



**Save the Children**

## **PVH CORP. AND SAVE THE CHILDREN**



## **Partnering for Early Childhood Education in India**

## **Impact Evaluation Endline report**

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## Executive summary

This report presents the results of a modestly sized, but methodologically strong, impact evaluation on the effect of a PVH Corp funded Save the Children intervention in Karnataka, India. The intervention sought to improve the quality of children's early learning opportunities in Anganwadi centers (preschools) in rural Bangalore.

A cluster-randomized control trial research design was used to conduct a strong impact evaluation. Fifty Anganwadi centers were randomly assigned to one of two treatment groups. A "light touch" treatment group received material support to enhance the quality of the classroom environment. This included beautification of Anganwadi center walls, a greenboard for the teacher to use, and some basic teaching aids. A "heavy touch" group received the same material support, and in addition received the Ready to Learn Emergent Literacy and Math (ELM) teacher training intervention, school supplies for children, a mobilization campaign, and educational material support to parents and mother's groups.

We assessed children's developmental status using the International Development and Early Learning Assessment (IDELA). A baseline survey was conducted prior to the start of the program, and an endline data collection was conducted eight months later. The study revealed that the addition of the "heavy touch" components of programming had a statistically significant and substantively meaningful effect on children's developmental outcomes. Children in the "heavy touch" group gained, on average, over 50% more on the IDELA assessment than children in the "light touch" control group, an effect size of 0.39 standard deviations.

The effect of the program was largest on children's Emergent Numeracy and Motor skills. Children in the "heavy touch" group gained nearly twice as much as those in the "light touch" group in these areas for an effect size of 0.49 for Emergent Numeracy and 0.43 for Motor skills. We find that the effect on Motor development is concentrated in the areas of fine motor skills. The effect on Emergent Literacy skills was smaller, and not statistically significant. We found no effect at all for children's Social-Emotional development.

To probe the robustness of the result we attempt different model specifications and find that the effect of the program barely changes with the addition of additional covariates. While we observed attrition of 18% between baseline and endline, it was non-differential between treatment groups. We test whether attrition may have biased our estimates and conclude that the restricted sample at endline was similarly balanced to the sample at baseline.

In addition to the IDELA assessment, other measures included in this report allowed us to examine the classroom environment of the Anganwadi centers and children's home environments. While these results are not as methodologically strong, we find that "heavy touch" Anganwadis had teachers with improved interactions with children and better numeracy-building activities.

We conclude that Save the Children's "heavy touch" programming led to both a significant and meaningful increase in children's early learning and development.



## Introduction



## Background

The government of India runs one of the world's largest programs for early childhood development - Integrated Child Development Services (ICDS) - which offers a package of health, nutrition and preschool education services to children through Anganwadi Centers. This is for children from the prenatal stage to age 6, as well as for pregnant and lactating mothers. Anganwadi Centers work on integrating health, hygiene and nutrition and early education,

It is a well-researched fact that early childhood education from 0-6 years is very crucial and lays the foundation for future learning, growth and development of the child. Cross-sectoral services for children at Anganwadi centers are delivered through one Anganwadi worker (AW). However, most Anganwadi workers are not well-educated and may not have the required skills to independently deliver holistic services for young children. An analysis submitted to the Karnataka State High Court in June 2013 attributes low-skilled Anganwadi teachers and poor learning environments as factors responsible for high dropout rates in the early years, resulting in children ending up on the streets.

This project aims to address this concern by focusing on improving learning levels and school readiness by providing a conducive and stimulating environment for early learning for children, capacity building of Anganwadi teachers and caregivers (parents/guardians) and also advocacy to improve the quality of pre-school education in Anganwadis.

The Project targeted rural Doddaballapur in Karnataka State where a majority of children are first generation school goers living in poor families mainly engaged as , low-skilled garment industry workers. The 'Apparel Park' in Doddabalapur town employs about 7,450 women garment workers from the area. The current project provides disadvantaged and vulnerable children whose mothers are mostly employed in garment factories the opportunity to a quality preschool education, giving them a better chance to succeed in school and reach their full potential.

### Figure 1. Doddaballapur Taluka Map

## Project

Save the Children implemented this project through a partner NGO, Makkala Jagriti (Awakening of Children). This NGO was founded in 2003 and provides holistic learning platforms and empowers socio-economically deprived children, youth and their community as a whole. As an implementing partner of Save the Children they are supporting to enhance the quality of pre-school education in Anganwadi Centers, to become spaces for holistic development of children, with a special focus on fostering early learning Outcomes.

**Figure 2. Light touch and heavy touch programming**

Light touch	Heavy touch
Material support to classrooms <sup>1</sup>	Material support to classrooms
	Early Literacy and Mathematics teaching and learning material distribution to families and centers
	Parents Workshops, monthly mother's groups meetings, and home visits
	Capacity building for Anganwadi teachers

## Method

This report details the design and implementation of a cluster-randomized control trial to investigate the impact of Save the Children's "heavy touch" programming on early learning outcomes.

## Design

As a cluster-randomized control trial (RCT), we randomly assigned 50 Anganwadi centers (early childhood care and development centers) to either a "light touch" (control) group or a "heavy touch" (treatment) group. The "light touch" and "heavy touch" groups received support as described earlier in the **Project** description.

The 50 Anganwadi centers included in the study were selected by the Child Development Project Officer (CDPO) overseeing Anganwadi centers in the area. The Child Development Project Officer identified the most marginalized Anganwadi Centers in the district.

After receiving the proposed list of AWC, we then randomly assigned them to the two treatment conditions. As such, this study has a high degree of internal validity but we do not assert that the studied Anganwadi centers are fully representative of Anganwadi centers in all of rural Bangalore. We present a full list of the results of this exercise in

<sup>1</sup> This support comprised primarily of painting of classrooms and the distribution of greenboards. The classrooms were painted to improve the educational environment of the classroom by including, for example, English and Kannada, a calendar with weekly theme, shapes and colors, numbers and objects, etc.



## **Appendix A: List of Anganwadi centers, treatment status, and number of children assessed at baseline and endline.**

We conducted two rounds of data collection. Enumerators conducted the baseline data collection at the end of August and beginning of September 2017 before the beginning of Save the Children's programs in the area. At endline, enumerators followed up with previously surveyed children at the end of April. They returned in June to Anganwadi centers to attempt to find as many as possible of the original children. The time of intervention was thus approximately eight-nine months.

### **Research questions**

The primary research question for this impact evaluation was:

**Does “heavy touch” programming (awareness campaign, mothers groups, and ELM teacher training) improve young children’s early learning and development above and beyond quality improvements to preschools?**

In order to address the above question, we will address the research questions below.

- 1) Did the random assignment of “heavy” and “light” touch status to Anganwadi centers produce balanced study groups?
- 2) Were patterns of attrition between baseline and endline similar between treatment groups or related to any baseline characteristics?
- 3) Did the “heavy touch” programming lead to improved early learning and developmental outcomes compared to the “light touch” group?
- 4) What other factors influenced children’s early learning and development status and growth?

### **Sample**

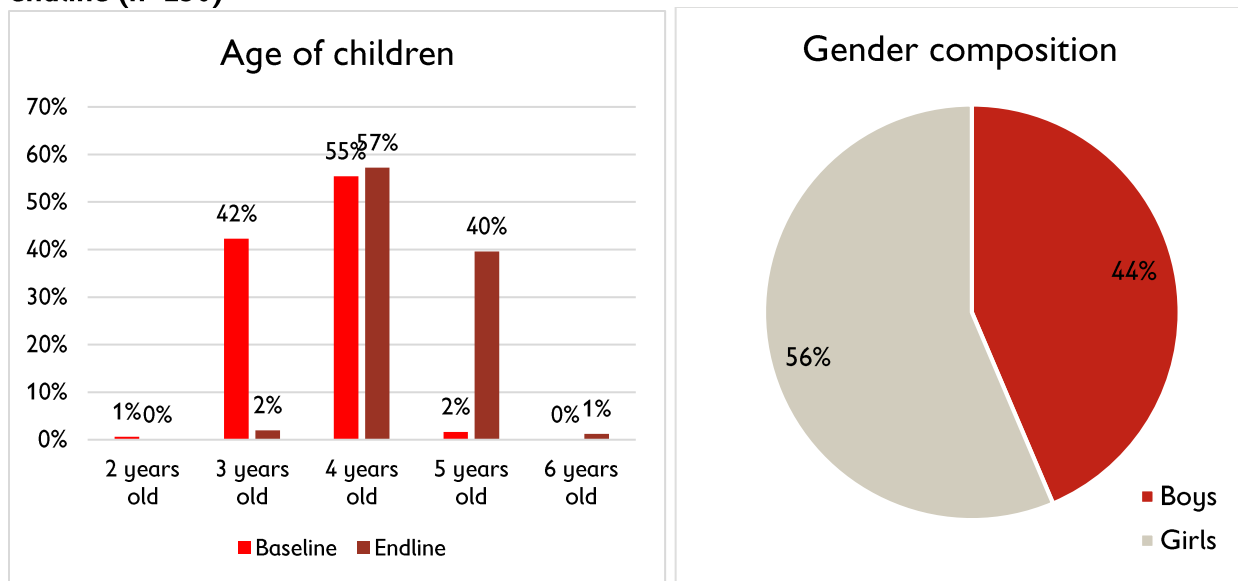
The IDELA tool is most appropriate for children aged 3 to 6 years old. Given that many children leave Anganwadi centers to enroll in private centers as they get older, and that most classes have many very young children, we wanted to ensure as large as possible a sample of age-eligible children. As such, we elected to conduct a census of all children aged 3-5 years old at baseline to ensure that they would be age-eligible at the endline data collection.

At baseline, we found a total of 320 age-eligible children. Out of the 320 age-eligible children, we secured assent from the child and consent from the caregiver for 305 to participate in the research.

**Figure 3** displays the composition of the baseline sample by age and gender.



**Figure 3. Composition of baseline population by age and gender at baseline (n=305) and endline (n=250)**



Nearly all of the children were either three or four years old at baseline, and four or five years old at endline. There are substantially more girls than boys in the studied Anganwadi centers, but the proportion did not change from baseline to endline.

We conducted random assignment process to assign treatment status without knowing the number of age-eligible children in each Anganwadi center. As such, we found our treatment group to have a larger sample than our control group as shown in



## Appendix A: List of Anganwadi centers, treatment status, and number of children assessed at baseline and endline.

### Measurement

We use include results from three instruments in this impact evaluation to understand the developmental status of children, the quality and composition of classrooms, and the home environment of children.

