation in children's skills and how direct child assessment and parent reported items related to one another.

Important differences were found between families and children in the control and intervention groups which indicate that children in the intervention group are significantly advantaged in their early learning environments and development relative to children in the comparison group. Specifically mothers in the intervention group tend to have higher education than mothers in the comparison group, and families in the intervention group own a greater variety of toys and engage in learning and play activities with their children significantly more than parents in the comparison group. Further, children in the intervention group have significantly more advanced skills than children in the comparison group in motor development, emergent literacy, socio-emotional development and the overall IDELA score. These baseline differences will make it difficult to attribute future learning gains to the program being implemented.

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<sup>1</sup> MELQO is an initiative lead by UNESCO, Brookings Institute, World Bank and UNICEF

Analyzing the relationship between home environments and children's early skills multivariate regressions find that the variety of reading materials and toys in children's homes are significant predictors of motor development, literacy, numeracy and overall school readiness. In addition, children from families with more economic resources tended to have stronger skills in all areas, except motor development. Mothers were found to spend the most time engaging with young children and further analysis shows that more engagement with children by other family members is related to more advanced skills in literacy, numeracy and overall school readiness. In addition, more aggressive discipline style in homes (i.e., hitting, yelling, and spanking) is significantly related to lower scores in approaches to learning and also socio-emotional development (marginally significant). All results suggest that stimulating, safe home environments are important for children's holistic development.

In terms of item performance, direct assessment items fit children in this sample relatively well with the exception of one phonemic awareness task which was too difficult for the 4-year-old children in this sample. MELQO parent-reported items were answered by all parents but the correlations between child and parent responses to similar questions were relatively low and vary in systematic ways. For example, mothers who reported engaging more with their children were more accurate in their assessment of their child's skills. In addition, parent reported items showed weaker construct validity. That is, they were less sensitive to important differences between children and families in this sample than direct child assessment items. For Save the Children's purpose of assessing the magnitude and equity of program impact, the results of this analysis suggest that future studies should favor direct child assessments over parent-reported questionnaires of children's skills.

## Introduction

The Save the Children's (SC) two year preschool education program targeting children aged 3-4 years old is located in the country of Bangladesh. Bangladesh is an extremely poor country, and the eighth most populous country in the world, with around 150 million people, including 61 million children. Within Bangladesh the preschool program is currently operating in the district of Meherpur. Situated in Khulna Division, Meherpur is located approximately 245 km northwest of the Bangladeshi capital Dhaka and is the smallest District in the country. It consists of three *upazilas*: Meherpur Sadar, Mujibnagar and Gangni. Within the *upazilas* there are two municipalities, 18 unions and 249 villages. Although Meherpur shares a 118 km border with India, migration of the 591,436 inhabitants of Meherpur to India is rare. The population of this area is religiously and linguistically homogenous, as the vast majority of inhabitants are Muslim and speak Bangla as their native tongue. The economy is based primarily on agriculture.

Despite certain climatic advantages, including fertile land with more than one growing season and a slightly higher land elevation level in comparison to other parts of the country, many marginalized communities in Meherpur face the socioeconomic challenges. 2011 Population and Housing Census data show that the literacy rate in the Meherpur Sadar upazila is 49.4% while the rate is 42.2% in the upazila of Gangni. Further, according to a 2010 Save the Children's Study<sup>2</sup>, 75% of children in Meherpur do not get adequate stimulation, and between 35% and 45% present low cognitive and language development. Moreover, Meherpur is among the regions with fewer pre-primary education centers<sup>3</sup> in Bangladesh.

SC began working in Meherpur in 2006 under its sponsorship-funded program known as *Shishuder Jonno* ("For the children" in Bangla). The program aims to ensure that children in Meherpur learn and develop to their full potential. The program provides support to children and their families at every stage of life through four core programs: Early Childhood Care and Development (ECCD), Basic Education (BE), School Health and Nutrition (SHN) and Adolescent Development (AD), following Save the Children International's Common Approach for Sponsorship Program (CASP) modules. In addition to the four core programs, Shishuder Jonno also implements cross-cutting Child Protection (CP) and Community Mobilization (CM) activities across the implementation area, as well as select innovation and pilot projects that may be scaled up within the program or in other Save the Children programs throughout Bangladesh.

Since 2006, Shishuder Jonno has been operating different ECCD intervention in all three *upazilas* (sub-districts) of Meherpur which has followed a gradual expansion manner. Aligned with the government's vision for universal preprimary education in Bangladesh, Save the Children has been implementing one year pre-primary education programs for children aged 5 years. This one year pre-school program is targeting 5years children before their formal schooling while in country there are very limited initiatives taken for the children aged 4years. A the same time, the policy documents demonstrate demand and

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<sup>2</sup> Parenting Education & Support Program: Comparison of the Effectiveness of a Service-based and a Community-based Intervention Model in context of Rural Bangladesh. Mohammad Imam Nahil. Deputy Program Manager. Save the Children, Bangladesh 2010.

<sup>3</sup> Directorate of Primary Education. EFA Report, p 22

scope for at least 2 years of pre-primary program. Bangladesh government has recently developed two policies (national education policy 2010, national ECCD Policy 2013) where the importance of extended early childhood education program is described. And the policies describe the future scope to expand early childhood education program to at least 2 years.

To realize the potential, SCI has started developing a program which can supplement the process for national program development in coming future. In 2014 a two year preschool model for children aged 3-4 years began on a small scale in Meherpur district. The goal was to test a multi-year program and document the value added of an extra year of preschool. In 2015, the two year pre-school program is being implemented in the upazila of Meherpur Sadar. Furthermore, by offering more years of preschool education, the program expects to provide richer experience that translates to better outcomes in early primary and primary education. The curriculum developed for children aged 3-4 year in conjunction with the Ministry of Primary and Mass Education (MoPME) represents an important effort for Bangladesh where there are still very limited educational initiatives taken for this age group. The program has different components: play-based learning center, parent's education program for early learning supports, teachers training, and follow-up supervision.

The key research questions to be explored in this report include:

- How comparable are children in the intervention and comparison groups in terms of background characteristics, home learning environment, and emergent skills?
- What can the baseline assessment tell us about children's emergent skills and parents' knowledge, attitudes, and behaviors?
  - How could this impact programming?
- What are the drivers of children's emergent skills before the intervention begins?
  - Are there equity issues to consider?
  - How could this impact programming?
- How do the result of direct child assessment items compare with parent reported items?

## **Methods**

### **Sampling**

In February-March of 2015 Save the Children conducted a baseline study using the International Development and Early Learning Assessment (IDELA) alongside additional tools and questions that were field tested as a part of collaboration with the MELQO initiative. Twenty-five villages took part in the baseline across four unions (Amdah, Amjhupi, Buripota and Kutubur) of Meherpur district. All children age 4 years in the intervention area were selected for the assessment and comparison children were chosen from the same or adjacent communities. In total, 257 children and their caregivers were included from the intervention area and 241 children from the comparison area. The average child age across intervention and comparison samples is 4.0 years.

Table 1. Study sample

	Intervention	Comparison
<b>Boys</b>	118	116
<b>Girls</b>	139	125
<b>Total</b>	257	241

## Measurement

The International Development and Early Learning Assessment (IDELA) tools and the MELQO tools and questions were used with children and caregivers in this study. The IDELA direct child assessment contains 22 questions in four domains: motor development, emergent literacy, emergent numeracy and socio-emotional development. It also contains two questions related to executive functioning (short-term memory and inhibitory control), as well as assessor-rated questions related to children’s approaches to learning. In addition, a number of new MELQO items were added in the area of emergent numeracy. The IDELA Caregiver questionnaire asks about parents’ age and educational background, home learning environment for children (materials and activities), parental attitudes about their role in child development and family socio-economic status (using household possessions as proxies for familial wealth). MELQO caregiver questions were used to supplement the IDELA Caregiver questionnaire and additional parent reported child development items were added covering four domains: emergent numeracy, emergent literacy, socio-emotional development and self-regulation. Direct child assessment items are displayed in Figure 1, and parent-report items in Figure 2.

The core objectives of this study are twofold. First, we will analyze similarities and differences between children and families in the intervention and comparison groups in order to determine whether they will be an appropriate sample with which to assess program impact later in the year. In addition, any equity findings that could inform programming throughout the year will also be reported. Secondly, this report will investigate the effectiveness of the IDELA and MELQO tools in the current context. The main focus in this area will be how the tools used capture variation in children’s skills and how direct child assessment and parent reported items relate to one another.

Figure 1. Direct child assessment Items

<b>Gross and Fine Motor Development</b>	<b>Emergent Literacy and Language</b>	<b>Emergent Numeracy</b>	<b>Socio-emotional Development</b>	<b>Executive Function</b>
Hopping on one foot	Print awareness	Measurement and comparison	Peer relations	Short-term memory
Copying a shape	Expressive vocabulary	Classification/Sorting	Emotional awareness	Inhibitory control <sup>4</sup>

<sup>4</sup> Cameron Ponitz, C., McClelland, M. M., Matthews, J. S., & Morrison, F. J. (2009). A structured observation of behavioral self-regulation and its contribution to kindergarten outcomes. *Developmental Psychology, 45*, 605–619.

Drawing a human figure	Letter identification	Number identification	Empathy
Folding Paper	Emergent writing	Shape identification	Conflict resolution
	Initial sound discrimination	One-to-one correspondence	Self-awareness
	Listening comprehension	Simple operations	
		Simple problem solving	
		Rote Counting (MELQO)	
		Spatial relationships (MELQO)	
<b>Approaches to Learning: Persistence, motivation and engagement</b>			

Figure 2. Parent reported items

Section	Topic	Description
<b>Family information (IDELA/MELQO)</b>	General family information	Sex of child, child age, number of children at home, ethnicity, parental literacy, parental education, languages spoken at home
	ECCD experience and educational expectations	Child participation in ECCD programs, details of participation, parental expectation and aspirations of child's educational attainment
	Access to early learning materials and resources at home	Types of reading materials at home, types of toys at home
	Parenting practices and support for learning and development	Adults in the home engaging with children to promote learning and development
	Inadequate care	Children left alone or in the care of another young child
	Caregiver self-efficacy	Attitudes about parent's role in child's development
	Socio-economic status	Roof and wall of home materials, objects/appliances owned, land/animals owned
<b>Parent report of child skills (MELQO)</b>	Emergent Numeracy	Parent report of child's ability to complete numeracy activities with help or independently.
	Emergent Literacy	Parent report of child's ability to complete literacy activities with help or independently.
	Socio-emotional development	Parent report of child's socio-emotional

Section	Topic	Description
	Self-regulation	development. Parent report of child's self-regulation competencies.

## Training and Field Testing

Twenty-two enumerators were trained and eventually 19 were chosen to carry out the final assessment. Three assessors were not asked to participate due to poor performance during the training. Enumerators were informed to strictly follow the assessment instructions, including:

- To seek consent from assessment participants before starting the test;
- Establish a relaxed and playful rapport with the child;
- Offering neutral encouragement and breaks as needed throughout the assessment;
- Prompting or encouraging the child according to the tool instruction;
- Not to discriminate against individual children by defining as either ahead of or behind development of their age.

Five-day training sessions for enumerators were designed in three parts. First, an 'Introduction to IDELA' session oriented enumerators to the IDELA and additional MELQO tools, and to further improve understanding there was in-depth orientation on how to implement different assessment items using necessary materials like puzzles, laminated student stimuli cards, etc. The second session continued on how to use tablets with Tangerine software to collect data electronically and also how to execute inter-rater reliability testing without possibly confusing and/or intimidating a child. The last session included three days of rigorous field testing during which key opportunities were given to the enumerators to practice using the tools and technology with children prior to the official study launch. During field testing some challenges arose both in the administration of certain items as well as in the response of children and caregivers to the questions. After field testing, important final changes to the tool were made and detailed below.

### Direct Assessment Tools:

#### ➤ Letter Identification and Number Identification

- Children were baffled by the letter and number charts which were entirely unfamiliar to them. The team found during field testing that children didn't know any letters and after asking them for multiple letters in a row some started crying. Pilot data also showed floor effects on these items.
- To avoid asking about 10 letters in a row and making children upset, instructions were amended. Only the high frequency letters/numbers were included with the assessment of these 4 year old children and stop rule was used such that if a child didn't know any of the first 3 letters /numbers in a row enumerators moved on to the next item. If a child knows one of the first 3 we asked about the remaining 7.

- **Inhibitory Control**
  - Even though this item is play-like, the children did not understand the instructions and enumerators ended up explaining over and over again hoping the child will “get it right” leading to further confusion. In general, 4 year old children with no ECD exposure in Bangladesh were too young for this task.
  - Based on the pilot data and the feedback from the team of enumerators, plus the challenges with the administration, the team decided to omit the item.
- **First Letter Sounds**
  - This item was also very challenging for 4 year olds in rural Meherpur. Children did not understand what was asked of them and many refused to answer or cried.
  - Based on the pilot data and the feedback from the team of enumerators , the team decided to retain the item but if kids didn’t understand the practice question after enumerators explained it twice they were not asked the trial questions.
- **Backwards digit span**
  - Extremely challenging question, children were baffled and there was consensus that it is not appropriate to retain with this age group of children in Bangladesh. After the pilot the item was omitted.

New items such as verbal counting, quantitative comparison of two sets, measurement vocabulary and spatial vocabulary were tested as a part of this study. Following is the feedback on these assessment items:

Item name	Observations
<b>Verbal counting</b>	The children or the enumerators did not face any complexity during this counting item and the children understood the instruction clearly.
<b>Quantitative comparison of two sets</b>	In this assessment item, the children were showed a picture with two groups of tomatoes to identify which group has the most. No issues raised against this item except some children were confused identifying tomato as apple.
<b>Measurement vocabulary</b>	In this item, children were showed four pictures of dog, elephant, stick and tree pictures to put their finger on pictures of particular dog, elephant, stick or tree to show that they can recognize which one is the largest or smallest or longest or shortest. Some children faced difficulties to recognize the word ‘Largest’ and ‘Shortest’ in bangla but they responded to the item quite quickly and positively after their parents helped/prompted them saying “It’s similar to the ‘Largest’ and ‘smallest’!”
<b>Spatial vocabulary</b>	In this item, some children were confused identifying the objects showed in pictures ‘next to’ and ‘in front of’ the table. In future

	more adaptations to the picture might be needed to ensure cultural relevance.
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**Caregiver/Parent Questionnaire:**

In caregivers assessment, there were 54 questions presented in four parts: mathematics, literacy, self-regulation and socio-emotional. During the field test, some caregivers were quite baffled about certain questions which was mainly because the concepts were foreign and enumerators were not able to offer further explanations or provide examples.