#### International Development and Learning Assessment (IDELA)

We use the International Development and Early Learning Assessment (IDELA) to measure the status of children's early learning and development with direct observation through a series of games and activities. We collected IDELA data at both baseline and endline points, and the results from IDELA and its component domains serve as our primary endpoints for estimating the impact of the project.

Twenty-four standard subtasks are included in the IDELA: Child Assessment as listed in **Table 1**. The Total IDELA score comprises twenty-two of these subtasks, those that fall under the core domains of Motor Development, Emergent Literacy, Emergent Numeracy, and Social-Emotional Domains. Additional non-core items attempt to measure children's Executive Functioning (through tasks that measure inhibitory control and short-term memory) and observations of children's Attitudes towards Learning.

**Table 1. IDELA Child Assessment Subtasks**

Motor Development	Emergent Literacy	Emergent Numeracy	Social-Emotional Development	Other items
Hopping	Print Awareness	Comparison by Size and Length	Friends	Approaches to Learning
Copying a Shape	Oral Vocabulary	Sorting and Classification	Emotional Awareness/Regulation	Inhibitory control
Drawing a Person	Letter Identification	Number Identification	Empathy/Perspective Taking	Short-term memory
Folding Paper	Emergent Writing	Shape Identification	Sharing/Solving Conflict	
	First Letter Sounds	One-to-One Correspondence	Self-Awareness	
	Oral Comprehension	Addition and Subtraction		
		Puzzle Completion		

IDELA is a standardized assessment, but must be contextualized in each administration to ensure the questions are culturally and developmentally appropriate. In this administration of the IDELA assessment, we made no major changes to the tool.



In order to ensure consistent administration of IDELA, enumerators go through a five-day training including field visits<sup>2</sup>. We report the internal consistency of the tool at both baseline and endline in **Appendix B: Internal consistency of IDELA at baseline and endline**. Overall, we find that the instrument performed well from an internal consistency standpoint. We observe a Cronbach's alpha values of 0.831 at baseline and 0.891 at endline, indicating that the tool had “Good” reliability at baseline, and nearly “Excellent” reliability at endline<sup>3</sup>.

### IDELA-Classroom Environment tool

The IDELA Classroom Environment tool (IDELA-CE) is a companion tool to the IDELA child tool. The IDELA-CE contains questions about the composition of the classroom and characteristics of the teacher (e.g. language, education, size) and attempts to capture the quality of the classroom environment with 30 questions about the domains as described in **Table 2**.

**Table 2. IDELA-CE Domains**

General Resources	Literacy and Numeracy Instruction	Interactions in the classroom
Size and safety of physical space	Print and numeracy environment of the classroom	Use of child-centered pedagogy
Water and sanitation facilities	Creative literacy and numeracy activities	Classroom management practices
Hygiene practices	Engagement with materials	Use of discipline
Presence and use of schedule		Treatment of children by gender and ability

The IDELA-CE is has not yet gone through the same rigorous validation processes that the IDELA child assessment has gone through and so we must be cautious about interpreting results. Having said this, the 30 items on the tool have an overall internal consistency of 0.851, indicating a “good” level of agreement between items.

We only collected one round of IDELA-CE data, for a total of 50 observations at each of the Anganwadi centers. The timing of the data collection was not ideal, as programming had already begun for several weeks when the classroom observations were conducted. As such, we can use time-invariant IDELA-CE results for our balance tests (e.g. teacher education, number of enrolled children, etc.) but should not use the quality results for understanding whether or not classrooms were of equivalent quality at baseline. Because programming had already started when the observations took place, we would expect the quality of classrooms to be influenced by the programming. Therefore, with a large degree of caution, we will consider these metrics as an additional secondary endpoint.

### IDELA-Home Environment tool

The IDELA-Home Environment tool (IDELA-HE) is also a companion tool to the IDELA child tool. We use the IDELA-HE tool to better understand the home environment of targeted children, including

<sup>2</sup> We wish to thank our teams of enumerators at baseline and endline. Radha N., Ashwini B., Anitha I., Murati N., Prakasha P., Radhamani P., Hareersha M., Rosey John, Latha N., and

<sup>3</sup> DeVellis, R.F. (2012). *Scale development: Theory and applications*. Los Angeles: Sage. pp. 109–110.



indicators on their family demographics, experience with ECCD, home learning resources, interactions with caregivers, socioeconomic status, and knowledge, attitudes, and practices. A summary of the types of IDELA-HE sections is presented in **Table 3**.

**Table 3. IDELA Home Environment Questionnaire**

Section	Description
<b>1. General family information</b>	Sex and age of child, number of caregivers and children at home, parental literacy and education, languages spoken at home
<b>2. ECCD experience and educational expectations</b>	Child participation in ECCD programs, details of participation, parental expectation and aspirations of child's educational attainment.
<b>3. Access to early learning materials and resources at home</b>	Types of reading materials at home, types of toys at home
<b>4. Parenting practices and support for learning and development</b>	Activities caregivers engage in to promote learning and development, use of positive and harsh discipline
<b>5. Participation in ECCD service provision</b>	Parental/caregiver engagement in community activities around ECCD
<b>6. Socioeconomic status</b>	Family's ownership of common household assets
<b>7. Disability</b>	Children's disability status and type

Similar to the IDELA-CE, we only collected one wave of IDELA-HE data in the middle of implementation. Data was collected in March 2018, about half a year after the beginning of the school-based programming. Parental-focused programming began in February 2018, shortly before the IDELA-HE was conducted.

Importantly, the population surveyed using the IDELA-HE was different than that of the child assessment, though the survey had substantial overlap. We surveyed 345 caregivers from the 50 Anganwadi centers and aimed to conduct a census of caregivers of children aged 3 to 3.5 years old. Children's caregivers that were above 3.5 years in the child sample were not included in this survey.

Of the 345 caregiver, 342 provided consent. 194 caregivers were from treatment Anganwadi, and 148 were from control Anganwadi centers.

While we only have one wave of data collected mid-intervention and the population of caregivers in the IDELA-HE survey is different, we can, as with the IDELA-CE, analyze time-invariant and programmatically unrelated factors to test balance between caregivers in treatment and control groups generally. Aspects like parental education, age, socio-economic status, etc. are not going to be influenced by the program and can be used as subjects of additional balance tests.

## Ethics

As with all human subject research conducted at Save the Children, we submitted study protocols to Save the Children's Ethics Review Committee who provided review and approval.

In order to protect the rights of children and participants, we secured written caregiver consent and child assent prior to conducting the child interview. Children were informed about the purpose of the

study in child-friendly language, and provided the opportunity to stop the interview at any point. Out of 320 age-eligible children at baseline, 15 declined assent and were not interviewed.

In order to collect data with the IDELA-Classroom Environment tool, we received permission from the teacher of the Anganwadi center. Written consent was obtained from caregivers before conducting the IDELA-Home Environment survey.

## Analysis

We begin our analysis with a description of our study participants at baseline in order to understand if the randomization process was successful at generating balanced control and treatment groups in terms of age, sex, and developmental status. We then describe the endline results, and estimate a number of models to quantify the effect of the treatment on IDELA scores. We conclude our analysis by attempting to address potential threats to these results (e.g. attrition).

## Baseline

We first examine the composition of our study group, and investigate any differences between the treatment and control groups. The results of our balance tests suggest that the control group and treatment group do not systematically differ from each other and that the randomization process was successful. We present a full accounting of all baseline variables and any differences by treatment group in **Appendix C: Balance tests of baseline IDELA data (n=305)**. We also present the results of balance tests from the IDELA-Classroom Environment tool in **Appendix D: IDELA-CE balance tests (n=50)** and the results of the balance tests from the IDELA-Home Environment tool in **Appendix E: IDELA-Home Environment balance tests**.

## Study population composition

Our primary interest of balance is to ensure that treatment and control groups are comparable in terms of developmental outcomes. However, we also wish to consider the balance in other characteristics. Assuming successful randomization, we should find few differences, on average, between treatment and control groups.

**Table 4** presents the breakdown of the baseline study groups by sex and treatment status. We find no significant difference in the proportion of boys and girls by study group. We also find no difference in the average age of children between treatment and control groups.

**Table 4. Gender breakdown by treatment status**

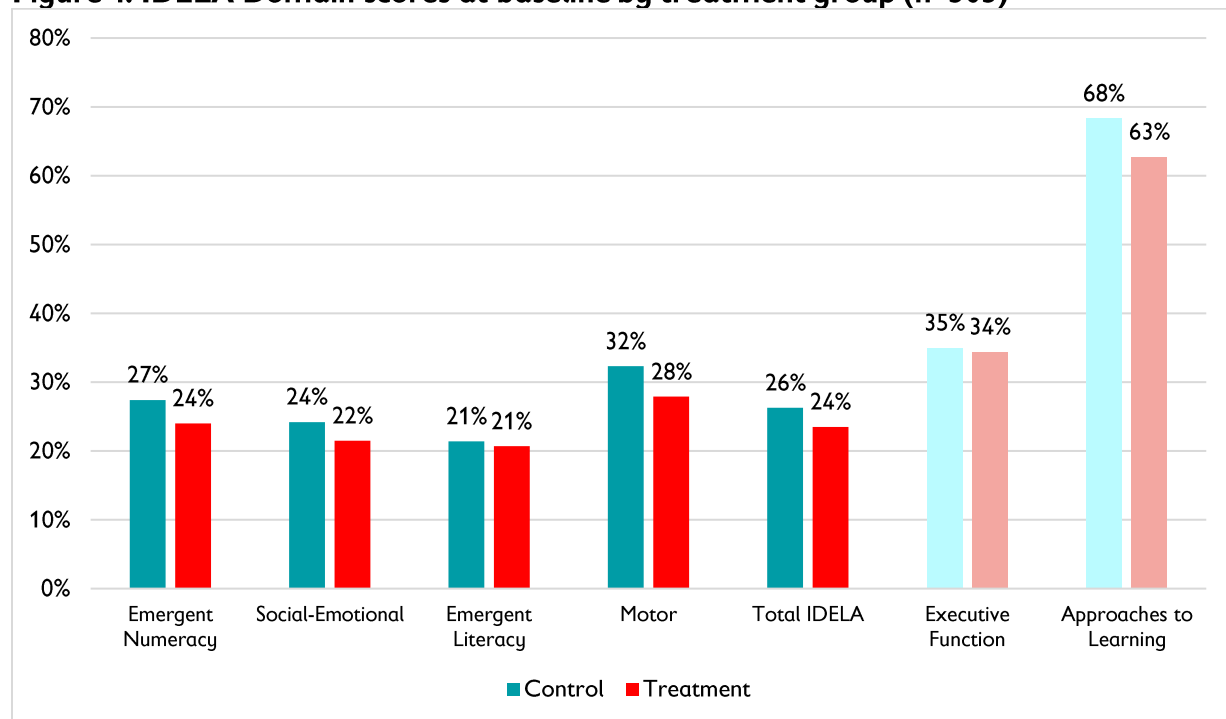
	Control	Treatment	Total
<b>Boys</b>	55	78	133
<b>Girls</b>	65	107	172
<b>Total</b>	120	185	305

## IDELA child outcomes

**Figure 4** displays the average scores in the treatment and control groups on the IDELA Total and the four core sub-domains (in bold colors) along with the two non-core domains (in pale colors). We observe no significant differences in children's early learning and developmental status by treatment

group. The Control group has slightly higher scores in every domain, but none of these differences are statistically significant at the conventional  $p < 0.05$  level (and indeed, none of these differences even reached marginal significant at the  $p < 0.10$  level).