Areas measured	Observation
<b>Mathematics</b>	From this part, question 34 which is about identifying largest, smallest, longest or shortest. In most of the case parents told the enumerators that children can recognize all but enumerators felt they were guessing and thinking that all the questions were along the same lines. In question 37 about completing puzzle, the puzzle word itself is unfamiliar among most of the mothers and many said they don't have puzzles at home.
<b>Literacy</b>	In this section all of the questions were understood by the caregivers though they still had a hard time answering some of the questions. The ratings were hard to explain to them and enumerators had to repeat the ratings a few times to for the mothers to choose from them. They primarily tended to answer with "yes/no" responses
<b>Self-regulation</b>	This section was very challenging to caregivers. There were issues with the ratings and the content of the questions was also complicated. The translation sounded foreign and the team re-did translation a few times during the pilot to ensure the questions made sense to caregivers. For instance, question 51 and 53. Is ( <i>name</i> ) over-active? How often does ( <i>name</i> ) keep working at something until s/he is finished? These are examples of questions that caregivers has a very hard time understanding. Enumerators were re-train to provider examples and explain better what is meant by these questions.
<b>Socio-emotional</b>	Same observations as above for self-regulation. This section was also challenging for caregivers to understand for the lack of explanation with practical examples from the enumerators: <ul style="list-style-type: none"> <li>- Question no. 61 about considering of other's people's feelings;</li> <li>- Question no. 69 about feeling free to explore in unfamiliar environment with a familiar person present;</li> <li>- Question no.70 about adjusting easily to transitions and</li> <li>- Question no. 71 about settling down after periods of exciting activities.</li> </ul>

Moreover, it can be said that this section was difficult to make caregivers understand the Likert Scale. It was difficult to differentiate what can be in sometimes or usually! The scoring was totally depending on enumerator's explanation and perceptions. In Bangladesh, specifically in more rural areas, it's better to use a yes/no response option rather than using Likert Scale. Likert scales require more skilled responders and enumerators.

Based on the field test and practice the following recommendations were shared against challenges faced to ensure the quality data from baseline survey:

- Enumerators were re-trained after field testing and all field observations and challenges were addressed
- Translation of specific items was re-checked
- Examples and further explanations for some of the caregiver questions were added and explained to enumerators
- Further exercises were carried out to ensure inter-rater reliability
- Further exercises were carried out to support enumerators with building rapport
- Given that children were very young and inexperienced, enumerators were coached on how best to support them if they got distracted, discouraged or started to cry
- To avoid distraction the enumerators were asked to visit homes for effective and quality data collection.
- Further reminders were also shared on how to administer the assessment objectively and not to prompt some answers from the children.

## **Analysis**

The main purpose of this analysis is to present a profile of children's early development and home environments, and to test the appropriateness of comparison children for use in a quasi-experimental research design. Summary statistics will be presented to display students' performance in each of the instrument's sub-tests, as well as learning materials and activities occurring in children's homes. To test the comparability of learners in the intervention and comparison samples, this report will use comparison of means through t-tests assuming unequal variance between the two samples and clustering within ECCD centers or villages. In addition, this report will use multivariate regression models to explore relationships between early learning and family background characteristics, home environments, and parent attitudes.

A second key purpose of this report is to investigate the performance of IDELA and MELQO tools in this study context. To this end, floor and ceiling effects and inter-rater reliability will be reported on for all direct child assessment items, and internal consistency will be reported for all child and parent subscales. In addition, correlations between child and parent items will be reported on where relevant.

## Home environment

### Family characteristics

This section describes background characteristics about the families who were sampled and looks at differences between comparison and intervention families. On average children in this study are 4 years of age, mothers are 26 years old and fathers are 33 years old. In general, mothers and fathers have about a primary level education. In the intervention group, 84 percent of mothers are literate compared to 74 percent in the comparison group. About 58 percent of fathers in both groups are literate, and all parents expect (have aspirations) that their children will complete both primary and secondary school.

**Investigating differences between comparison and intervention families, analyses find that children in the intervention group tend to be slightly older, and mothers in this group have more education and are more likely to be literate relative to the comparison group.** As intended in the research design, children in the intervention group are significantly more likely to be enrolled in ECCD centers.

Table 2. Family characteristics, by group

	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
Child sex (Female=1)	55%	49%	52%	
Child age	4.0	4.1	4.0	*
Mother age	26.8	26.2	26.5	
Mother education (0=None; 4=Higher education)	2.1	2.4	2.2	**
Mother literacy	74%	84%	79%	**
Father age	33.8	32.8	33.3	
Father education (0=None; 4=Higher education)	1.5	1.6	1.6	
Father literacy	57%	60%	58%	
# children in family	1.9	1.9	1.9	
Currently attend an ECCD program	2%	91%	45%	***
Parent expects child to complete primary school	100%	100%	100%	
Parent expects child to complete secondary school	98%	100%	99%	

\*p < .05, \*\*p < .01, \*\*\*p < .001

Looking at resources in the home we see that in general radio, refrigerators, and motorcycles are uncommon commodities for families to own while bicycles, electricity, land and livestock are more common in the communities sampled. **There are no significant differences between the possessions owned by families in the comparison and intervention groups, which suggests a similar socio-economic status of the families in both groups.**

Table 3. Home possessions, by group

	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
Radio	2%	4%	3%	
TV	49%	52%	50%	
Refrigerator	8%	7%	7%	
Bicycle	78%	78%	78%	
Motorcycle	14%	17%	15%	
Electricity	74%	78%	76%	
Land	62%	63%	62%	
Livestock	92%	93%	93%	

\*p < .05, \*\*p < .01, \*\*\*p < .001

### Learning materials at home

This section describes learning materials found in children’s homes. In general, magazines and newspapers are uncommon reading materials whereas religious books and textbooks are fairly common. On average 33 percent of children have a storybook a home, and on average families have about two different types of text at home. Parents also report that there are a variety of toys for children to play with, almost five different types on average. **Parents in the intervention group report to have significantly more types of toys at home than parents in the comparison group.** Figure 4 displays the proportion of families with 4 or more reading materials and toys at home as well as the proportion of children with no reading materials at home.

Table 4. Home learning materials, by group

	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
Storybooks	27%	39%	33%	
# Storybooks (0-12)	.7	.9	.8	
Textbooks	73%	73%	73%	
Magazine	0%	1%	1%	
Newspaper	2%	2%	2%	
Religious book	77%	79%	78%	
Coloring book	8%	14%	11%	
Comic	3%	3%	3%	
# types reading material	1.9	2.1	2.0	
Homemade toy	85%	88%	86%	
Manufactured toy	92%	94%	93%	
Household object	88%	86%	87%	
Outside toy	94%	94%	94%	
Drawing toy	32%	43%	37%	
Puzzle	2%	5%	4%	
Building toy	54%	64%	59%	

<b>Color/shape toy</b>	12%	16%	14%	
<b>Toys teaching numbers</b>	17%	22%	20%	
<b># types of toys</b>	4.7	5.1	4.9	*

\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 3. Average child-friendly learning materials in homes

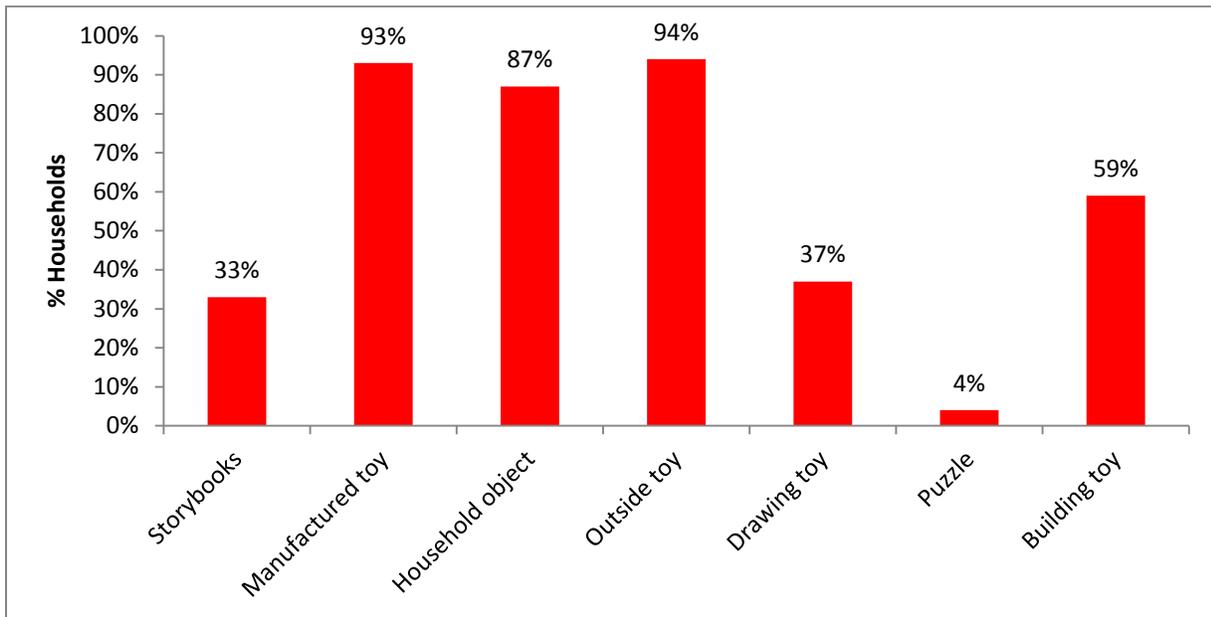
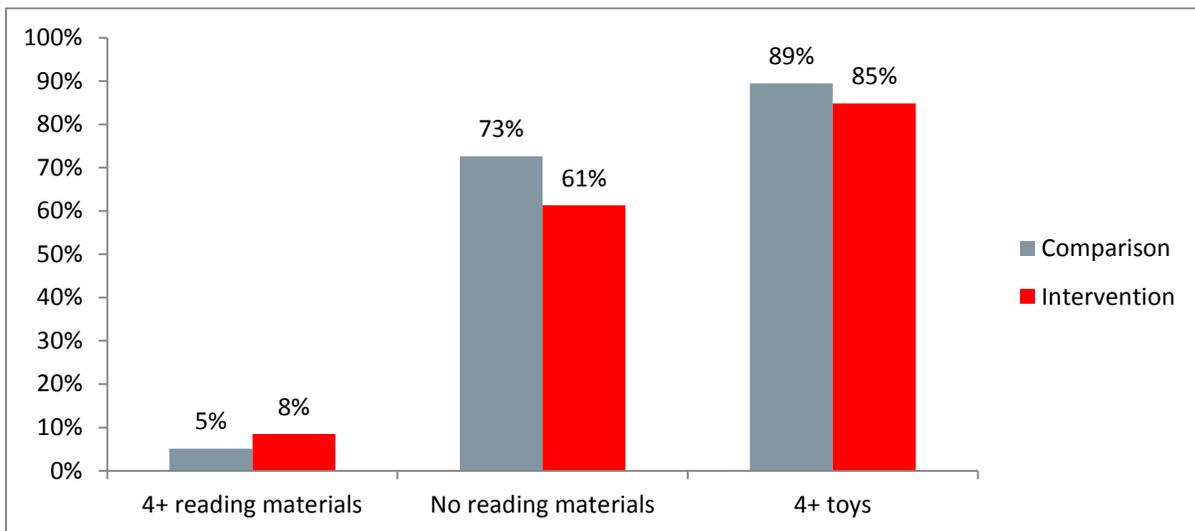


Figure 4. Variety of reading materials and toys in home, by intervention group



### Parent support for learning and development

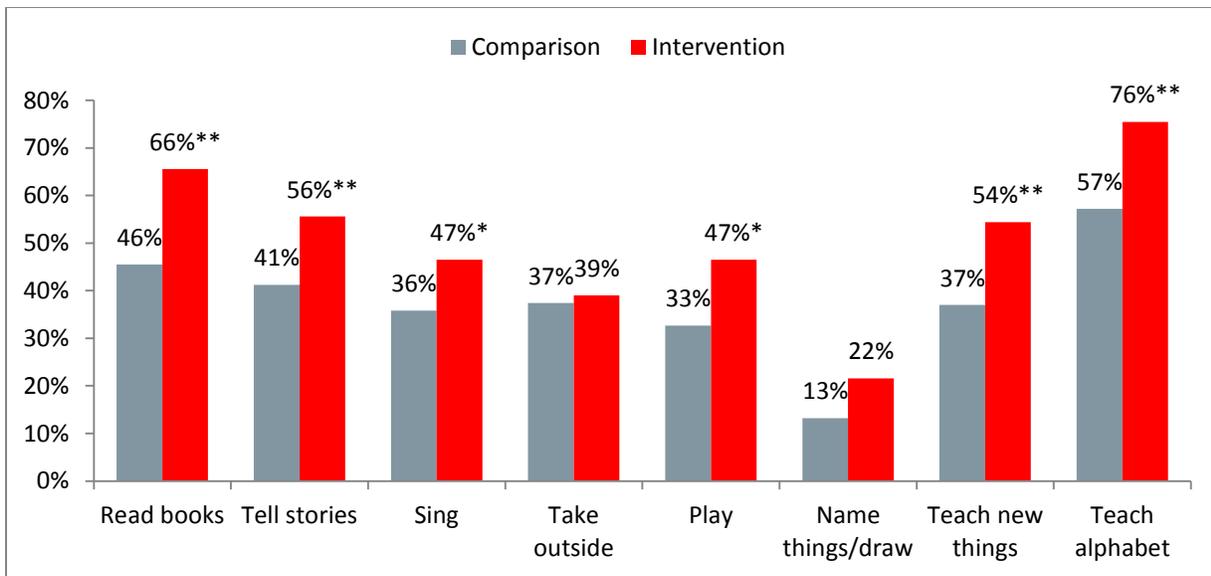
This section describes activities that parents report engaging in with their children at home. **Analyses find that parents in the intervention group report engaging in significantly more learning and play activities with their children at home relative to parents in the comparison group.** In addition, mothers in both groups report engaging in the most activities with children, followed by other family members and then fathers.

Table 5. Home learning activities in the past 3 days, by group

	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
Read books	46%	66%	55%	**
Tell stories	41%	56%	48%	**
Sing	36%	47%	41%	*
Take outside	37%	39%	38%	
Play	33%	47%	39%	*
Name things/draw	13%	22%	17%	
Teach new things	37%	54%	45%	**
Teach alphabet	57%	76%	66%	**
Hug	100%	100%	100%	
Spank	55%	51%	53%	
Hit	61%	53%	57%	
Yell	83%	80%	82%	
# Home learning activities	3.5	4.7	4.1	***
Mother activities	2.9	3.9	3.4	***
Father activities	0.5	0.7	0.6	
Other family activities	0.8	1.2	1.0	**
Parent uses negative discipline	2.0	1.8	1.9	

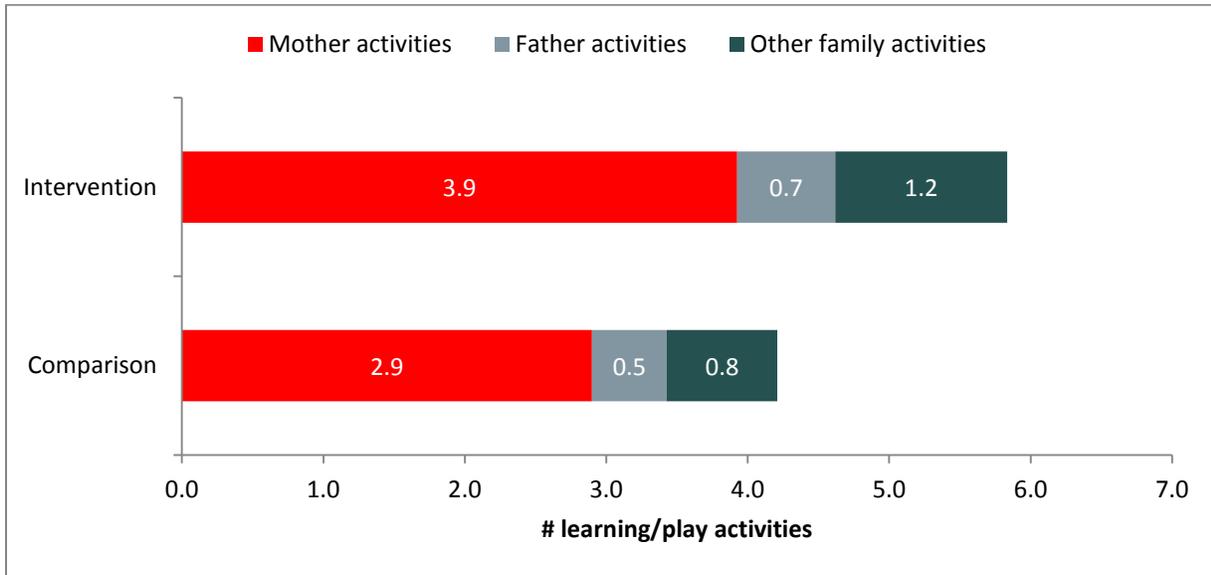
\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 5. Learning and play activities at home, by intervention group



\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 6. Summary of number of reported activities with children per week, by caregiver



### Parenting beliefs and attitudes

This section reviews parent beliefs about their role in their children’s development. **Table 6 displays that parents in the intervention and comparison groups have similar attitudes about their roles in their children’s development.** Also, additional analyses find that parents with higher educational attainment tend to have significantly more positive beliefs about their role in child development. There was not a significant relationship between socioeconomic status and beliefs in this area.

Table 6. Parent beliefs and attitudes, by group

	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
I play crucial role in development of my child (4=Strongly agree; 1=Strongly disagree)	3.3	3.4	3.4	
It is important to take good care of child	3.6	3.6	3.6	
Important to make enough time for child	3.3	3.4	3.3	
Knowing to read and write is important for child	3.6	3.6	3.6	
I will encourage child to complete secondary school	3.5	3.5	3.5	
I think I can support my child's school readiness at home	3.2	3.3	3.2	
I think my child learns skills by playing	3.3	3.5	3.4	*
I talk to child while doing household work	3.2	3.2	3.2	
I praise my child whenever s/he does something impressive	3.4	3.5	3.5	
<b>Total score</b>	<b>30.5</b>	<b>31.0</b>	<b>30.8</b>	

\*p < .05, \*\*p < .01, \*\*\*p < .001

## Children's learning and development

This section will detail children's performance on the direct child assessment with a focus on differences between the skills of children in the intervention and comparison groups. Total domain scores are calculated by adding the weighted score of each item in the domain so that all items contribute equally to the domain score. The total direct child assessment score is calculated by adding the weighted scores (percent correct) from each item in the core domains (motor, literacy, numeracy, socio-emotional and executive function) so that all items contribute equally to the total score. Due to the difference in administration style between the direct child assessment items and the enumerator reported learning approaches items, the learning approaches items are not included in the total IDELA score.

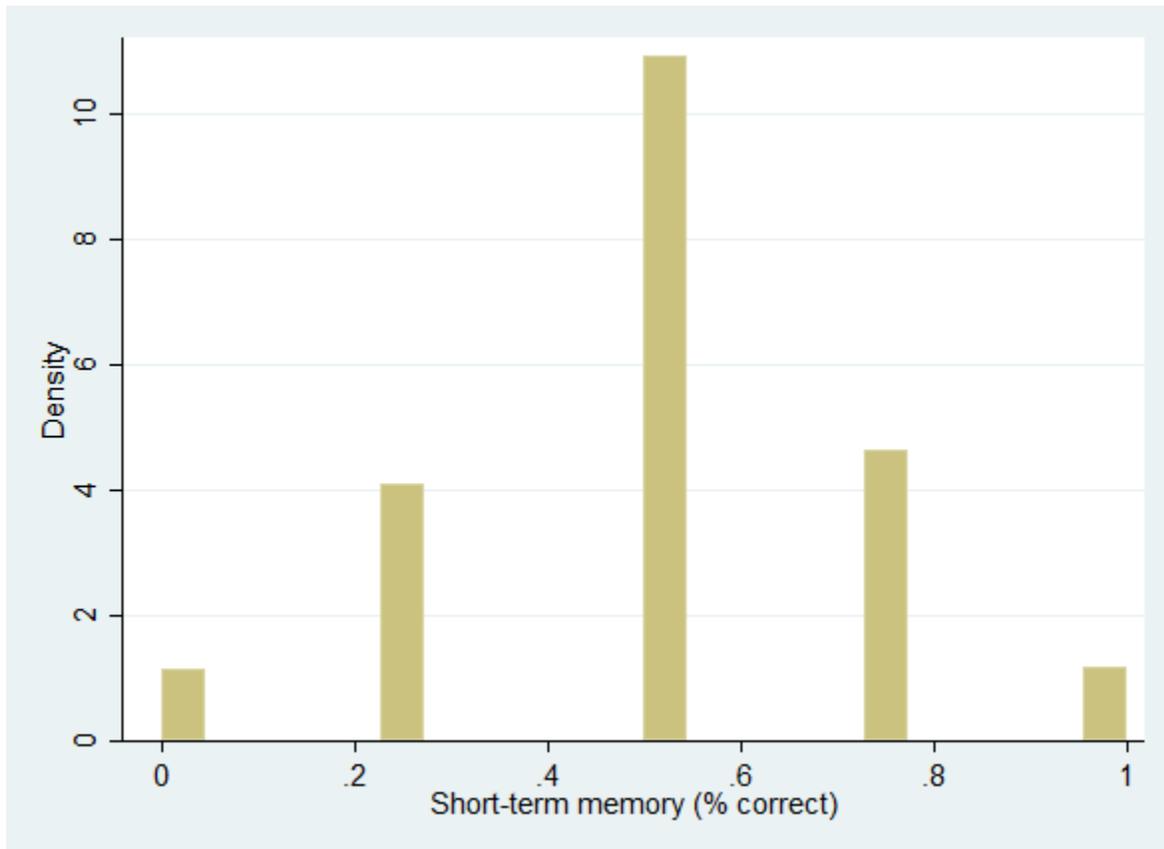
## Cognition

Two items focused on short-term memory and inhibitory control are included in the standard IDELA tool to investigate these important areas of children's executive functioning. However, only the short-term memory item was included in this assessment because the inhibitory control task was deemed too difficult for target children during the pilot testing process. The inhibitory control task is a game that asks children to make a different movement from what the assessor instructs. The short-term memory task involves asking children to remember strings of numbers. **Overall, the short-term memory task fit well for the children assessed and there were no differences between groups on the short-term memory task.**

Table 7. Cognition items, by group

	Range	Comparison	Intervention	Significant difference
Short-term memory	0-4	2.0	2.1	

Figure 7. Distribution of short term memory scores



### Motor development

Table 7 displays average motor development skills for children in the control and intervention groups. **Overall children in the intervention group have significantly stronger motor skills than children in the comparison group, most notably around drawing.**

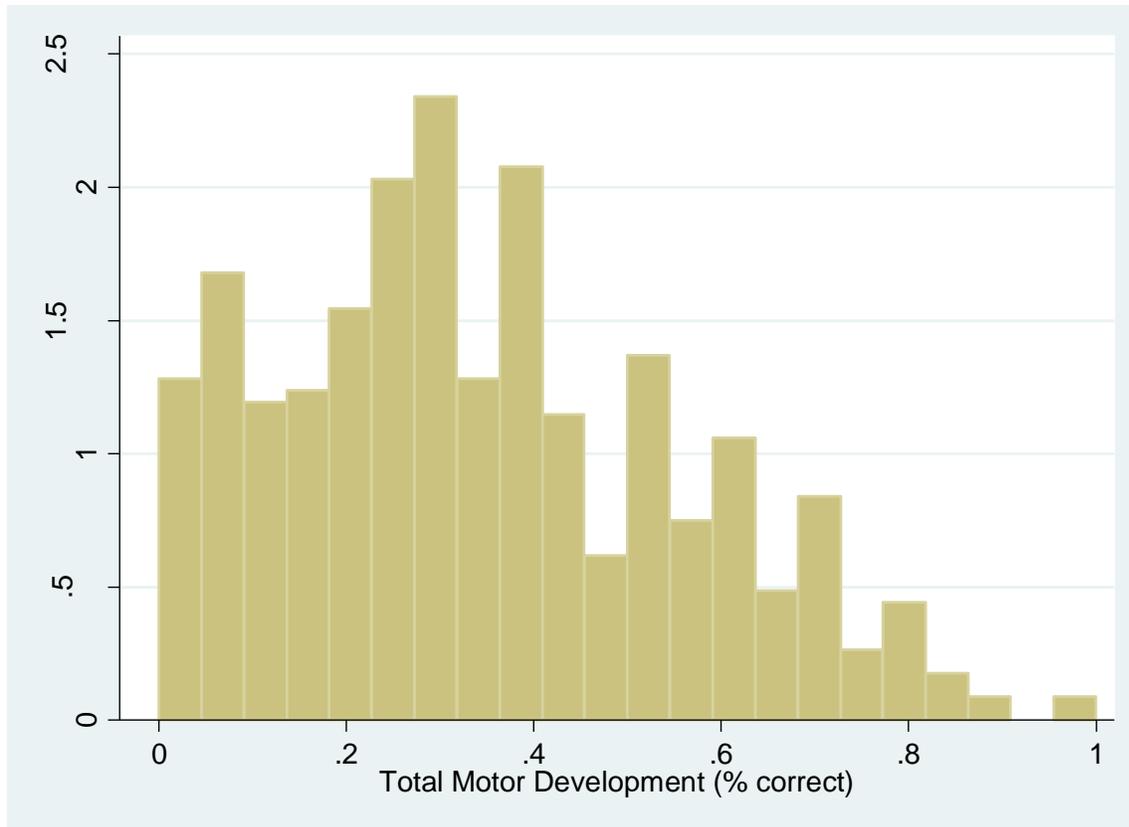
Table 7. Motor development, by group

	Range	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
Hopping	0-10	5.6	5.8	5.7	

Folding paper	0-4	1.1	1.5	1.3	*
Copy shape	0-4	1.2	1.5	1.3	
Draw human figure	0-8	0.9	1.6	1.2	**
Total Motor Development	0-1	31%	38%	34%	*

\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 8. Distribution of motor development items



### Emergent Literacy and Language

Table 8 displays children’s emergent literacy skills. In general, children have the strongest skills in the areas of print awareness and expressive vocabulary and the weakest skills in the area of letter identification and identifying first word sounds. In fact, most children in this sample could not complete the first letter sound task at all. This is to be expected and is developmentally appropriate. **Overall, children in the intervention group have significantly stronger emergent literacy skills than children in the comparison group.**