**Figure 4. IDELA Domain scores at baseline by treatment group (n=305)**



When we examine the 24 sub-tasks of the IDELA assessment, we find that children in both treatment and intervention groups scored similarly. Within the 22 tasks that comprise the core domains, children in the control group scored significantly higher on the “Comparison by Size and Length” task that asks children to identify long and short, and big and small objects. Enumerators also rated children in the control group significantly higher on “Item persistence”, indicating that these children were more engaged with the assessment.

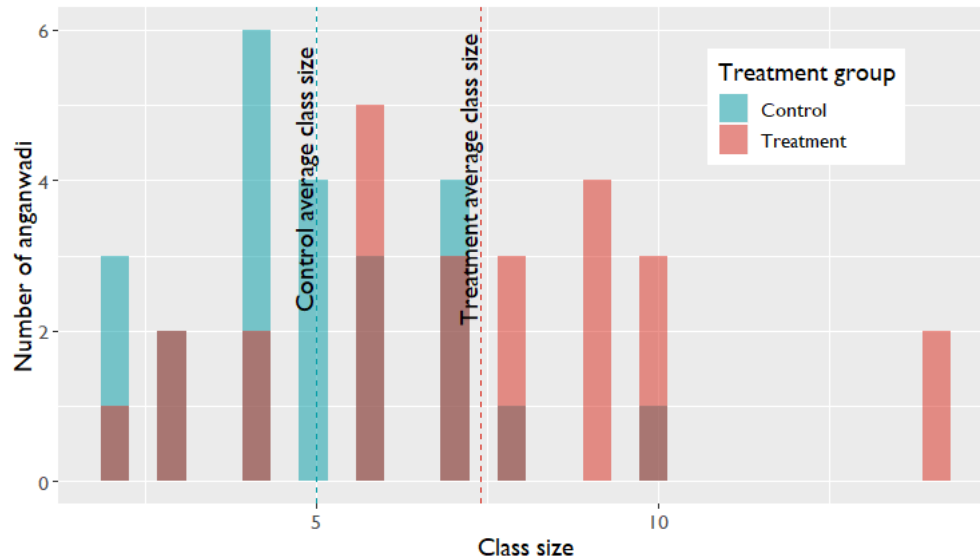
As would be expected from a successful randomization, we find that the control group is largely comparable to the treatment group. While we find a few significant differences, they are generally small. In addition, where they do exist, they are in favor of the control group.

### Classroom environment

As noted above, we did not consider the number of age-eligible children when randomizing Anganwadi centers. The result was that our population size in treatment Anganwadis is larger than the population in the control group. On average, treatment Anganwadi contained significantly more age-eligible children than control Anganwadi.

**Figure 5** displays the distribution of population size by treatment and control and shows the difference in average size and between these two groups.

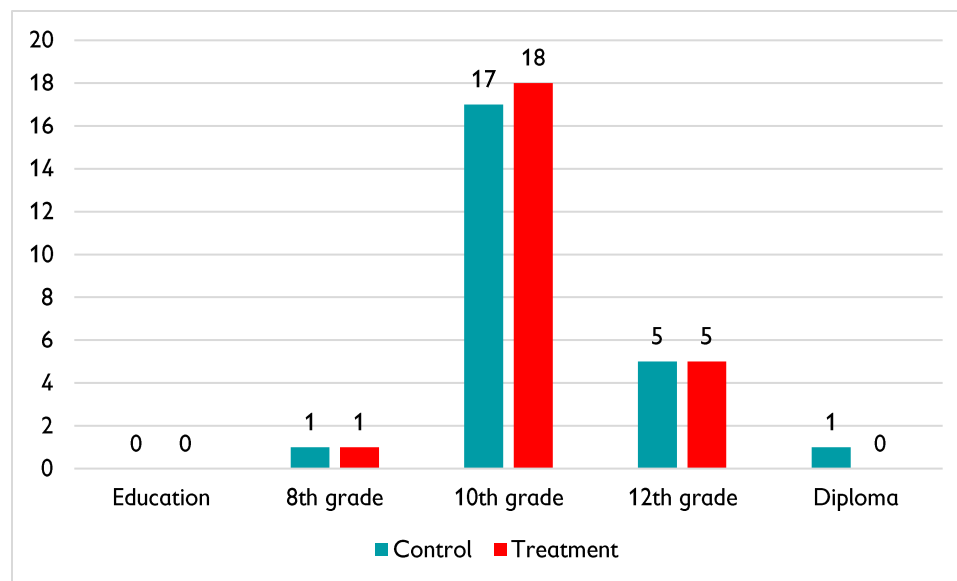
**Figure 5. Distribution of class sizes in treatment and control**



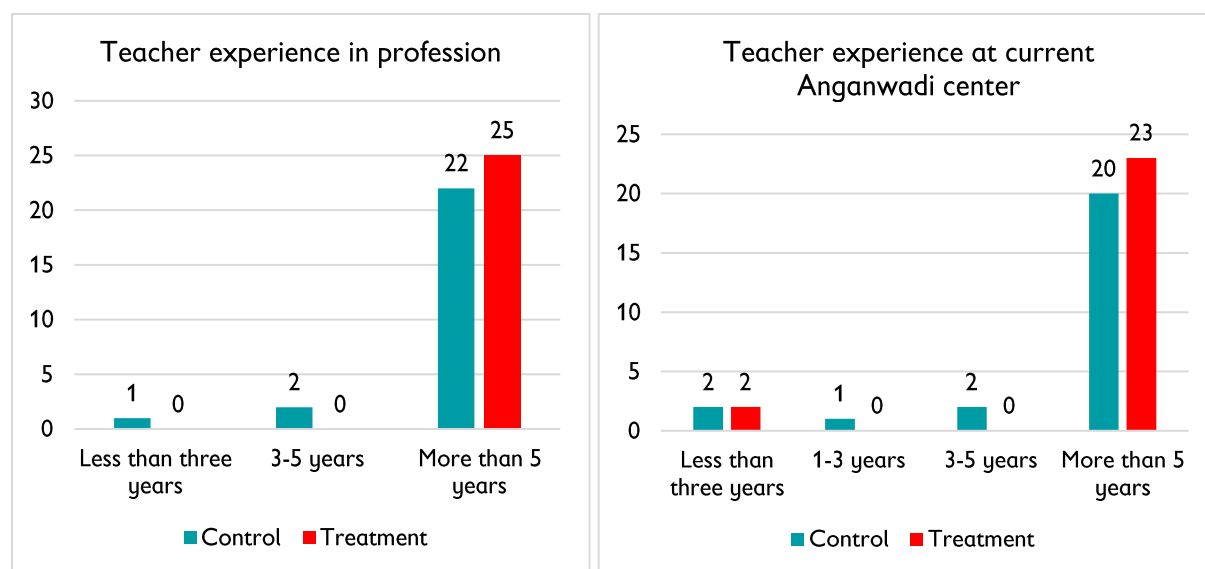
On average, there were 4.8 age-eligible children in control Anganwadi and 7.4 age-eligible children in treatment Anganwadi. This difference is driven largely by two factors: a single Anganwadi center in control that had zero age-eligible children, and two exceptionally large Anganwadi centers in treatment that each had 14 age-eligible children. We also note this difference in our balance tests from the IDELA-Classroom Environment tool in **Appendix D: IDELA-CE balance tests (n=50)**. We find that the average class size in treatment Anganwadi (22 children) is significantly larger than the control Anganwadi (17 children).

Other than the size of the class, class and teacher level characteristics appear to be well balanced between treatment and control groups. The languages that are spoken in classes and by the teacher are similar between treatment and control. We observe no difference in the distribution of education of teachers in our sample. As **Figure 6** shows, a majority of teachers in both treatment and control groups had achieved a maximum of a 10<sup>th</sup> grade education. A few had finished high school, but very few teachers had any advanced education. **Figure 7** shows the distribution of experience in teachers between treatment and control. The majority of teacher in both samples had more than five years of experience in the profession and at the current center. While there were a small number of less experienced teachers in the control group, we do not observe any statistically significant differences in these distributions.

**Figure 6. Highest educational attainment by Anganwadi teacher (n=50)**



**Figure 7. Experience of Anganwadi teacher at current center and in profession (n=50)**

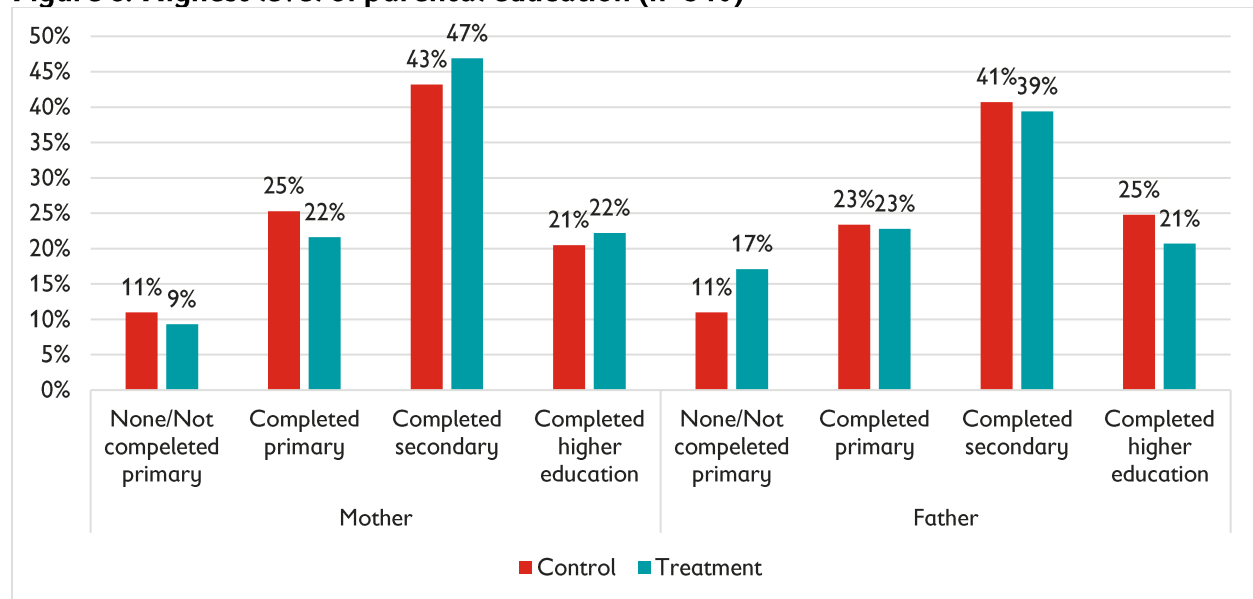


### Home environment

As noted earlier, we can use time-invariant factors as subjects of our balance test to determine whether or not caregivers in treatment Anganwadi were similar to those in control Anganwadi in terms of observable characteristics. Full results of our balance tests are presented in **Appendix E: IDELA-Home Environment balance tests**.

We find no significant differences whatsoever in terms of caregiver education, literacy, socio-economic status, language characteristics, family composition or disability. **Figure 8** presents the levels of parental education in treatment and control as an illustrative example.

**Figure 8. Highest level of parental education (n=340)**



We can also use the results from these balance tests to better understand the populations represented in this study. About 90% of mothers and 85% of fathers reported being literate, educational attainment was low. Over one in three mothers and fathers had not completed education beyond primary school.

About 80% of families were Kannada-speaking, and there were large minorities of Telugu and Hindi speaking families as well. Mothers were substantially younger, on average, than fathers at 26 years old. Fathers were 32 years old on average. Caregivers reported just over two children in their family on average indicating fairly small family sizes.

Mobile phone ownership is nearly universal and most families reported owning a television and electricity, but less than one in three families own a refrigerator. About half of families reported owning a bicycle, and about one third owned a motorbike.

As we stated earlier, while the group of respondents does not correspond perfectly to our child respondents for the IDELA, these results further strengthen our argument that the control group is a suitable estimate of the counterfactual as we observe no significant differences on any observable characteristics.

## Endline

After establishing the baseline comparability of treatment and control groups, we now turn our attention to the endline results. We focus on the IDELA results for which we have two waves of data. We first discuss various model specifications, before deciding on a “final model” with which we explore the results across the IDELA domains. The results of the IDELA-CE and IDELA-HE which can be considered outcomes of the program are also discussed.

## Attrition

As a randomized control trial, we are confident that children at baseline were similar on both observed and unobserved characteristics. However, attrition may bias endline results. If children



attrited from the control and treatment groups for different reasons, our estimates of impact may be biased in unpredictable ways.

We can assess the threat attrition provides to our results by examining patterns in attrition according to observable characteristics. Overall, attrition was 18.3%, with 24 children (19.8%) from Control and 32 children (17.3%) from Treatment groups attriting. A logistic regression of attrition on treatment status reveals that there was no differential attrition. We conduct a similar model building process for attrition in **Appendix H: Models of attrition**.

Throughout the attrition model building process we consistently find no relationship between treatment status and attrition. However, we do find interesting results when considering other child-level covariates. Older children were significantly less likely to attrite than younger children. Children who were three years old at baseline attrited at a rate of 33%, whereas just 19% of four-year-old children attrited.

As sensitivity test, we re-run our balance tests from baseline on the restricted sample of non-attriters in **Appendix I: Balance tests of baseline data without attrition (n=250)**. We find no additional differences beyond what was reported earlier.

In conclusion, we find that attrition, in terms of observable characteristics, did not differ between our control and treatment groups. Our endline sample was balanced on observable characteristics at baseline. As such, we are confident that attrition does not bias our estimates of impact.

### IDELA model building process

Our primary endpoint is the Total IDELA score. Our model building process consists of an OLS multivariate regression model including robust clustered standard errors to account for random assignment of treatment to Anganwadi centers.

Model 1 is our simplest model. As IDELA is a measure with high autocorrelation<sup>4</sup>, we believe applying a “difference-in-difference” approach is appropriate to estimate the impact of the program<sup>5</sup>. We estimate a model which regresses children’s IDELA scores (at both time periods), on dummy variables indicating 1) treatment status 2) endline status, and 3) a treat-by-endline interaction as shown below.

$$IDELA = \beta_0 + \beta_1 * treat + \beta_2 * endline + \beta_3 * endlineXtreat + \epsilon \quad (1)$$

$\beta_1$ , the treatment status indicator, represents the difference between treatment and control at baseline.  $\beta_2$ , the endline coefficient, provides the average gain between baseline and endline in the control group.  $\beta_3$  is our coefficient of interest; it represents the difference in average IDELA gain between the treatment and control groups.

The results of this model are encouraging and are presented in

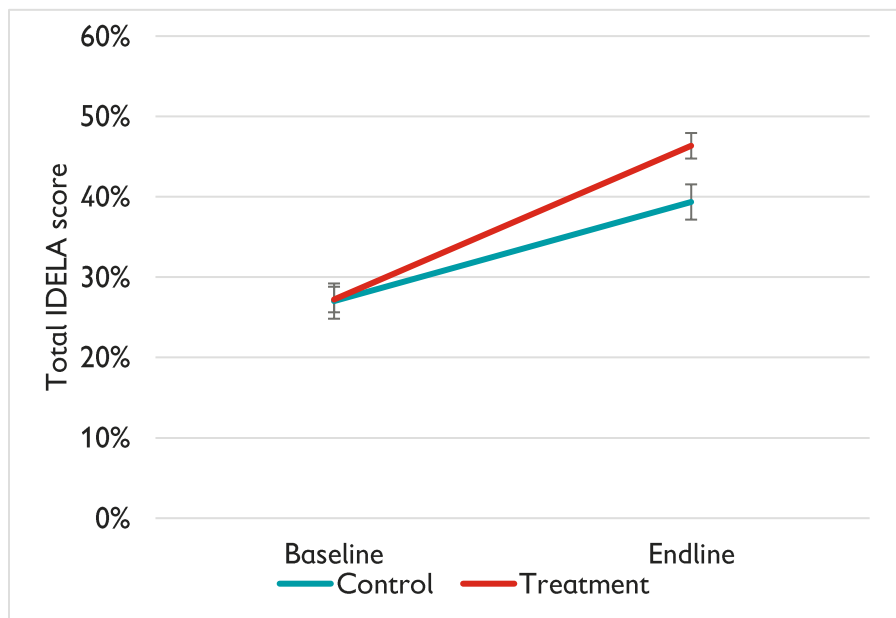
<sup>4</sup> I need a reference here.

<sup>5</sup> [http://siteresources.worldbank.org/DEC/Resources/Beyond\\_Baseline\\_and\\_FollowUpJDE\\_final.pdf](http://siteresources.worldbank.org/DEC/Resources/Beyond_Baseline_and_FollowUpJDE_final.pdf)



**Appendix F: Model building** process. As we know from our baseline balance tests, treatment and control groups had statistically similar baseline Total IDELA scores. Children in the control group improved, on average, 16.3 percentage points on Total IDELA score. In the treatment group, the gain was an average of 23.1 percentage points, 6.8 percentage points larger than in the control group and a statistically significant difference ( $p = 0.03$ ). **Figure 9** presents children's baseline and endline average score by treatment.

**Figure 9. Baseline and Endline Total IDELA scores in treatment and control groups (n=250)**



Error bars represent +/- one robust clustered standard error

Given the study design, we consider the estimate of impact in Model 1 unbiased. However, we may be able to refine our estimate of impact by adding in additional covariates. Doing so will also allow us to explore the relationship between children's background factors and classroom composition with their developmental outcomes. Model 2 adds in child-level covariates of age and gender. Model 3 adds in classroom-level effects of teacher education, experience and size. Model 4 includes both child and classroom-level covariates.

$$IDELA = \beta_0 + \beta_1 * treat + \beta_2 * endline + \beta_3 * endlineXtreat + \beta_4 * Child's\ age + \beta_5 * Child\ is\ female + \epsilon \quad (2)$$

$$IDELA = \beta_0 + \beta_1 * treat + \beta_2 * endline + \beta_3 * endlineXtreat + \beta_6 * Class\ size + \beta_7 + \beta_8 * Teacher\ education + \beta_9 * Teacher's\ experience + \epsilon \quad (3)$$

$$IDELA = \beta_0 + \beta_1 * treat + \beta_2 * endline + \beta_3 * endlineXtreat + \beta_4 * Child's\ age + \beta_5 * Child\ is\ female + \beta_6 * Class\ size + \beta_7 * Teacher\ education + \beta_8 * Teacher's\ experience + \epsilon \quad (4)$$

The results of this model building process and the estimation of the models indicated above are presented in



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## Appendix E: IDELA-Home Environment balance tests

Variable	Control	Treatment	P-value of Difference
<b>Mother's age</b>	26.372	26.191	0.714
	[0.407]	[0.281]	
<b>Mother is literate</b>	92%	87%	0.135
	[0.020]	[0.025]	
<b><i>Mother's level of education</i></b>			
<b>None/Not completed primary</b>	11%	9%	0.577
	[0.022]	[0.021]	
<b>Completed primary</b>	25%	22%	0.568
	[0.054]	[0.036]	
<b>Completed secondary</b>	43%	47%	0.572
	[0.055]	[0.037]	
<b>Completed higher education</b>	21%	22%	0.767
	[0.044]	[0.033]	
<b>Father's age</b>	32.25	32.304	0.929
	[0.338]	[0.510]	
<b>Father is literate</b>	88%	81%	0.150
	[0.023]	[0.040]	
<b><i>Father's level of education</i></b>			
<b>None/Not completed primary</b>	11%	17%	0.086
	[0.021]	[0.028]	
<b>Completed primary</b>	23%	23%	0.909
	[0.043]	[0.038]	
<b>Completed secondary</b>	41%	39%	0.813
	[0.042]	[0.036]	
<b>Completed higher education</b>	25%	21%	0.470
	[0.043]	[0.038]	
<b><i>Family members that live with the child:</i></b>			
<b>Mother</b>	89%	88%	0.856
	[0.039]	[0.030]	
<b>Father</b>	33%	34%	0.941
	[0.097]	[0.077]	
<b>Grandparent</b>	28%	25%	0.651
	[0.062]	[0.051]	
<b>Older brother/sister</b>	22%	24%	0.839
	[0.073]	[0.061]	
<b>Younger brother/sister</b>	12%	17%	0.427
	[0.040]	[0.046]	
<b>Number of children in family</b>	2.06	2.03	0.805
	[0.088]	[0.112]	