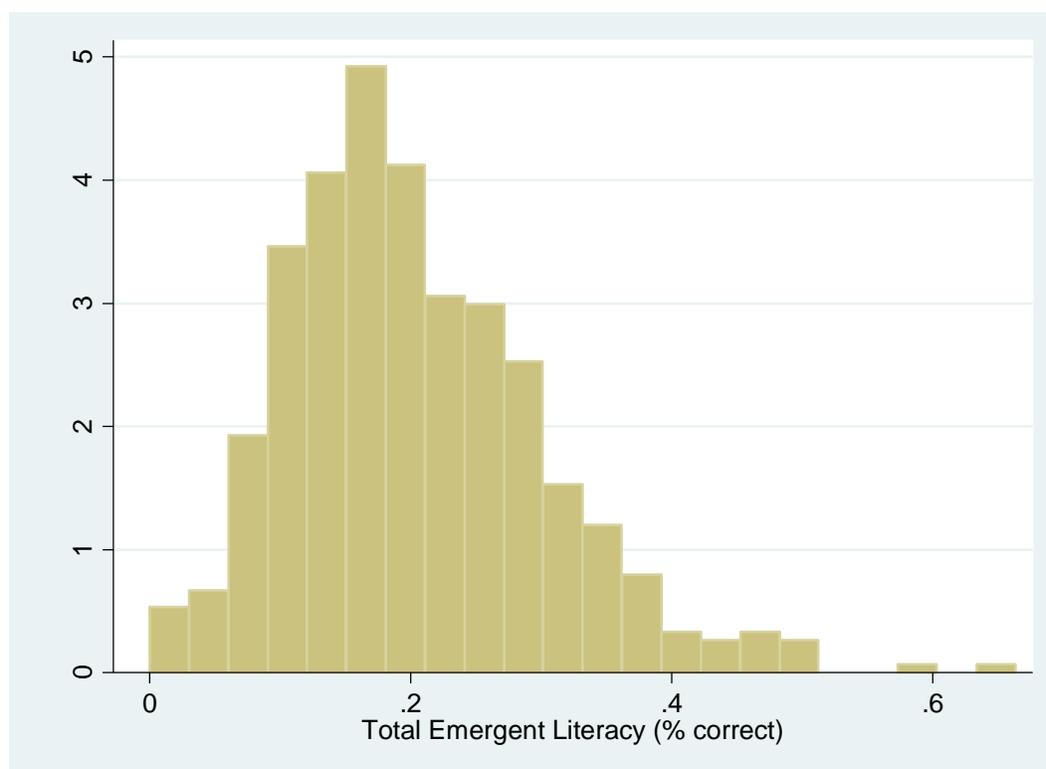
Table 8. Emergent Literacy and language, by group

Range	Comparison	Intervention	Average	Significant
-------	------------	--------------	---------	-------------

		(N=257)	(N=241)	(N=498)	difference
Print awareness	0-3	1.3	1.5	1.4	
Letter ID	0-20	0.4	0.8	0.6	
Expressive vocabulary	0-20	3.8	4.3	4.0	*
Oral comprehension	0-5	1.2	1.6	1.4	*
First letter sounds	0-3	0.0	0.0	0.0	*
Writing level	0-4	0.9	1.1	1.0	**
Total Emergent Literacy	0-1	19%	22%	20%	***

\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 9. Distribution of emergent literacy items



### Emergent Numeracy/Math

As seen in Table 9 there are no significant differences between the intervention and comparison groups in the numeracy domain on average, but intervention children outperformed the comparison children on some subtests. Overall, children have the strongest skills in the areas of size/length differentiation and shape identification, and the weakest skills in the areas of number identification and puzzle completion. These trends are developmentally appropriate.

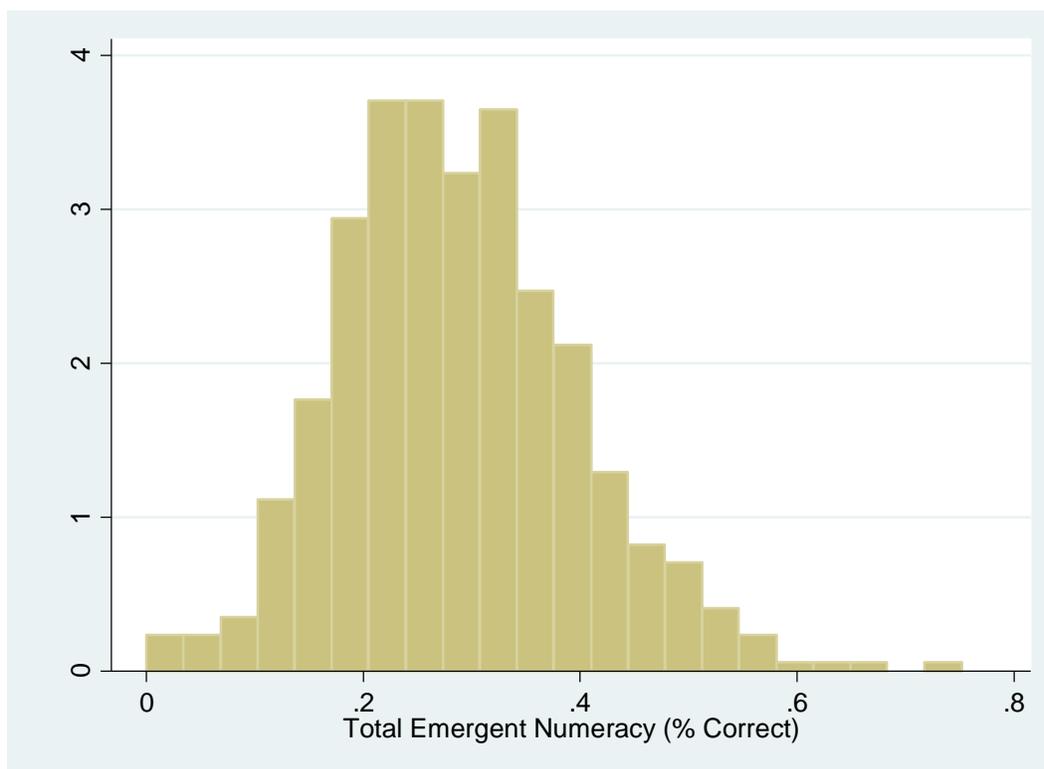
Table 9. Emergent Numeracy, by group

	Comparison Range (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
--	--------------------------------	-------------------------	--------------------	---------------------------

One-to-one correspondence	0-3	0.3	0.3	0.28	
Number ID	0-20	0.3	0.6	0.46	*
Shape ID	0-4	1.6	1.6	1.6	
Sorting	0-2	0.4	0.6	0.48	*
Size/length (IDELA)	0-4	2.6	2.7	2.7	
Simple operations	0-3	1.0	1.0	1	
Puzzle	0-4	0.1	0.3	0.21	*
MELQO Child can count to 30	0-1	21%	24%	23%	
MELQO Size/length	0-4	2.5	2.8	2.7	***
MELQO Spatial awareness	0-4	2.2	2.3	2.2	
Total Emergent Math	0-1	27%	30%	29%	*

\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 10. Distribution of emergent numeracy items



## Socio-emotional Development

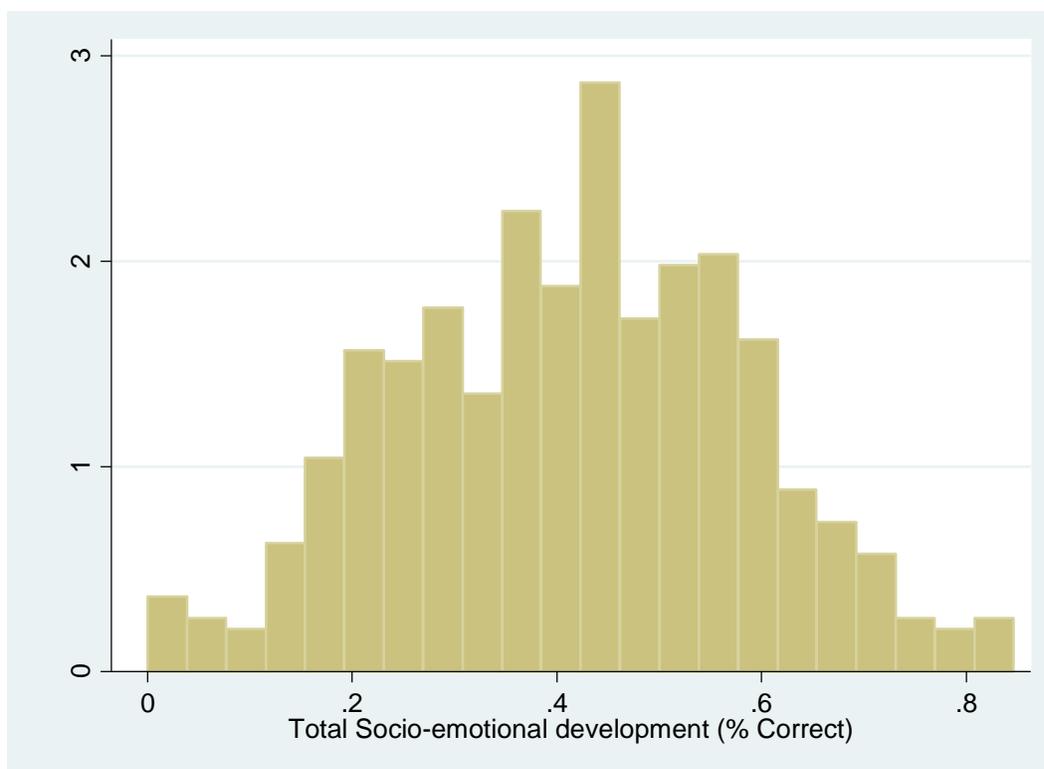
Table 10 summarizes children's socio-emotional development. **Similar to the motor and literacy domains, children in the intervention group have significantly stronger socio-emotional skills than children in the comparison group.** In general children have the strongest skills in the areas of emotional awareness and have room to grow in the area of self-awareness.

Table 10. Socio-emotional development, by group

	Range	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
<b>Peer relationships (friends)</b>	0-10	3.0	2.9	2.9	
<b>Emotional awareness</b>	0-6	3.0	3.7	3.4	*
<b>Empathy</b>	0-6	2.4	2.9	2.6	**
<b>Conflict resolution</b>	0-6	2.7	2.9	2.8	**
<b>Self-awareness</b>	0-8	2.7	3.0	2.8	*
<b>Total Socio-emotional Development</b>	0-1	40%	44%	42%	*

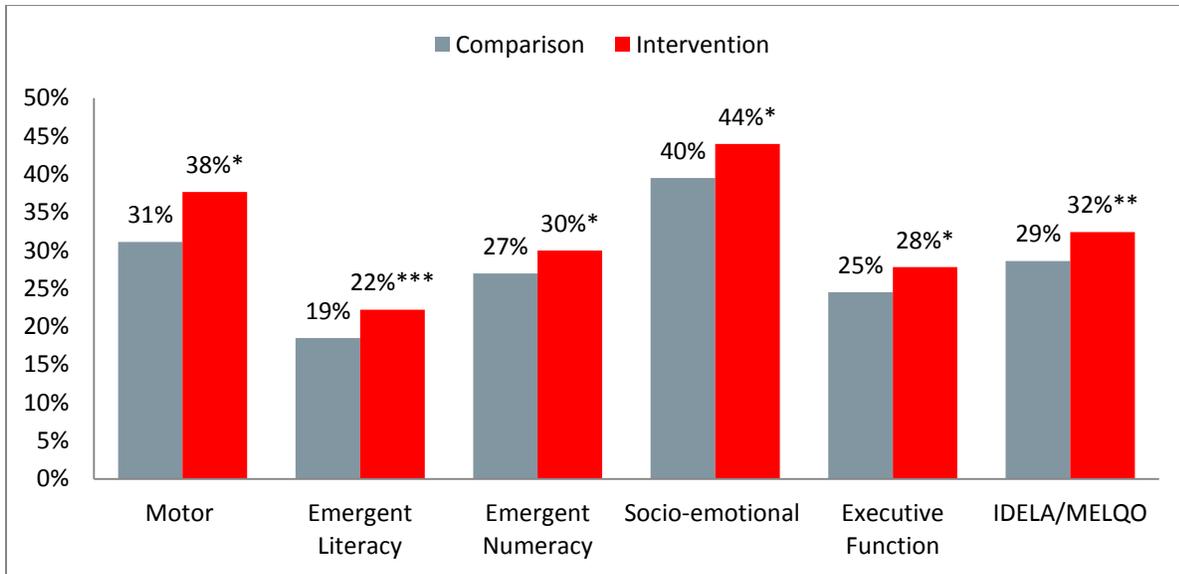
\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 11. Distribution of socio-emotional items



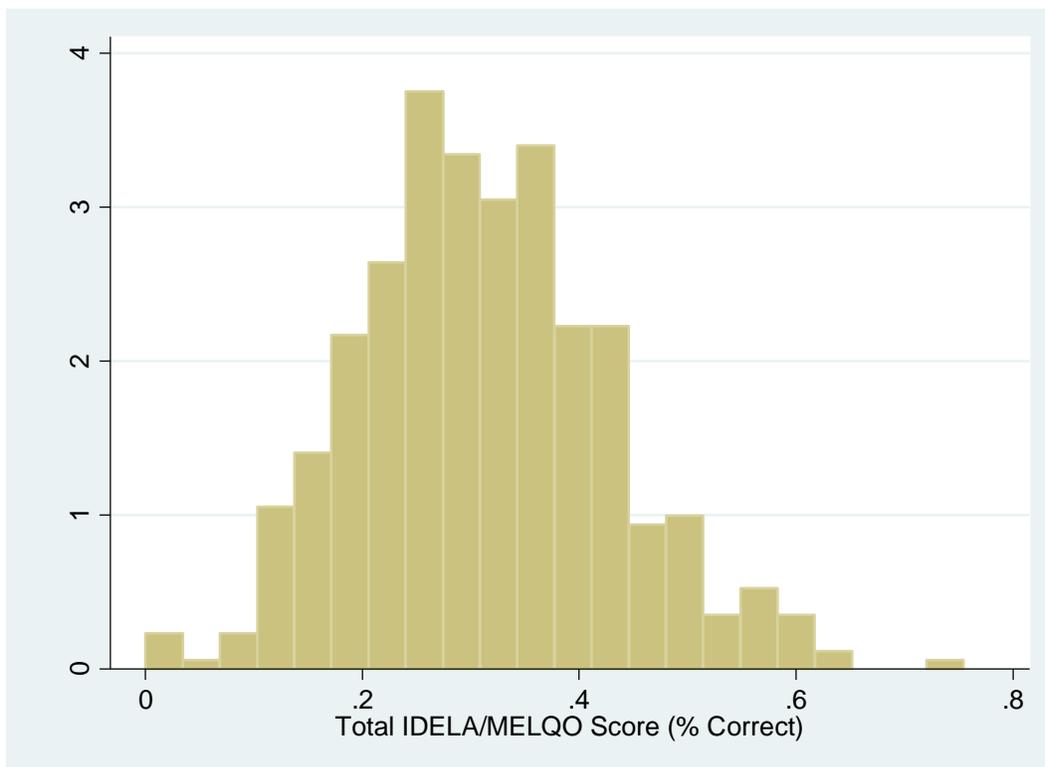
Overall, children in the intervention group have stronger early skills than children in the comparison group (Figure 4). **There were no significant differences between boys' and girls' skills in any domain.**