<b>Child's preferred language:</b>			
<b>English</b>	7%	1%	0.389
	[0.066]	[0.011]	
<b>Hindi</b>	1%	4%	0.203
	[0.009]	[0.020]	
<b>Kannada</b>	76%	80%	0.590
	[0.068]	[0.040]	
<b>Korada</b>	1%	0%	0.314
	[0.007]	[0.000]	
<b>Odia</b>	0%	1%	0.299
	[0.000]	[0.005]	
<b>Telugu</b>	13%	9%	0.494
	[0.043]	[0.029]	
<b>Urdu</b>	3%	5%	0.381
	[0.021]	[0.019]	
<b>Languages spoken in home:</b>			
<b>English</b>	7%	2%	0.386
	[0.059]	[0.012]	
<b>Hindi</b>	2%	9%	0.120
	[0.011]	[0.041]	
<b>Kannada</b>	80%	84%	0.573
	[0.066]	[0.038]	
<b>Korada</b>	1%	0%	0.314
	[0.007]	[0.000]	
<b>Nepali</b>	1%	0%	0.321
	[0.007]	[0.000]	
<b>Odia</b>	0%	1%	0.299
	[0.000]	[0.005]	
<b>Tamil</b>	0%	1%	0.320
	[0.000]	[0.005]	
<b>Family owns a...</b>			
<b>Radio</b>	18%	18%	0.981
	[0.035]	[0.031]	
<b>TV</b>	91%	93%	0.452
	[0.023]	[0.019]	
<b>Refrigerator</b>	23%	34%	0.099
	[0.049]	[0.038]	
<b>Bicycle</b>	57%	62%	0.273
	[0.034]	[0.030]	
<b>Motorbike</b>	36%	45%	0.201
	[0.053]	[0.049]	
<b>Mobile phone</b>	95%	98%	0.142
	[0.020]	[0.011]	



<b>Electricity</b>	97%	99%	0.331
	[0.016]	[0.007]	
<b>Land</b>	37%	42%	0.593
	[0.070]	[0.063]	
<b>Livestock</b>	25%	29%	0.575
	[0.061]	[0.049]	
<b>Number of types of possessions</b>	4.784	5.191	0.089
	[0.176]	[0.158]	
<b>Caregiver believes child has a disability</b>	1%	2%	0.881
	[0.009]	[0.009]	
<b>Type of disability</b>			
<b>Communication/language</b>	0%	1%	0.328
	[0.000]	[0.005]	
<b>Cognitive</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Sensory integration/attention</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Physical</b>	1%	1%	0.721
	[0.007]	[0.007]	
<b>Visual</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Auditory</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Other type of disability</b>	1%	0%	0.321
	[0.007]	[0.000]	
<b>Caregiver worries about cognitive development of child</b>	53%	42%	0.297
	[0.081]	[0.073]	
<b>Caregiver worries about physical development of child</b>	55%	52%	0.789
	[0.085]	[0.069]	

The value displayed for t-tests are *p*-values.\*\*\*, \*\*, and \* indicate significance at the  $p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$ , and critical levels.

Appendix F: Model building process. The estimate of impact remains remarkably stable throughout all the above models and is consistently estimated at 6.8 percentage points.

Looking at the results of these variously complex models, we elect to retain controls for children's age and gender, along with the number of enrolled children. Child's age is a consistently significantly predictive variable, and we include gender regardless of its significance as convention. We find that class size is also a consistently predictive variable: children in larger classes had significantly lower Total IDELA score. While the variables for teacher's experience and education are significant for some categories, we choose to omit these variables in our final model. We make this decision because the significant results are almost entirely the result of a single teacher/classroom.

Our final model, which is estimated as shown below as Model 5, generates the regression output in **Table 5**.

$$IDELA = \beta_0 + \beta_1 * treat + \beta_2 * endline + \beta_3 * endlineXtreat + \beta_4 * Child's\ age + \beta_5 * Child\ is\ female + \beta_6 * Class\ size + \epsilon \quad (5)$$

**Table 5. Final regression model predicting Total IDELA**

	(5) Total IDELA
Treatment	0.00195 (0.0262)
Endline	0.123*** (0.0261)
Treatment X Endline	0.0680* (0.0303)
Child's age (in years)	0.0593*** (0.0157)
Child is female	0.00582 (0.0139)
Number of students enrolled in center	-0.00480*** (0.00131)
Constant	0.0998 (0.0705)
Observations	500
R <sup>2</sup>	0.389

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



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Using the final model as presented in **Table 5**, we again conclude the program caused a 6.8 percentage point increase in Total IDELA score, an estimated Cohen's d effect size of 0.39<sup>6</sup>. We also observe, as would be expected, that older children have higher IDELA scores, but that boys and girls scored equally well. Interestingly, we also find that class size has a significant negative association with IDELA scores. For each additional child registered in a child's class, we predict a 0.5 percentage point lower Total IDELA score. While these findings are significant, they are strictly correlational in nature.

### IDELA domain scores

After conducting our model building process with the Total IDELA endpoint, we now use the same model to estimate the impact of the program on the various sub-domains. We present the results of the application of this model across the Motor, Social-Emotional, Emergent Literacy, and Emergent Numeracy domains in **Appendix G: Final model applied to IDELA core domains**.

**Figure 10** presents the covariate-adjusted estimates for baseline and endline averages by treatment group. In addition to Total IDELA, the program caused significantly higher scores in the Emergent Numeracy and Motor domains. The program did not have an impact on children's Social Emotional domain score. While our estimate of impact for Emergent Literacy is fairly large, the results are not statistically significant ( $p = 0.094$ ).

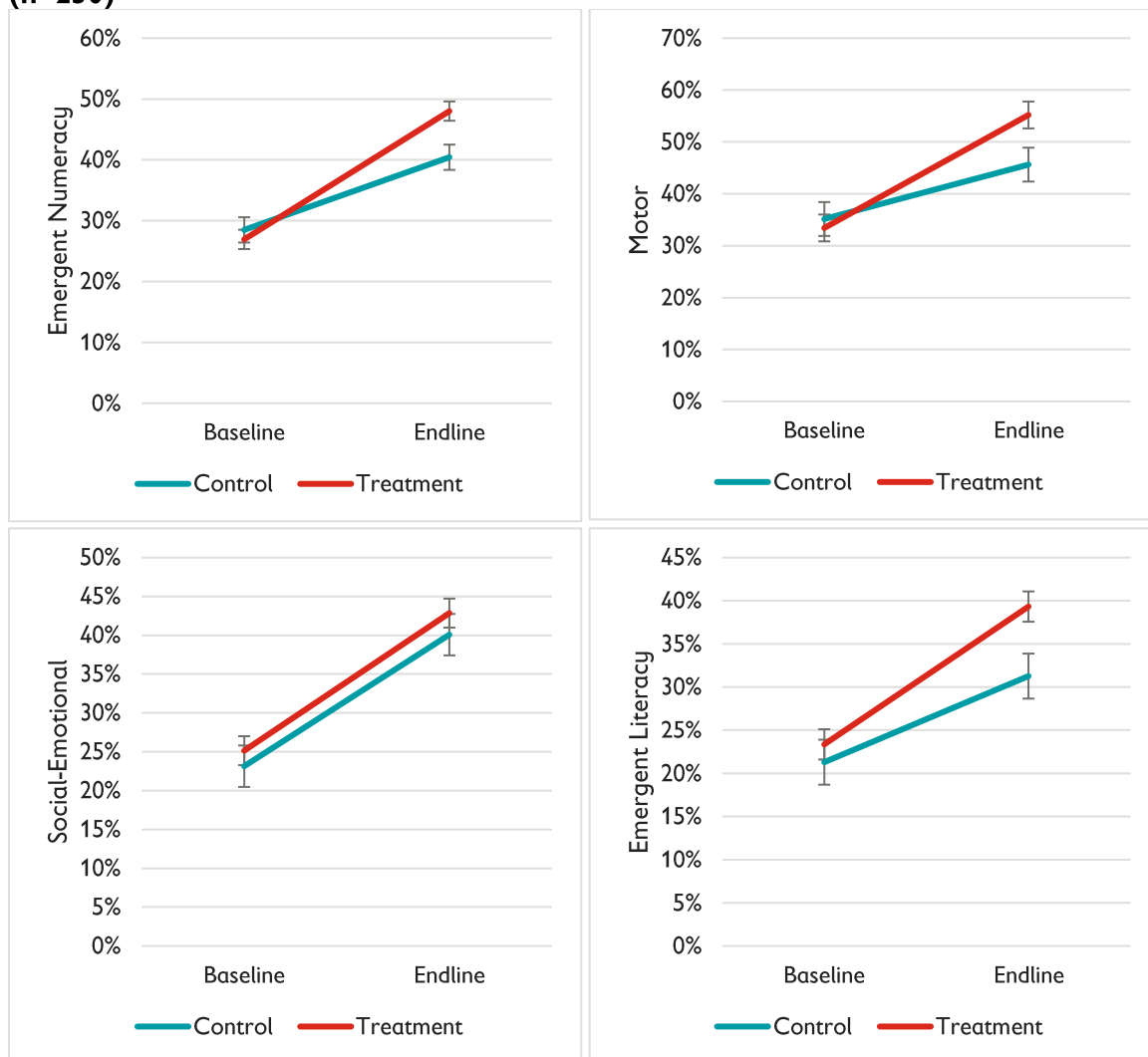
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<sup>6</sup> We calculate the Cohen's d effect size by dividing the percentage-point estimate of impact by the standard deviation of the outcome at baseline.