Figure 12. Summary IDELA subscales and overall score, all children



\*p < .05, \*\*p < .01, \*\*\*p < .001

Figure 13. Distribution of all direct assessment items



### Approaches to learning

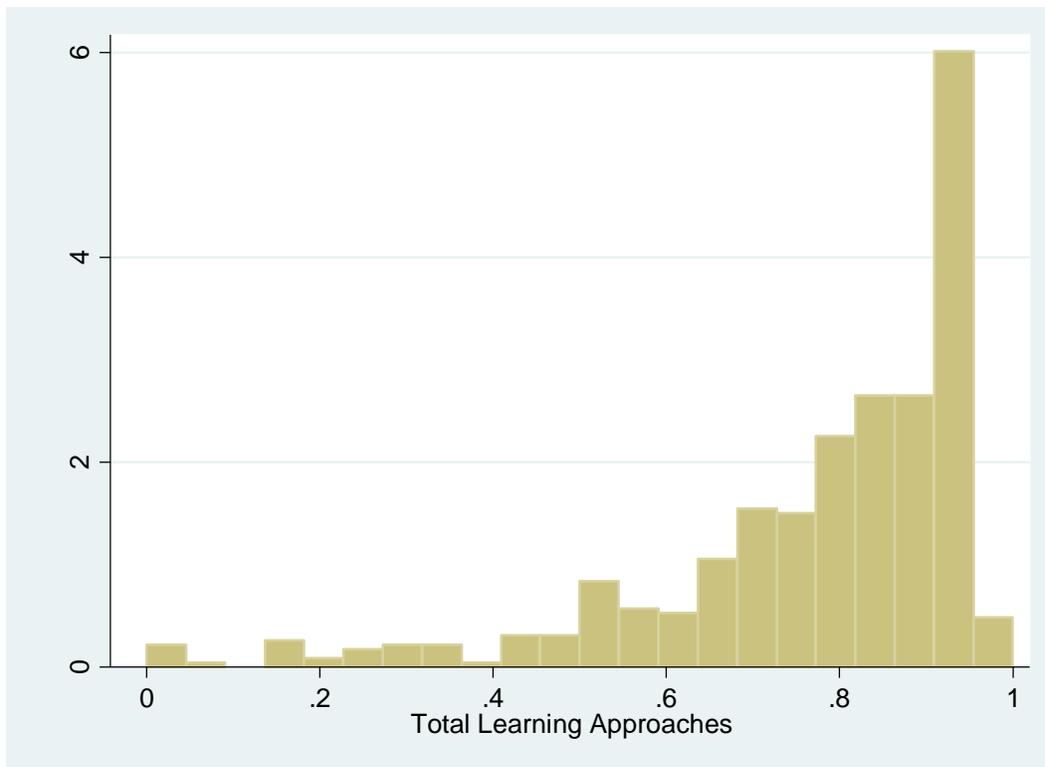
IDELA measures approaches to learning through enumerator observation of children during the assessment. Questions are added to six difficult items that ask assessors to rate children's level of

persistence in completing a complicated task. In addition, a series of seven questions at the end of the assessment ask enumerators to reflect on how attentive, curious and persistent children were throughout the assessment. **Overall, children in the intervention group display more persistence in answering challenging questions on the assessment, but overall there are no significant differences between comparison and intervention children in this area.**

Table 11. Approaches to learning, by group

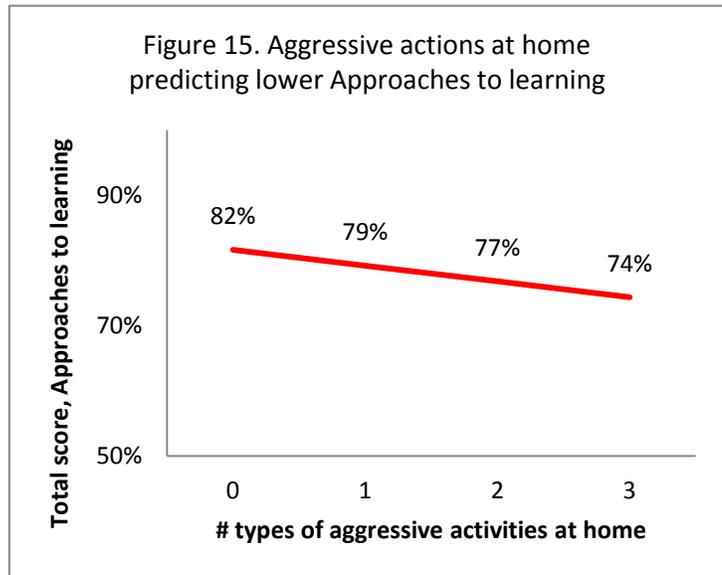
	Range	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
Persistence on challenging tasks	0-18	12.0	13.2	12.6	*
Overall attentiveness to assessment	0-28	23.2	23.9	23.5	
Total Approaches to Learning	0-1	75%	80%	77%	

Figure 14. Distribution of learning approaches items



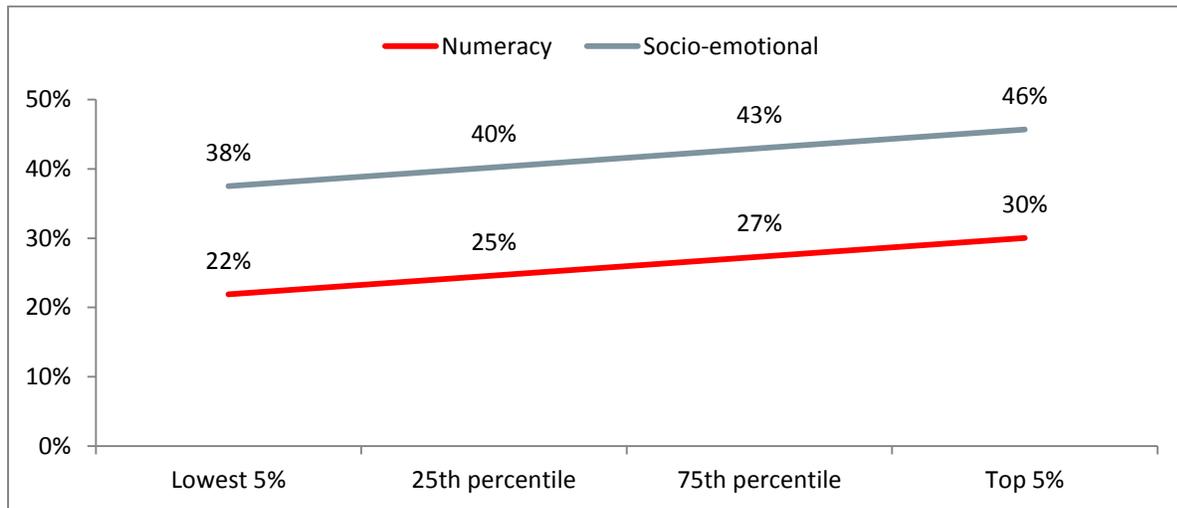
## Learning equity

Multivariate regressions clustering for children within communities were used to investigate drivers of early learning and development. Overall, children's early skills are significantly positively related to their age and parents' education level. In addition, controlling for these relevant background characteristics and assignment to the intervention or comparison group, analyses find a variety of interesting predictors of early learning and development. Building on descriptive findings that other family members provide the second most support to children after mothers, regression analyses confirm that more engagement with children by other family members is related to more advanced skills in literacy, numeracy and overall school readiness. In addition, more aggressive discipline style in homes (i.e., hitting, yelling, and spanking) is significantly related to lower scores in approaches to learning and also socio-emotional development (marginally significant) (Figure 15). Similarly, more positive caregiver attitudes about their role in their child's development are related to stronger literacy, approaches to learning, and overall school readiness skills. All results suggest that warm, attentive home environments are crucial for children's holistic development.



Looking at home resources, analyses find that the variety and reading materials and toys are significant predictors of motor development, literacy, numeracy and overall school readiness. In addition, children from families with more economic resources tended to have stronger skills in all areas, except motor development (Figure 16). Full regression results appear in Appendix A.

Figure 16. Relationship between socioeconomic status and IDELA scores



Note: The socioeconomic status variable was created through factor analysis of home possession vari.

## Conclusion

**In conclusion, important differences were found between families and children in the control and intervention groups which indicate that children in the intervention are significantly advantaged in their early learning environments and development relative to children in the comparison group.** Specifically mothers in the intervention group tend to have higher education than mothers in the comparison group, and families in the intervention group own a greater variety of toys and engage in learning and play activities with their children significantly more than parents in the comparison group. Further, children in the intervention group have significantly more advanced skills than children in the comparison group in motor development, emergent literacy, socio-emotional development and the overall IDELA score. These baseline differences will make it difficult to attribute endline learning gains to the program being implemented.

## Next steps

Considering programmatic implications, this analysis suggests several important areas of focus. For example, results suggest that more emphasis could be put on promoting child engagement from family members other than mothers, and highlighting the need for positive parenting practices from all caregivers. In addition, working with families to create additional toys and reading materials for children could have positive effects on ongoing child learning. Finally, care should be taken to involve and support all parents from these communities, especially those who are the most disadvantaged as their children are the most at risk of falling behind.

## Parent reported items

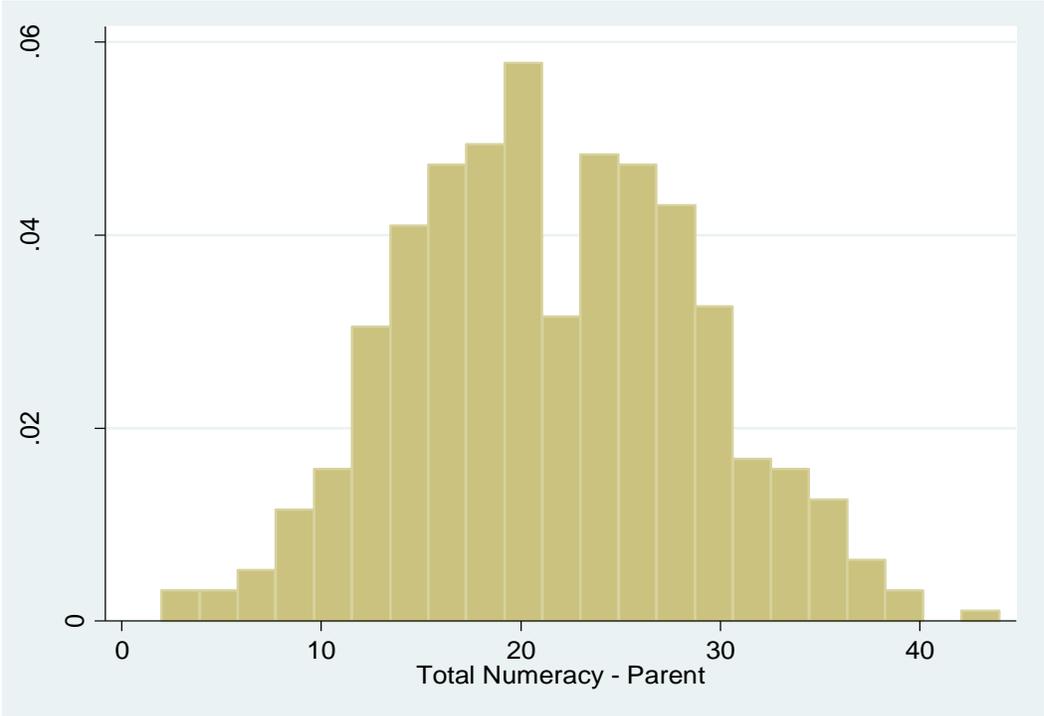
### Emergent Numeracy

Parent reported numeracy items follow a similar pattern as direct assessment items in that they identify a few significant differences between intervention and comparisons children’s skills, some similar (number ID and puzzle completion) and some different (one-to-one correspondence). On their current scales the parent-reported numeracy items show children scoring substantially higher than direct child assessment items (about 50 percent compared to about 25 percent correct).

Table 12. Parent reported numeracy scores, by group

	Range	Comparison (N=257)	Intervention (N=241)	Average (N=498)	Significant difference
Quantity discrimination	0-2	1.7	1.8	1.7	
Number ID	0-3	0.2	0.5	.35	**
Shape ID	0-8	3.7	4.2	4.0	
One-to-one correspondence	0-6	1.9	2.3	2.1	*
Size/length	0-12	8.8	9.3	9.1	
Time	0-6	1.9	2.4	2.1	
Spatial awareness	0-2	1.5	1.5	1.5	
Addition	0-2	0.5	0.5	.5	
Puzzle	0-2	0.1	0.3	.19	*
Total Numeracy	0-1	46%	51%		*

Figure 17. Distribution of parent-reported numeracy items



The strongest correlations between direct child assessment and parent report items are found with simple operations and spatial concepts, and the weakest is with completing a puzzle.

Table 13. Correlation between parent-reported and direct child assessment items: Numeracy

Parent	Correlation	Child
Can child identify written numerals up to 10?	<b>0.21</b>	Identifies numbers 1-10
Can child identify written numerals up to 20?	<b>0.15</b>	Identifies numbers 11-20
Child can name: circle	<b>0.12</b>	Identifies circle
Child can name: triangle	<b>0.09</b>	Identifies triangle
Child can name: square	<b>0.05</b>	Identifies square
Child can name: rectangle	<b>0.08</b>	Identifies rectangle
Child can pick 3 out of larger group of items	<b>0.20</b>	Chooses 3
Child can pick 6 out of larger group of items	<b>0.21</b>	Chooses 8
Child can pick 14 out of larger group of items	<b>0.15</b>	Chooses 15
Child can add 2 and 3	<b>0.28</b>	Adds 2 and 3
Child can identify: Largest of 3 objects	<b>-0.01</b>	Identifies largest dog
Child can identify: Smallest of 3 objects	<b>-0.03</b>	Identifies smallest elephant
Child can identify: Longest of 3 objects	<b>0.14</b>	Identifies longest stick
Child can identify: Shortest of 3 objects	<b>0.11</b>	Identifies shortest tree
Child understands words like above, next to, under and in front of	<b>0.27</b>	Identifies things above, under, next to, in front of table
Child can complete 5-piece puzzle	<b>0.02</b>	Completed 4-piece puzzle
<b>Average</b>	<b>0.13</b>	

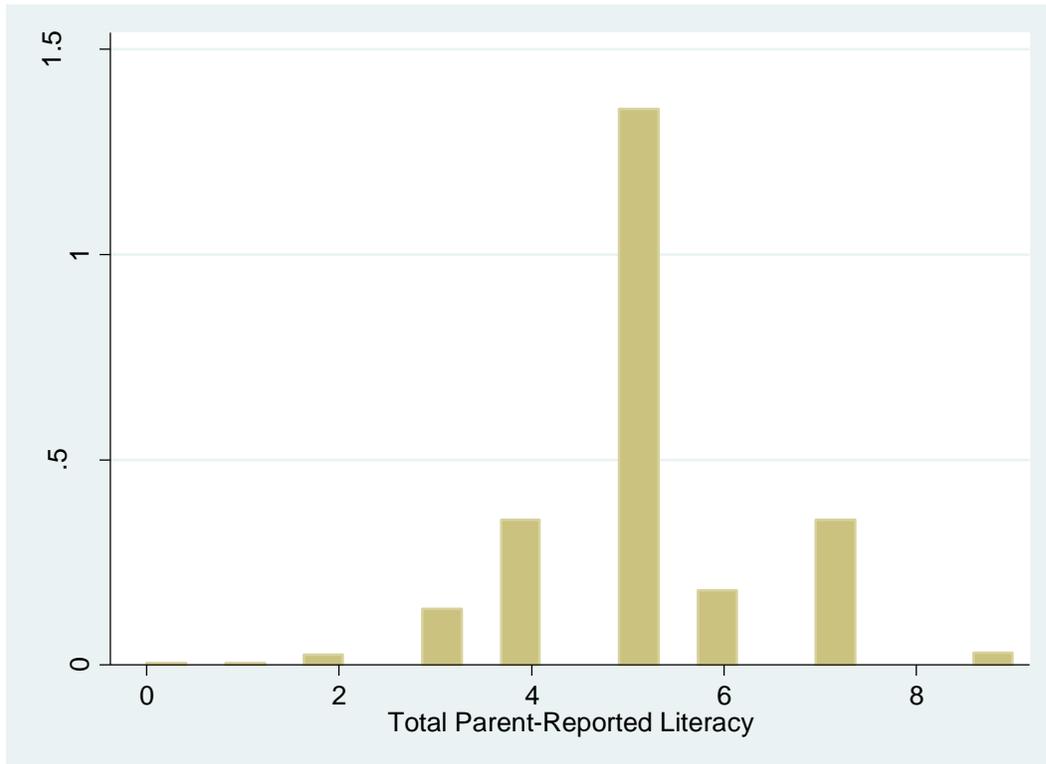
## Literacy

Both parent-reported and direct assessment literacy items find intervention children with stronger skills than comparison children. Similar to the trend seen with numeracy items parent-reported items show children scoring substantially higher than on the direct assessment. The strongest correlation between direct child assessment and parent report items is found with emergent writing, and the weakest is with print awareness and expressive vocabulary.

Table 13. Parent reported literacy scores, by group

	Range	Comparison	Intervention	Significant difference
<b>Interest in reading</b>	0-1	0.9	0.9	
<b>Communicate with adults/peers</b>	0-2	1.9	1.9	
<b>Can understand what others say</b>	0-2	1.9	1.8	
<b>Can identify 10 letters</b>	0-2	0.3	0.7	***
<b>Can write name</b>	0-2	0.0	0.0	
<b>Total Literacy</b>	0-1	71%	75%	*

Figure 18. Distribution of parent-reported literacy items



There is a large range of correlations between parent and child reported literacy items. Small – medium correlations are found with letter identification and emergent writing but very small correlations seen for interest in reading, communication and comprehension.

Table 14. Literacy item correlation between parent-report and direct assessment items

Parent	Correlation	Child
Child is interested in reading	<b>0.01</b>	Familiarity with books
Child can communicate needs/wants	<b>0.02</b>	Expressive vocabulary
Child can understand what is being said to them	<b>0.04</b>	Oral comprehension
Child can identify 10 letters of the alphabet	<b>0.36</b>	Letter identification (1-10)
Child can write his/her name	<b>0.39</b>	Emergent writing
<b>Average</b>	<b>0.16</b>	

### Socio-emotional

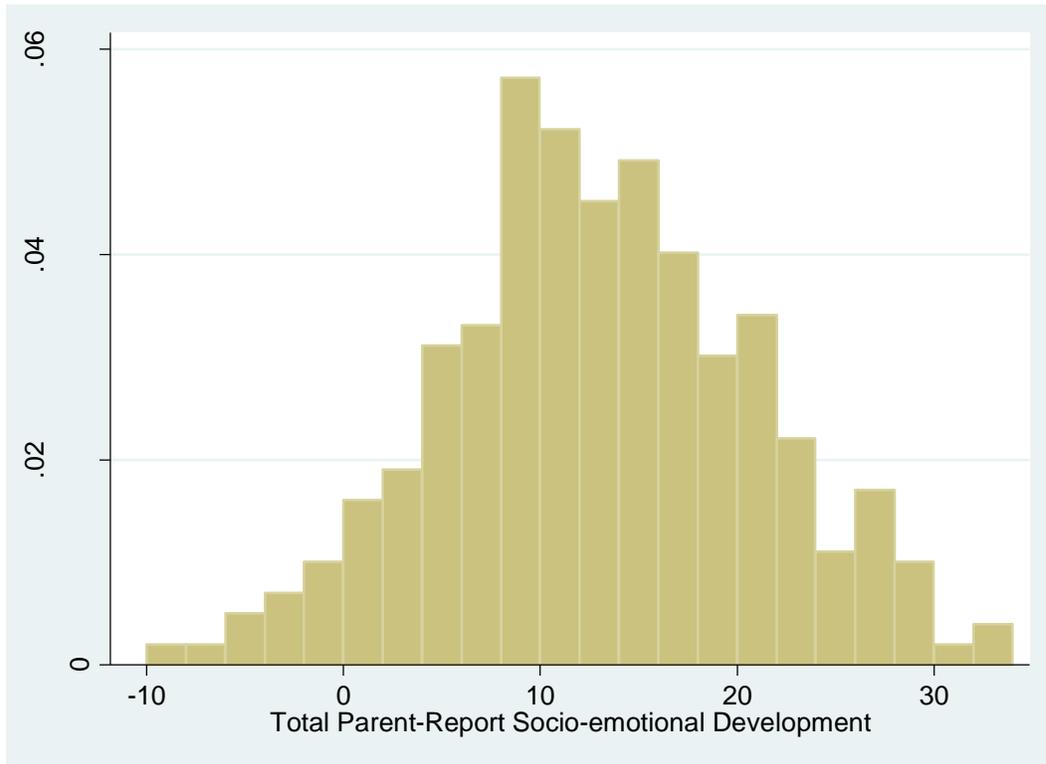
Scattered differences were found between comparison and intervention children on parent-reported self-regulation items, but overall no significant differences were identified. This differs from the direct assessment on which intervention children scored significantly higher than comparison children. As with the self-regulation items, to create a total score items phrased in the negative were re-coded such that

“Never” was given a value of 0 and “Often” was given a value of -3 in order to maintain a meaningful scale. Other variables maintained the original scoring.

Table 15. Parent reported socio-emotional scores, by group

	Range	Comparison	Intervention	Significant difference
Child takes responsibility for actions	0-3	1.7	1.9	
Child shows consideration of others' feelings	0-3	1.3	1.4	
Child understands wrong and right	0-3	0.7	1.0	**
Child gets along well with others	0-3	1.9	1.9	
Child offers help when appropriate	0-3	1.6	1.7	
Child will comfort another child	0-3	1.8	1.8	
Child has difficulty taking turns	0-3	1.4	1.6	*
Child shares with peers	0-3	1.7	1.8	
Child plays well in groups	0-3	1.9	2.1	
Child is comfortable in new place	0-3	1.6	1.8	
Child makes transitions easily	0-3	1.4	1.4	
Child settles down easily after playing	0-3	1.5	1.4	
Child settles down easily after being upset	0-3	1.8	1.8	
Child is unable to sit still	0-3	1.8	1.7	
Child shows self-control	0-3	1.2	1.3	
Child kicks/bites others	0-3	0.9	0.7	
Child destroys things	0-3	0.8	0.8	
Child hurts him/herself on purpose	0-3	0.2	0.2	
Child is clingy	0-3	2.2	2.1	
Child is upset when left by caregiver	0-3	2.1	2.0	
Child is often sad	0-3	0.5	0.5	
Child describes feelings with words	0-3	1.6	1.8	*
<b>Total Socio-emotional</b>	-24-42	11.7	13.4	

Figure 19. Distribution of parent reported socio-emotional items



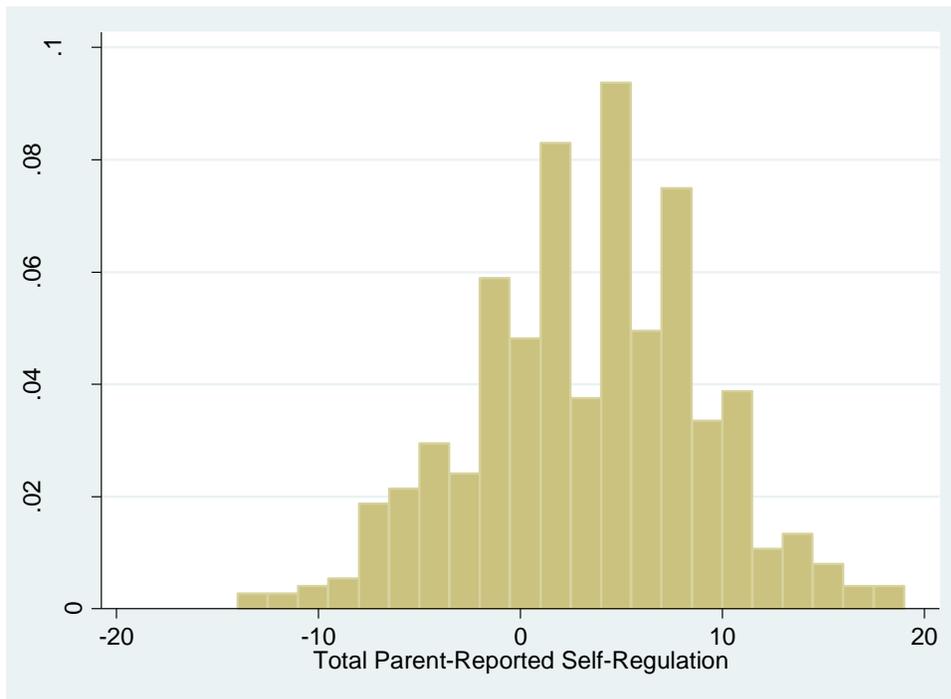
### Self-regulation

Scattered differences were found between comparison and intervention children on parent-reported self-regulation items, but overall no significant differences were identified. To calculate a total score items phrased in the negative were re-coded such that “Never” was given a value of 0 and “Often” was given a value of -3 in order to maintain a meaningful scale. Other variables maintained the original scoring.

Table 16. Parent reported self-regulation scores, by group

	Range	Comparison	Intervention	Significant difference
Child needs reminding to finish things	0-3	1.4	1.6	
Child follows through on instructions	0-3	1.5	1.9	***
Child is easily distracted	0-3	1.2	1.2	
Child remembers list of things	0-3	1.9	2.1	
Child thinks before starting task	0-3	0.6	0.7	
Child stops when told to	0-3	1.4	1.2	
Child intrudes on others/rude	0-3	1.5	1.3	*
Child acts without thinking	0-3	0.8	1.0	
Child is over-active	0-3	2.1	1.9	*
Child keeps working until finished	0-3	1.5	1.7	
Child is diligent	0-3	1.7	1.8	
Child has difficulty doing things s/he doesn't like	0-3	1.6	1.5	
Child does not like challenging tasks	0-3	1.3	1.4	
Child explores new objects	0-3	2.2	2.3	
Child shows interest in things	0-3	1.9	1.9	
<b>Total self-regulation</b>	<b>-21-24</b>	<b>2.7</b>	<b>3.6</b>	

Figure 20. Distribution of parent reported self-regulation items



Investigating correlations between the parent reported domains we find small to medium correlations in most areas with the strongest correlation being between socio-emotional and self-regulation items ( $r=.49$ ).

Table 17. Correlation of parent reported child development domains

	Numeracy	Literacy	Socio-emotional	Self-regulation
Numeracy	1			
Literacy	0.33	1		
Socio-emotional	0.35	0.29	1	
Self-regulation	0.29	0.24	0.49	1

Looking at the correlations between parent and child reported items analyses find a variety of relationships. Overall, the strongest correlation between parent-report and direct assessment items is in the numeracy domain ( $r=.43$ ). Smaller correlations are found between literacy, socio-emotional development and approaches to learning items, ranging from .12 with socio-emotional items to .22 with literacy items. Also, although the parent and child reported numeracy items have a moderate correlation overall, the items themselves have weaker relationships, as seen earlier.