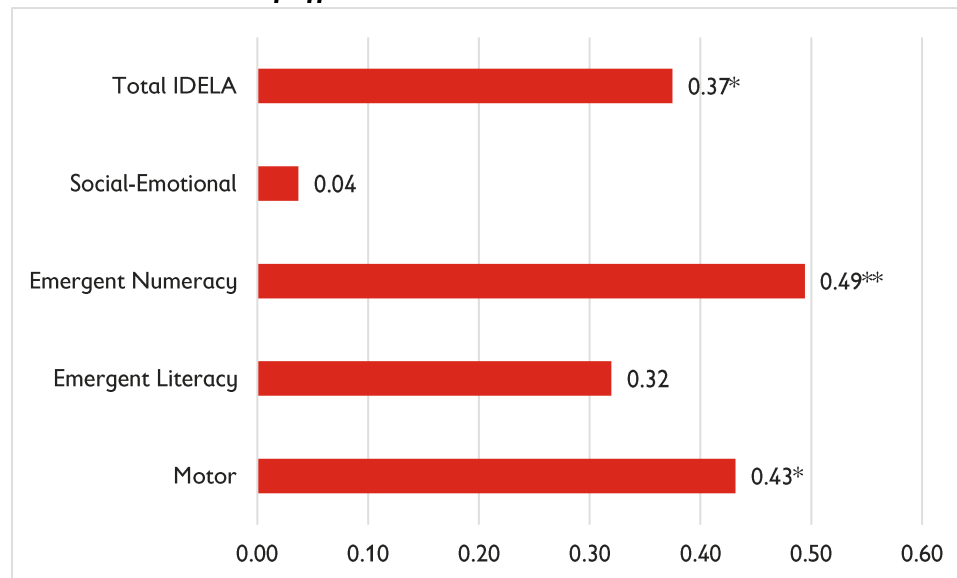
**Figure 10. Covariate-adjusted baseline-endline IDELA domain scores by treatment group (n=250)**



Because the IDELA scale varies from domain to domain, we can use Cohen's d effect sizes to make cross-domain comparisons.

**Table 6** presents the effect size of the treatment by domain. The program had the largest impact on the Emergent Numeracy domain.

**Table 6. Estimates of effect size on IDELA core domains**

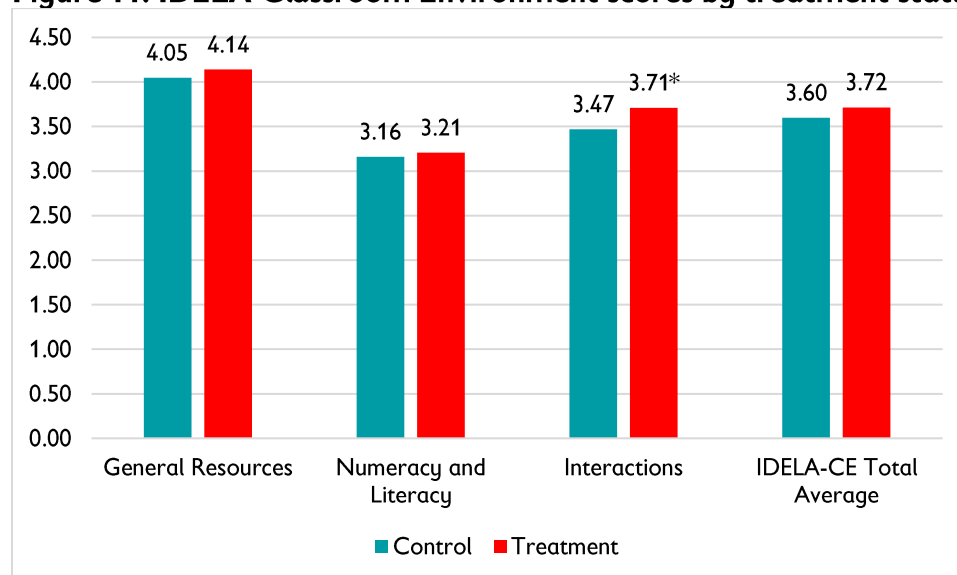


### IDELA-CE results

As mentioned earlier, the IDELA-CE classroom observations were conducted *after* programming had already begun. As such, we used time-invariant properties as a means of establishing balance between Anganwadis. However, as programming had already begun, we assume that the quality of instruction and results on the IDELA-CE reflect the impact of the program.

Given that observations were conducted early in the program cycle (October-December), we should be cautious about our interpretation as the impact of the program. **Figure 11** presents the results of the IDELA-CE domain scores.

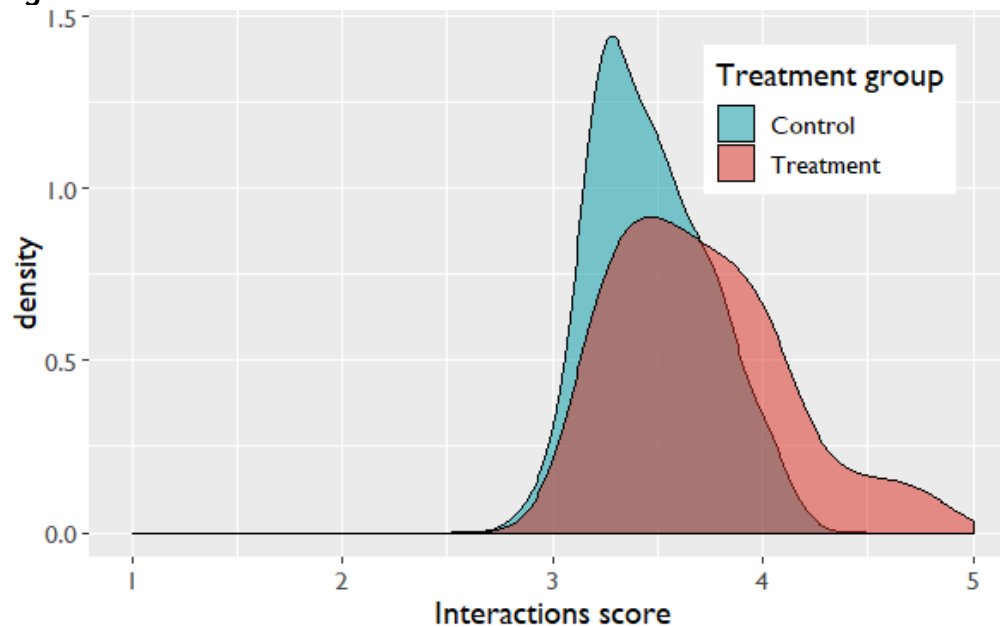
**Figure 11. IDELA-Classroom Environment scores by treatment status (n=50)**



Only the “interactions” domain had a significant difference between treatment and control groups. Anganwadis in the treatment group had a 0.24 point higher Interactions score, an fairly large Cohen’s

d effect size of 0.67. **Figure 12** presents the distribution of Interactions scores. The “floor” of both distributions is similar, indicating few centers with truly poor interactions. However, treatment Angawadi centers were much more likely to have scores in the higher end of the distribution.

**Figure 12. Distribution of Interactions scores in Treatment and Control**



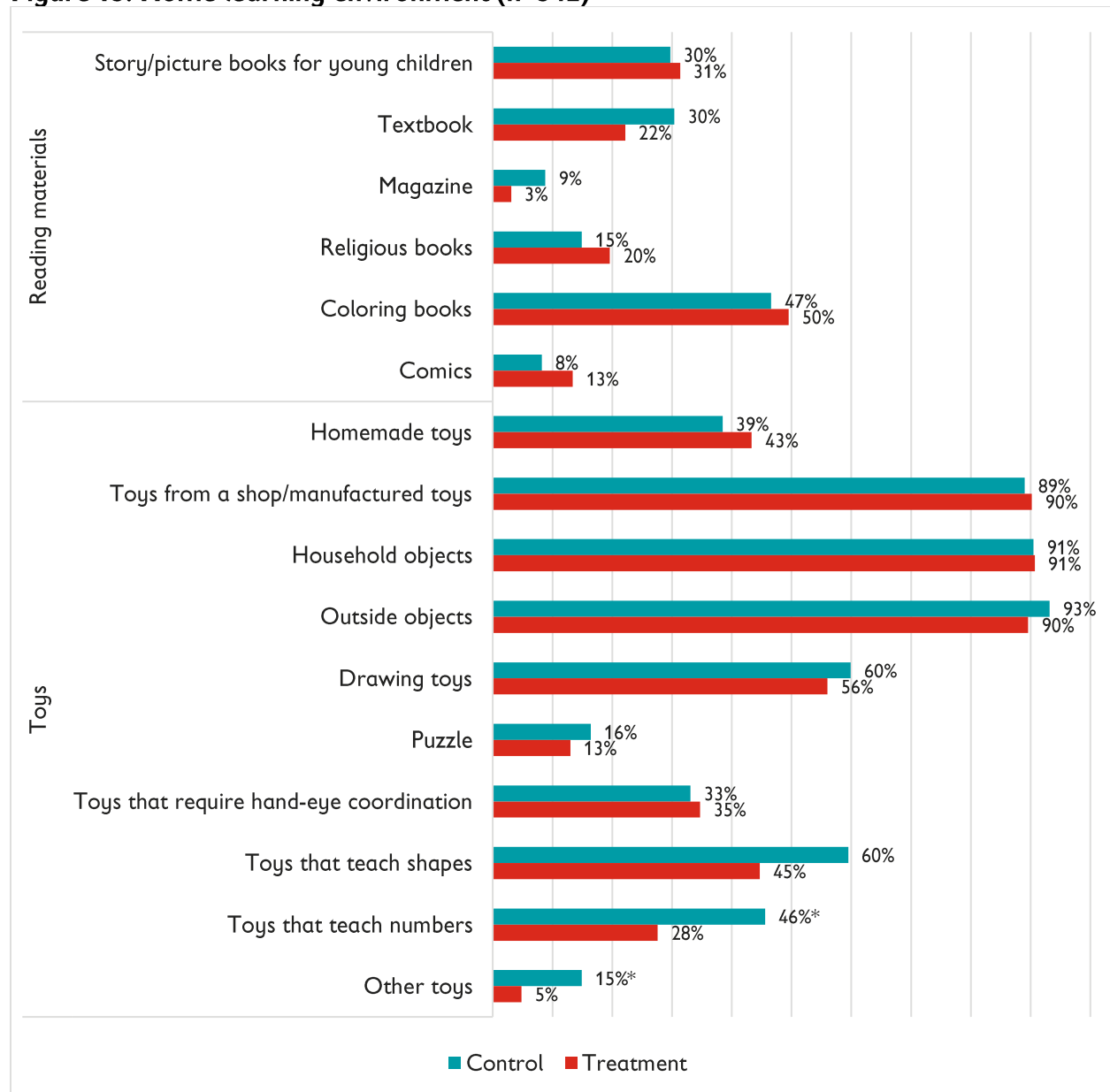
We may interpret this difference as the effect of the program on classroom quality. Such an interpretation would be supported by the program’s Theory of Change and the child-level impact results. However, this interpretation comes with substantially more limitations. The observations were conducted early in the programmatic cycle in the middle of the program and we lack a baseline comparison. The estimate of impact may indeed be conservative, as additional programming may have continued to improve the quality of the classroom environment beyond what is presented here.