Table 18. Average correlation between parent-report and direct assessment domains

Direct child assessment	Correlation	Parent-reported
Numeracy	<b>0.43</b>	Numeracy
Literacy	<b>0.22</b>	Literacy
Socio-emotional	<b>0.12</b>	Socio-emotional
Approaches to learning	<b>0.19</b>	Self-regulation
Cognition (short-term memory)	<b>0.09</b>	Self-regulation

Ninety-five percent of respondents were mothers so it may also be relevant to investigate correlation between parent-report and direct assessment items by mother's level of education. Half of mothers reported having less than secondary education, while the other half reported have completed secondary education or higher. **Correlations between parent-reported and direct assessment items increase with maternal education for numeracy and literacy, but not with socio-emotional development or self-regulation.** It's not clear why socio-emotional and self-regulation items would not follow the same patten as numeracy and literacy but more research in this area is warranted.

Table 19. Correlation between parent-report and direct assessment items, by mother's education

Direct child assessment	Less than primary	Primary	Secondary	Parent-reported
Numeracy	0.37	0.36	0.47	Numeracy
Literacy	0.06	0.14	0.24	Literacy
Socio-emotional	0.00	0.22	0.05	Socio-emotional
Approaches to learning	0.13	0.26	0.14	Self-regulation
<b>Average</b>	<b>0.10</b>	<b>0.24</b>	<b>0.2</b>	

Interestingly, even stronger correlational differences are seen between parents who report more and less learning/play engagement with their children. However, there are no noticeable differences between the correlation of child and parent items by socioeconomic status. In fact, the correlation between socio-emotional and self-regulation items appears to be even stronger for poorer parents.

Table 20. Correlation between parent-report and direct assessment items, by HLE

Direct child assessment	Less than 5 learning/play activities at home	5 or more learning/play activities at home	Parent-reported
Numeracy	0.33	0.51	Numeracy
Literacy	0.08	0.29	Literacy
Socio-emotional	0.05	0.17	Socio-emotional
Approaches to learning	0.13	0.25	Self-regulation
<b>Average</b>	<b>0.16</b>	<b>0.24</b>	

Table 21. Correlation between parent-report and direct assessment items, by socioeconomic status

Direct child assessment	Less than 50th percentile wealth	Greater than or equal to 50th percentile wealth	Parent-reported
Numeracy	0.42	0.45	Numeracy
Literacy	0.21	0.21	Literacy
Socio-emotional	0.21	0.01	Socio-emotional
Approaches to learning	0.22	0.15	Self-regulation
<b>Average</b>	<b>0.24</b>	<b>0.17</b>	

## Learning equity

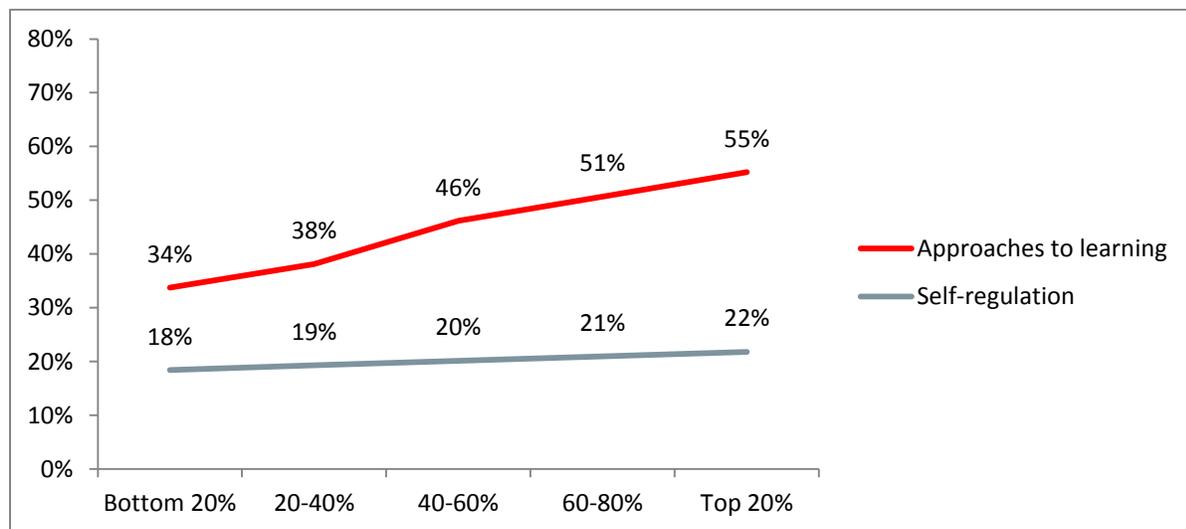
**Parent reported items find similar patterns of relationships as direct assessment item but some important relationships lose significance.** For example, child age is not significantly related to parent-reported outcomes. Similarly socioeconomic status and care efficacy were found to predict direct assessment outcomes but the same significant relationships are not found with parent-reported variables. The relationship between parent education and children's skills remains significant with

parent-report items, but this relationship could be endogenous given the strong links between maternal education and child learning. Finally, the correlation between more negative discipline at home and lower scores in the approaches to learning and socio-emotional domains remains with parent-report data. Full regression analyses are shown in Appendix A.

## Approaches to learning & Self-regulation

Another area that expanded approaches to learning and self-regulation items allow us to investigate is whether these characteristics are significantly related to children’s skills in the more school-related domains. Data from this sample suggest that both direct-assessment items of approaches to learning and parent reported self-regulation items are significant predictors of other cognitive domain scores, even controlling for the important background characteristics discussed above. Approaches to learning items have a stronger relationship with other direct assessment domains with effect sizes ranging from .30-.50, compared to the self-regulation items with effect sizes ranging from -.03-.10. However it is not clear how endogenous the relationship between approaches to learning scores and other direct assessment scores could be given that the same assessors score the items and rate children’s engagement with them. (Approaches to learning scores and overall IDELA scores are correlated  $r=.55$ .) Also, the approaches to learning data in this sample are very negatively skewed so these results should be interpreted with caution and more research in this area is needed. Full regression results are in Appendix A.

Figure 21. Relationship between approaches to learning and self-regulation with overall IDELA score



## Psychometric analysis

### Item performance

This section will focus on item performance defined as floor and ceiling effects or large amounts of missing information.

### Cognition

Within the cognition domain, the short-term memory task appears to fit well in this context. The team will re-test the inhibitory control item at the end of the school year to see if it is a better fit for children at the time of the endline assessment when they are closer to 5-years-old and have had a year of ECD support.

Table 22. Cognitive item performance

Variable	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
Memory 2-digit	480	0.99	0.10	0	1	96%	96%
Memory 3-digit	478	0.78	0.41	0	1	95%	95%
Memory 4-digit	463	0.29	0.45	0	1	92%	92%
Memory 5-digit	450	0.07	0.26	0	1	90%	90%

### Motor Development

Drawing a human appeared as the most difficult task for children in this sample, with about 30 percent of children unable to attempt the task. Given the strong performance of this item in other settings and the growth expected over the period of the study we would not recommend removing it for the endline assessment. The copying and folding tasks are performing well overall, and although some children chose not to participate in the hopping task those who did scored well.

Table 23. Motor development item performance

Variable	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
Resembles triangle	462	0.32	0.47	0	1	92%	92%
Human feature #1	409	0.51	0.50	0	1	82%	82%
Human feature #2	385	0.32	0.47	0	1	77%	77%
Human feature #3	371	0.18	0.38	0	1	74%	74%
Human feature #4	367	0.17	0.38	0	1	73%	73%
Human feature #5	362	0.20	0.40	0	1	72%	72%
Human feature #6	356	0.12	0.32	0	1	71%	71%
Human feature #7	360	0.05	0.22	0	1	72%	72%
Human feature #8	361	0.06	0.24	0	1	72%	72%
Folds	492	1.30	1.06	0	4	98%	98%
Hops	443	6.43	3.52	0	10	88%	88%

### Emergent Literacy

Interestingly, children in this sample had difficulty with the second expressive vocabulary question that asks them to name animals. This item is usually an easier item so the Bangladesh team will want to reflect on why it was particularly difficult or confusing for children in their study. They could also consider dropping it for the endline assessment. In general, letter knowledge is very low for children in this sample, which is not uncommon for children in this age group. However many government partners and other donors have great interest in this measure so it typically remains part of the assessment. First letter sounds was another item that was very difficult for children in this sample with only about 30 percent of children attempting the task. The team should review the administration guidelines and consider whether it is a good fit for the endline assessment. Finally, there was slightly lower response rate for the inferential listening comprehension items as would be expected. Due to the important of this item and strong persistence shown by students on the task overall it should remain in the assessment for endline.

Table 24. Literacy item performance

Variable	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
Expressive vocabulary (market items)	477	3.75	1.85	1	10	95%	95%
Expressive vocabulary (animals)	94	2.45	1.78	1	10	19%	19%
Print awareness #1	494	0.74	0.44	0	1	99%	99%
Print awareness #2	488	0.14	0.35	0	1	97%	97%
Print awareness #3	483	0.53	0.50	0	1	96%	96%
Letter 1	501	0.01	0.10	0	1	100%	100%
Letter 2	501	0.17	0.38	0	1	100%	100%
Letter 3	501	0.03	0.18	0	1	100%	100%
Letter 4	501	0.02	0.14	0	1	100%	100%
Letter 5	501	0.02	0.15	0	1	100%	100%
Letter 6	501	0.02	0.14	0	1	100%	100%
Letter 7	501	0.03	0.18	0	1	100%	100%
Letter 8	501	0.03	0.16	0	1	100%	100%
Letter 9	501	0.03	0.17	0	1	100%	100%
Letter 10	501	0.01	0.10	0	1	100%	100%
Letter 11	501	0.02	0.13	0	1	100%	100%
Letter 12	501	0.02	0.13	0	1	100%	100%
Letter 13	501	0.02	0.13	0	1	100%	100%
Letter 14	501	0.02	0.13	0	1	100%	100%
Letter 15	501	0.02	0.14	0	1	100%	100%
Letter 16	501	0.02	0.15	0	1	100%	100%
Letter 17	501	0.02	0.13	0	1	100%	100%
Letter 18	501	0.02	0.15	0	1	100%	100%
Letter 19	501	0.02	0.13	0	1	100%	100%
Letter 20	501	0.02	0.15	0	1	100%	100%
First letter sound #1	134	0.04	0.21	0	1	27%	27%
First letter sound #2	106	0.03	0.17	0	1	21%	21%
First letter sound #3	98	0.04	0.20	0	1	20%	20%
Writing level	455	1.09	0.53	0	4	91%	91%
Listening comp. #1 (Literal)	433	0.40	0.49	0	1	86%	86%
Listening comp. #2 (Literal)	436	0.39	0.49	0	1	87%	87%
Listening comp. #3 (Inferential)	378	0.38	0.49	0	1	75%	75%
Listening comp. #4 (Literal)	416	0.28	0.45	0	1	83%	83%
Listening comp. #5 (Inferential)	382	0.18	0.39	0	1	76%	76%

## Emergent Numeracy

Overall the numeracy items performed well with this sample of children. Similar to letter identification, there are very low skills in number identification for this age group, but due to considerable interest from various parties it should remain in the assessment.

Table 25. Numeracy item performance

Variable	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
Size/length #1	492	0.95	0.23	0	1	98%	98%
Size/length #2	493	0.77	0.42	0	1	98%	98%
Size/length #3	489	0.61	0.49	0	1	98%	98%
Size/length #4	491	0.42	0.49	0	1	98%	98%
Sorting one way	475	0.37	0.48	0	1	95%	95%
Sorting another way	465	0.14	0.35	0	1	93%	93%
Shape ID #1	494	0.82	0.38	0	1	99%	99%
Shape ID #2	487	0.17	0.38	0	1	97%	97%
Shape ID #3	488	0.41	0.49	0	1	97%	97%
Shape ID #4	389	0.30	0.46	0	1	78%	78%
Number ID #1	501	0.06	0.23	0	1	100%	100%
Number ID #2	501	0.14	0.34	0	1	100%	100%
Number ID #3	501	0.02	0.13	0	1	100%	100%
Number ID #4	501	0.07	0.26	0	1	100%	100%
Number ID #5	501	0.04	0.19	0	1	100%	100%
Number ID #6	501	0.02	0.14	0	1	100%	100%
Number ID #7	501	0.01	0.09	0	1	100%	100%
Number ID #8	501	0.01	0.10	0	1	100%	100%
Number ID #9	501	0.02	0.13	0	1	100%	100%
Number ID #10	501	0.02	0.15	0	1	100%	100%
Number ID #11	501	0.01	0.08	0	1	100%	100%
Number ID #12	501	0.01	0.08	0	1	100%	100%
Number ID #13	501	0.01	0.08	0	1	100%	100%
Number ID #14	501	0.01	0.08	0	1	100%	100%
Number ID #15	501	0.01	0.08	0	1	100%	100%
Number ID #16	501	0.01	0.08	0	1	100%	100%
Number ID #17	501	0.01	0.08	0	1	100%	100%
Number ID #18	501	0.01	0.08	0	1	100%	100%
Number ID #19	501	0.01	0.08	0	1	100%	100%
Number ID #20	501	0.01	0.08	0	1	100%	100%
One-to-one correspondence (3)	493	0.21	0.41	0	1	98%	98%
One-to-one correspondence (8)	488	0.07	0.25	0	1	97%	97%

Variable	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
One-to-one correspondence (15)	419	0.02	0.13	0	1	84%	84%
Add 3+2	480	0.20	0.40	0	1	96%	96%
Add 2+2	482	0.13	0.33	0	1	96%	96%
Subtract 3-1	491	0.69	0.46	0	1	98%	98%
Puzzle	484	0.22	0.65	0	4	97%	97%

### MELQO Numeracy items

MELQO items added to the direct assessment performed well with this sample of children.

Table 26. Additional MELQO item performance

	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
Counting	476	7.22	6.27	0	32	95%	95%
Quantity discrimination	493	0.88	0.33	0	1	98%	98%
Size/length #1	495	0.97	0.18	0	1	99%	99%
Size/length #2	496	0.86	0.34	0	1	99%	99%
Size/length #3	495	0.58	0.49	0	1	99%	99%
Size/length #4	494	0.28	0.45	0	1	99%	99%
Spatial awareness #1	490	0.78	0.41	0	1	98%	98%
Spatial awareness #2	494	0.69	0.46	0	1	99%	99%
Spatial awareness #3	493	0.37	0.48	0	1	98%	98%
Spatial awareness #4	492	0.41	0.49	0	1	98%	98%

### Socio-emotional Development

Some of the identifying information questions were difficult for children in this sample, which is to be expected for 4-year-olds, but overall the socio-emotional items seem to fit well in this context.

Table 27. Socio-emotional item performance

	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
Identifying info #1	481	0.74	0.44	0	1	96%	96%
Identifying info #2	371	0.15	0.35	0	1	74%	74%
Identifying info #3	446	0.88	0.33	0	1	89%	89%
Identifying info #4	429	0.91	0.29	0	1	86%	86%
Identifying info #5	353	0.56	0.50	0	1	70%	70%
Identifying info #6	238	0.08	0.26	0	1	48%	48%
Friends	467	3.16	1.69	1	10	93%	93%
Emotion ID (sad)	500	0.94	0.83	0	2	100%	100%

	N	Mean	Std. Dev.	Min	Max	Response rate n < .9	Response rate n < .8
Emotion ID (feel better)	500	0.91	0.87	0	2	100%	100%
Emotion ID (feel better)	500	0.56	0.74	0	2	100%	100%
Emotion ID (happy)	500	0.96	0.88	0	2	100%	100%
Empathy #1 (identify)	500	1.20	0.63	0	2	100%	100%
Empathy #2 (feel better)	500	0.89	0.84	0	2	100%	100%
Empathy #3 (feel better)	500	0.53	0.72	0	2	100%	100%
Conflict resolution #1	500	1.43	0.67	0	2	100%	100%
Conflict resolution #2	500	0.85	0.78	0	2	100%	100%
Conflict resolution #3	500	0.50	0.63	0	2	100%	100%

### **Parent reported items**

The only questions with large missing information were the two questions related to counting to 10 and 20. However qualitative feedback from the team in Bangladesh reported that enumerators were not confident that parents were able to accurately differentiate between whether their children could do a task independently or needed help. They reported that parents could identify whether a children could do the task or not but had trouble elaborating further.

### **Inter-rater reliability**

To test inter-rater reliability, 8 percent of learners (40 out of 498 children) were assessed by two enumerators simultaneously. Long one-way ANOVA techniques were used to calculate the intra-class correlation within pairs of assessors for a measure of reliability. Table xx presents the results below. Using Fleiss' benchmarks for excellent ( $ICC > 0.75$ ), good or fair ( $0.75 \geq ICC > 0.4$ ), and poor ( $0.4 \geq ICC$ ); many of the literacy outcome variables exhibited excellent inter-rater reliability. As shown in Table x agreement between raters was excellent overall but in some cases there was not enough variability to calculate the ICC.

Table 28. Inter-rater reliability

<b>Sub-Test</b>	<b>Inter-rater Reliability</b>	<b>Rating</b>
<b>Total Motor Development</b>	0.97	Excellent
<b>Hopping</b>	NA	
<b>Fold</b>	0.98	Excellent
<b>Copy triangle</b>	0.92	Excellent
<b>Drawing human figure</b>	0.98	Excellent
<b>Total Emergent Literacy</b>	0.99	Excellent
<b>Print awareness</b>	NA	
<b>Expressive vocabulary</b>	NA	
<b>Phonemic awareness (word pairs)</b>	NA	
<b>Oral comprehension</b>	0.99	Excellent
<b>Writing level</b>	0.96	Excellent
<b>Letter ID</b>	NA	
<b>Total Emergent Numeracy</b>	0.97	Excellent
<b>Shape ID</b>	0.97	Excellent
<b>Sorting</b>	0.9	Excellent
<b>Size distinction</b>	0.98	Excellent
<b>Simple operations</b>	NA	
<b>Puzzle</b>	NA	
<b>Number ID</b>	0.99	Excellent
<b>One to one correspondence</b>	0.96	Excellent
<b>Socio-emotional Development</b>	0.99	Excellent
<b>Friends</b>	NA	
<b>Empathy for others</b>	0.94	Excellent
<b>Solving conflict</b>	0.99	Excellent
<b>Recognizing self-emotions</b>	0.99	Excellent
<b>Personal information</b>	0.95	Excellent
<b>Total IDELA</b>	0.99	Excellent
<b>Memory</b>	NA	
<b>Total Approaches to Learning</b>	0.99	Excellent
<b>Persistence</b>	0.99	Excellent
<b>Observation</b>	0.97	Excellent
<b>MELQO Spatial awareness</b>	0.98	Excellent
<b>MELQO Size/Length</b>	0.96	Excellent
<b>MELQO Counting</b>	NA	

## Internal consistency

Internal consistency measures the correlation between items that propose to measure the same construct. Thus internal consistency calculations were performed for both the overall MELQO-IDELEA instrument and four of the subscales. The analyses produced standardized Cronbach's alphas and use George and Mallery's (2003) rules of thumb for interpreting the alpha:  $\alpha > .9$  is Excellent,  $\alpha > .8$  is Good,  $\alpha > .7$  is Acceptable,  $\alpha > .6$  is Questionable,  $\alpha > .5$  is Poor, and  $\alpha < .5$  is Unacceptable. As can be seen in Table 26, the motor and socio-emotional development domains show good internal consistency ratings, and the approaches to learning and overall instrument have excellent internal consistency. The internal consistency can be stronger for the literacy numeracy domains. There internal consistency results are lower than normal for the IDELEA subscales and in part is due to the young age, lack of exposure to ECCD services of the children participating in the assessment and floor effects for items such as letters/numbers id. At endline it will be interesting to look at the changes in internal consistency.

Table 29. Average internal consistency of IDELEA domains and overall instrument

Domain	Internal consistency
Motor Development	0.83
Emergent Literacy	0.60
Emergent Numeracy	0.65
Socio-emotional Development	0.78
Total IDELEA	0.87
Approaches to Learning	0.94

Table 30 displays internal consistency for MELQO parent reported items. The numeracy and socio-emotional development domains show acceptable internal consistency ratings, whereas the self-regulation and literacy domains show questionable and unacceptable internal consistency respectively.

Table 30. Average internal consistency of parent report domains and overall instrument

Domain	Internal consistency
Numeracy	0.77
Literacy	0.22
Self-regulation	0.61
Socio-emotional	0.72

## Construct validity

Construct validity has been displayed throughout the report. In summary, the direct assessment items are more sensitive to the impact of various background characteristics (e.g., child age, home learning environment and socioeconomic status) compared to the parent-report items.

## Appendix A

Table A1. Multivariate regression results with direct assessment items clustered by village, all children

VARIABLES	(1) IDELA	(2) Motor Development	(3) Emergent Literacy	(4) Emergent Numeracy	(5) Socio- emotional Development	(6) Approaches to learning
Child age	0.0524*** (0.0135)	0.112*** (0.0297)	0.0346* (0.0162)	0.0385** (0.0116)	0.0722*** (0.0197)	0.0517 (0.0261)
Father education	0.00780~ (0.00422)			0.00928* (0.00392)		
Mother education			0.00798~ (0.00446)			
Home activities with other family member	0.00479* (0.00185)	0.0101* (0.00432)	0.00540* (0.00242)	0.00443~ (0.00241)		
Negative discipline					-0.0116~ (0.00609)	-0.0244*** (0.00662)
SES (home possession)	0.0153** (0.00498)	0.0136 (0.00987)	0.0128* (0.00487)	0.0160** (0.00566)	0.0275*** (0.00749)	0.0138 (0.00814)
# types of toys	0.0102* (0.00395)	0.0278*** (0.00770)				
# types of reading materials			0.00907* (0.00446)	0.0142** (0.00429)		
Parent attitude	0.00340* (0.00137)	0.00486~ (0.00279)	0.00584*** (0.00156)	0.00286~ (0.00157)		0.0156*** (0.00391)
Intervention	0.0236* (0.0111)	0.0404 (0.0244)	0.0221* (0.00984)	0.0134 (0.0124)	0.0334 (0.0203)	0.0276 (0.0207)
Constant	-0.0597 (0.0590)	-0.382** (0.134)	-0.115~ (0.0656)	0.0202 (0.0561)	0.131 (0.0803)	0.255 (0.139)
Observations	471	494	483	462	494	494
R-squared	0.165	0.104	0.144	0.122	0.062	0.112
r2_a	0.152	0.0927	0.131	0.109	0.0547	0.103

Robust standard errors in parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05, ~ p<0.1

Table A2. Multivariate regression results with parent-reported items clustered by village, all children

VARIABLES	(1) Parent report- Literacy	(2) Parent report- Numeracy	(3) Parent report- Socio-emotional	(4) Parent report- Self-regulation
Child age	-0.0720 (0.132)	1.043 (0.814)	0.361 (1.082)	0.279 (0.674)
Father education		0.483~ (0.271)		
Mother education	0.0967* (0.0465)			
Home activities with other family member	-0.00273 (0.0274)	0.379~ (0.198)		
Negative discipline			-1.167** (0.343)	-0.819*** (0.211)
# types of reading material	0.104* (0.0471)	0.744* (0.297)		
SES (home possession)	0.0495 (0.0640)	0.402 (0.378)	0.187 (0.427)	-0.0398 (0.232)
Parent attitude	0.0377~ (0.0214)	0.338* (0.138)		0.419*** (0.115)
Intervention	0.234~ (0.126)	2.104** (0.752)	1.404 (0.865)	0.609 (0.563)
Constant	4.059*** (0.602)	6.283 (4.447)	12.63** (4.428)	-5.852 (3.542)
Observations	483	479	494	494
R-squared	0.057	0.106	0.038	0.086
Adjusted R-squared	0.0432	0.0929	0.0306	0.0766

Robust standard errors in parentheses  
 \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, ~ p<0.1

Table A3. APL predicting cognitive domains, all children

VARIABLES	(1) IDELA/MELQO	(2) Motor Development	(3) Emergent Literacy	(4) Emergent Numeracy	(5) Socio- emotional Development
APL (z-score)	0.0371*** (0.00354)	0.0695*** (0.00934)	0.0227*** (0.00363)	0.0258*** (0.00367)	0.0657*** (0.00573)
Child age	0.0435*** (0.0111)	0.0934*** (0.0263)	0.0330** (0.0108)	0.0274~ (0.0157)	0.0514** (0.0156)
Father education	0.00764* (0.00345)		0.00912* (0.00366)		
Home activities with other family member	0.00410* (0.00155)	0.00814* (0.00390)	0.00403~ (0.00232)	0.00460~ (0.00238)	
# types of toys	0.0103** (0.00345)	0.0276*** (0.00662)			
SES (home possession)	0.0115* (0.00431)	0.00728 (0.00961)	0.0135* (0.00542)	0.0107* (0.00455)	0.0210** (0.00662)
Parent attitude	0.000244 (0.00122)	-0.00111 (0.00232)	0.00100 (0.00145)	0.00370* (0.00157)	
Intervention	0.0201* (0.00981)	0.0346 (0.0212)	0.0113 (0.0118)	0.0204* (0.00972)	0.0267 (0.0190)
# types of reading material			0.0143** (0.00409)	0.00982* (0.00403)	
Mother education				0.00633 (0.00413)	
# aggressive actions at home					0.00273 (0.00579)
Constant	-0.0581 (0.0433)	-0.365** (0.121)	0.0197 (0.0516)	-0.107~ (0.0612)	0.00804 (0.0677)
Observations	471	494	462	483	494
R-squared	0.342	0.240	0.178	0.232	0.260
r2_a	0.330	0.229	0.163	0.219	0.252

Robust standard errors in parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05, ~ p<0.1

Table A4. Self-regulation predicting cognitive domains, all children

VARIABLES	(1) IDELA	(2) Motor Development	(3) Emergent Literacy	(4) Emergent Numeracy	(5) Socio- emotional Development
Self-regulation (z-score)	0.00768** (0.00230)	0.0165** (0.00539)	0.00647~ (0.00338)	0.00674* (0.00277)	0.00938~ (0.00515)
Child age	0.0533*** (0.0132)	0.114*** (0.0291)	0.0393** (0.0114)	0.0355* (0.0161)	0.0731*** (0.0195)
Father education	0.00732~ (0.00422)		0.00890* (0.00394)		
Home activities with other family member	0.00450* (0.00186)	0.00938* (0.00417)	0.00418~ (0.00242)	0.00509* (0.00246)	
# types of toys	0.0101* (0.00389)	0.0275*** (0.00770)			
SES (home possession)	0.0157** (0.00498)	0.0141 (0.00967)	0.0163** (0.00575)	0.0130* (0.00489)	0.0276*** (0.00740)
Parent attitude	0.00267~ (0.00138)	0.00317 (0.00273)	0.00226 (0.00158)	0.00517** (0.00154)	
Intervention	0.0224* (0.0111)	0.0374 (0.0239)	0.0124 (0.0123)	0.0210* (0.00975)	0.0313 (0.0201)
# types of reading material			0.0140** (0.00424)	0.00893* (0.00439)	
Mother education				0.00763~ (0.00424)	
# aggressive actions at home					-0.00956 (0.00612)
Constant	-0.0674 (0.0567)	-0.397** (0.131)	0.0129 (0.0549)	-0.121~ (0.0646)	0.0980 (0.0850)
Observations	471	494	462	483	494
R-squared	0.176	0.115	0.129	0.153	0.068
r <sup>2</sup> <sub>a</sub>	0.162	0.102	0.114	0.139	0.0589

Robust standard errors in parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05, ~ p<0.1