### IDELA-HE results

Because the IDELA-HE was conducted after parental-focused programming began, we only included time-invariant factors in our balance tests. However, while we could use the data in a similar way to the IDELA-CE by considering differences as a result of the program, we would expect little change after that short of an implementation period. Perhaps as to be expected, we observe no impact (after a month of programming) on home environmental factors targeted by the program. On average, caregivers in treatment and control groups exhibited extremely similar home learning environments, engagement in learning activities with their child, harsh discipline usage, and attitudes.

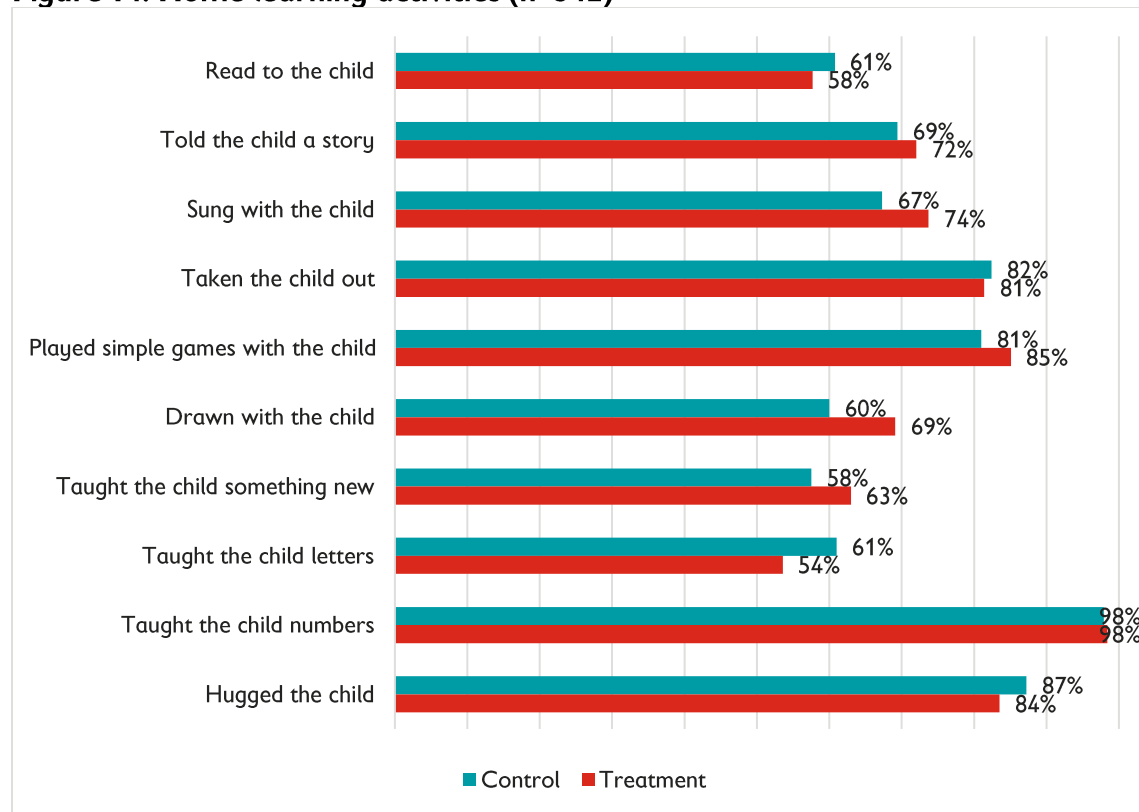
**Figure 13** displays children’s home learning environment. We present the reported home ownership of a variety of reading materials and toys. There are no significant differences in the number of types of reading materials by treatment status. Children in the treatment group did not have improved access to reading materials. When it comes to toys, there is a largely similar story. However, we find that children in the treatment group were significantly less likely to have access to toys that teach numbers and other types of toys.

**Figure 13. Home learning environment (n=342)**



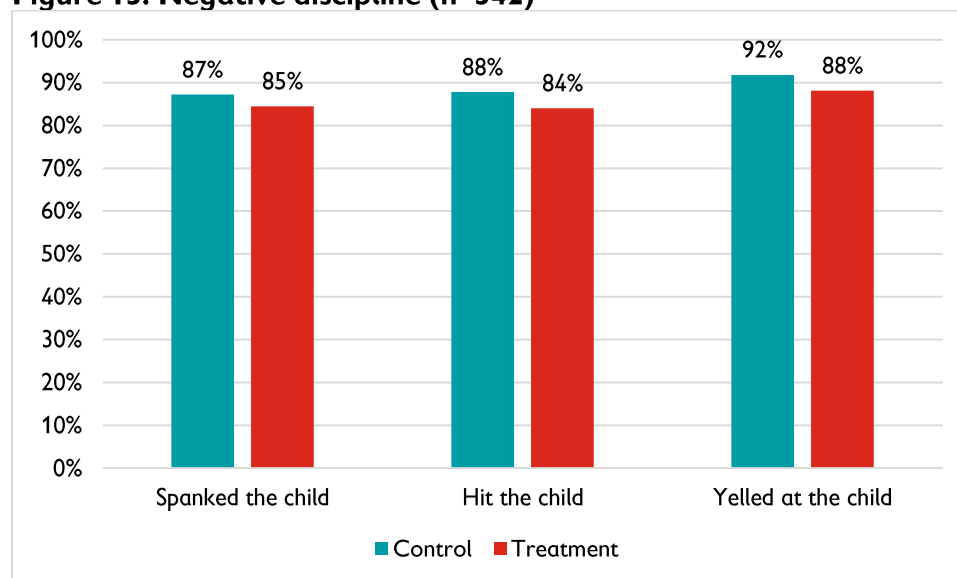
**Figure 14** demonstrates the home learning activities that caregivers reported engaging in with their children. We observe differences in the likelihood of engaging in any of the activities. In general, caregiver engagement is high, with large majorities of caregivers reporting teaching children numbers, playing games and hugging their children. While a majority of caregivers did read to their child, this was the least common type of learning activity.

**Figure 14. Home learning activities (n=342)**



Harsh discipline appears to be a serious concern in this population. A huge majority of caregivers reported spanking, hitting, and yelling at their children. We observe no differences in harsh discipline by treatment group.

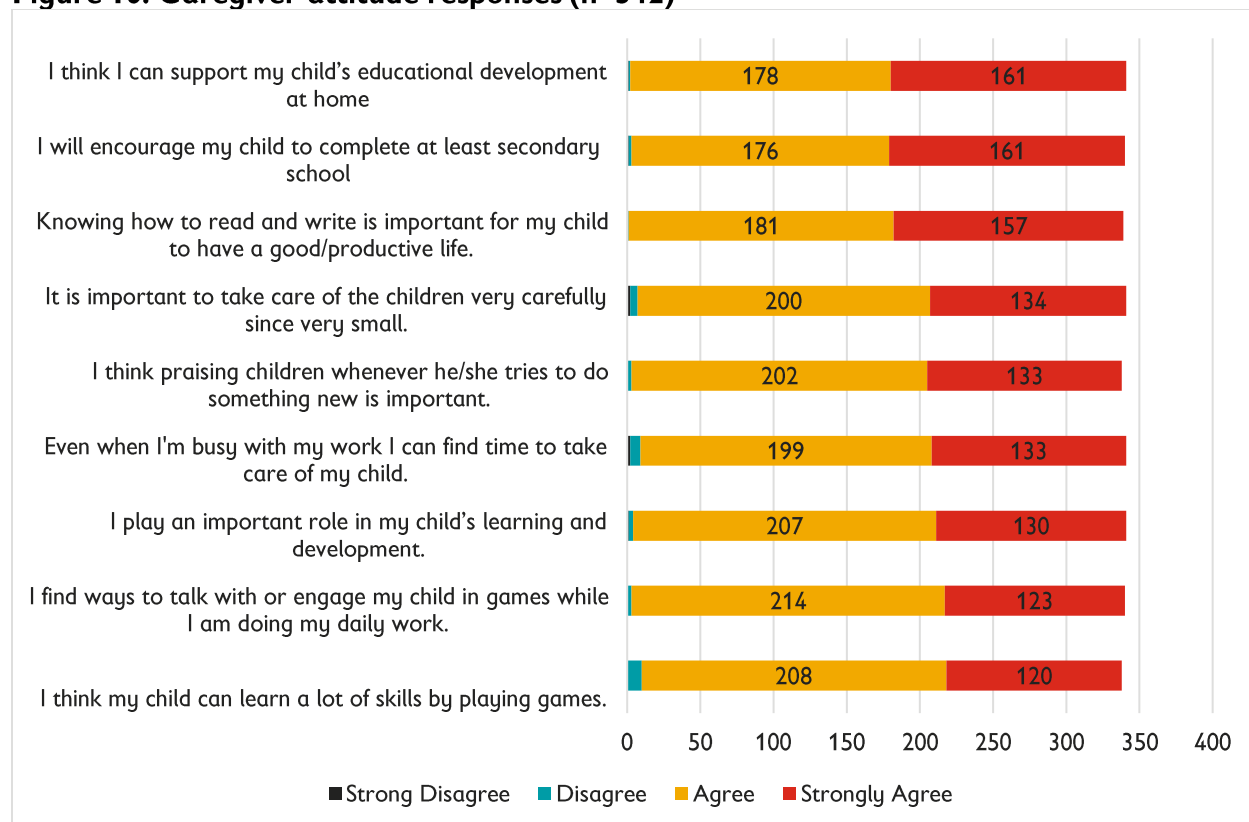
**Figure 15. Negative discipline (n=342)**



We present our final IDELA-HE results in **Figure 16**. These results indicate caregiver's agreement with various statements about childcare, learning, and development. While nearly all caregivers

agreed with all statements (and there were no differences between treatment and control), the strength of agreement varied slightly. Caregivers were most likely to strongly agree with statements about their ability to support their child's learning and development and encouraging their child to complete school. Caregivers were less enthusiastic about the possibility of learning through playing games.

**Figure 16. Caregiver attitude responses (n=342)**



In general, the results from the IDELA-HE suggest that, after a month of implementation of parent programs, that there were no positive impacts on caregiving practices, learning environments, or attitudes. A forthcoming endline of the IDELA-HE may illuminate changes in the caregiving programming.

## Discussion

The results of this evaluation provide valuable information on how the “heavy touch” programming influenced children’s early learning and development.

The effect of the program was largest on children’s Emergent Numeracy skills; this finding is thoroughly consistent with the program’s Theory of Change and the emphasis of the Emergent Literacy and Math program. While the effects on Emergent Literacy are not significant, the point estimate was fairly large and this finding may due to a lack of statistical power. The lack of any effect on Social-Emotional skills was not surprising as it is not a primary target of the ELM program. The sizeable effect of the program on Motor skills comes as somewhat more of surprise. Upon further exploration, we find that differential gains were concentrated in tasks that measured children’s fine

motor development. The project emphasized engagement in creative activities such as playing with clay/playdoh, scribbling with crayons, and painting activities. This increase in fine-motor play may have driven this sizable impact.

We can use the results of the IDELA-CE to generate hypotheses as to how the program was most effective at improving children's developmental outcomes. The program targeted teachers, centers, and caregivers through various interventions. While the methodology was not nearly as strong as with our child-level data, our classroom observations provide valuable preliminary insight into how the program affected teachers. We conducted observations early in the intervention period, and Anganwadi teachers had already improved their teaching practices to improve interactions with and among students. Of course, there is no guarantee that these practices continued to improve, but it is reasonable to consider that these changes were instrumental to improving children's IDELA scores.

The results of the IDELA-HE demonstrated no positive effects on children's learning environments, and no effects on learning activities engaged in with children, negative discipline, or attitudes. As discussed earlier, this is likely a result of the timing of the data collection, which was conducted just a month after parental-focused parenting began. We can make no strong conclusions about the relative contributions of the program to improving children's developmental outcomes, but the IDELA-CE results lead us to believe that Anganwadi center teaching quality had improved as a result of the program. Further research should be conducted to better understand the changes in Anganwadi center instructional practices and Home Environments to better understand their relative contributions to improvements in child outcomes.

## Limitations

The primary limitation of this study is external validity. We randomly assigned Anganwadi centers to "heavy touch" and "light touch" conditions, but the fifty Anganwadi centers included in the study were not selected in a representative fashion. As such, the factors that allowed the "heavy touch" components to affect children's early learning and development may not be present in the wider population of Anganwadi centers. If scaling the heavy-touch components to a wider population is Anganwadi centers, a more representative study must be undertaken to ensure the effects found in this report are generalizable.

A potential limitation to the internal validity and conflict of interest that data were collected by program implementers and analyzed by Save the Children staff. We have taken steps to mitigate the potential limitations that this places on our results and believe that the design of our study and research makes this less of a concern. Both "heavy touch" and "light touch" anganwadi received support from Save the Children. As such, staff were interacting with both treatment and control centers on a regular basis. Enumerators understood that we were collecting data for evaluation, but were kept blind to the details of the impact evaluation and our emphasis of comparing "heavy" and "light" touch programming. As such, we believe they would have had little incentive to bias results in favor of children in the "heavy touch" condition.

The Principal Investigator is a member of the Save the Children US Department of Education and Child Protection Research Team. While this unit is funded by Save the Children US, it is independent from the programming team and operates as an in-house consulting group. The Research Team's



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priority is to provide honest and reliable analysis of programming results and is not held accountable for the success or failure of the project.

The reality that program staff were interacting with treatment and control staff on a regular basis may have actually had the opposite effect if spillover and contamination occurred. If program implementers blurred the lines between treatment and control conditions, our estimates of program effects would be downwardly biased.

In general, while we acknowledge the limitations for external validity of this evaluation, we are confident in the internal validity.

## **Conclusion**

We present the results of a methodologically strong impact evaluation demonstrating the effect of a Save the Children intervention on children's early learning and development. The program sought to improve teaching quality in Anganwadi centers, along with material improvements and parental interventions to support early learning and development. Children who benefited from the program had improved overall developmental scores on the International Development and Early Learning Assessment, and demonstrated the strongest gains in Emergent Numeracy and Motor skills, with an emphasis on fine motor skills. Our additional analysis demonstrated that the study was well balanced. We also present preliminary evidence suggesting improvements to the quality of instruction in the Anganwadi centers.





## Appendix A: List of Anganwadi centers, treatment status, and number of children assessed at baseline and endline

Anganwadi	Random Assignment	Number of children assessed	
		Baseline	Endline
<b>Anjanamurthinagar</b>	Heavy Touch (Treatment)	6	4
<b>Bashethalli-01</b>	Light Touch (Control)	5	1
<b>Bashethalli-02</b>	Light Touch (Control)	5	4
<b>Bashethalli-03 R</b>	Light Touch (Control)	2	2
<b>Beedigere</b>	Light Touch (Control)	6	5
<b>Bhuvneshwarinagara</b>	Light Touch (Control)	3	3
<b>Bommanahalli</b>	Heavy Touch (Treatment)	9	7
<b>Chandrashekara Pura</b>	Heavy Touch (Treatment)	6	5
<b>Chikka belavangala-01</b>	Light Touch (Control)	4	3
<b>Dodda Bellavangala-02</b>	Heavy Touch (Treatment)	6	5
<b>Dodda Thumkur</b>	Heavy Touch (Treatment)	4	4
<b>Ghatti. S.S</b>	Light Touch (Control)	7	6
<b>Hanabe-01</b>	Light Touch (Control)	2	2
<b>Hanabe-02</b>	Heavy Touch (Treatment)	3	3
<b>Hosauddya</b>	Light Touch (Control)	4	4
<b>Hulkunte-01</b>	Light Touch (Control)	5	4
<b>Hulkunte-02</b>	Heavy Touch (Treatment)	6	5
<b>JP Nagar-02</b>	Heavy Touch (Treatment)	14	11
<b>Kacheripalya</b>	Heavy Touch (Treatment)	2	1
<b>Kalpete</b>	Light Touch (Control)	7	4
<b>Kanmangala Colony</b>	Light Touch (Control)	4	4
<b>Kodigehalli</b>	Light Touch (Control)	5	3
<b>Kumbarpete-02</b>	Light Touch (Control)	10	9
<b>Kumbarpete-03</b>	Light Touch (Control)	7	5
<b>Kurabarahalli</b>	Light Touch (Control)	0	0
<b>Majjarahosahalli</b>	Heavy Touch (Treatment)	7	4
<b>Marlenahalli</b>	Light Touch (Control)	7	7
<b>Melkote</b>	Heavy Touch (Treatment)	10	9
<b>Muthasandra</b>	Heavy Touch (Treatment)	9	9
<b>Nagadevanahalli</b>	Light Touch (Control)	4	4
<b>Nandi Guda</b>	Light Touch (Control)	6	6
<b>Palanjogihalli</b>	Heavy Touch (Treatment)	10	9
<b>Ragunathpura</b>	Heavy Touch (Treatment)	7	7
<b>Railway Station(r)</b>	Light Touch (Control)	3	2
<b>Rajgattha-01</b>	Heavy Touch (Treatment)	8	6
<b>Rajgattha-02</b>	Heavy Touch (Treatment)	9	9
<b>Rojipura-01</b>	Heavy Touch (Treatment)	8	7



<b>Rojipura-02</b>	Heavy Touch (Treatment)	10	9
<b>Sakkaregollahalli-01</b>	Light Touch (Control)	8	5
<b>Sanjaynagara</b>	Light Touch (Control)	2	2
<b>Shirvara</b>	Light Touch (Control)	4	4
<b>Shivapura-01</b>	Heavy Touch (Treatment)	14	12
<b>Siddanayakanahalli</b>	Light Touch (Control)	6	4
<b>Sonnappanahalli</b>	Heavy Touch (Treatment)	8	6
<b>Sulekunte</b>	Heavy Touch (Treatment)	4	3
<b>Thimmasandra</b>	Heavy Touch (Treatment)	9	7
<b>Thyagarajnagara</b>	Heavy Touch (Treatment)	7	7
<b>Vaddrahalli</b>	Heavy Touch (Treatment)	6	3
<b>Veerabhadrayapalya-02</b>	Light Touch (Control)	4	4
<b>Veerabhadrayapalya-03</b>	Heavy Touch (Treatment)	3	1
<b>TOTAL</b>	NA	305	250



## Appendix B: Internal consistency of IDELA at baseline and endline

### Baseline

Test scale = mean(unstandardized items)

Item	Obs	Sign	item-test correlation	item-rest correlation	average interitem covariance	alpha
sizepct	305	+	0.5053	0.4143	.010483	0.8229
sortpct	305	+	0.4643	0.3507	.0104879	0.8275
shapeidpct	305	+	0.2321	0.1566	.0114393	0.8323
numberidpct	305	+	0.2013	0.1783	.0116712	0.8312
onetoonepct	305	+	0.3520	0.2820	.0111678	0.8280
addsubpct	305	+	0.3509	0.2646	.011078	0.8292
puzzlepct	305	+	0.4726	0.3991	.0107803	0.8236
personalpct	305	+	0.5119	0.4618	.0109367	0.8228
friendspct	305	+	0.5962	0.5453	.0106475	0.8192
emotionpct	305	+	0.4508	0.3802	.0108814	0.8244
empathypct	305	+	0.2511	0.1714	.0113822	0.8322
conflictpct	305	+	0.4500	0.3444	.0106035	0.8270
expvocabpct	305	+	0.5912	0.5524	.0108931	0.8213
papct	305	+	0.5517	0.4702	.0103771	0.8200
letteridpct	305	+	0.2387	0.1795	.0114723	0.8309
lettersoun~t	305	+	0.4082	0.3415	.011042	0.8260
writepct	305	+	0.5563	0.4694	.0102907	0.8200
oralcompct	305	+	0.7113	0.6496	.0098182	0.8106
drawhumanpct	305	+	0.5215	0.4535	.0106682	0.8215
foldpct	305	+	0.6161	0.5369	.0100845	0.8164
copyshapepct	305	+	0.5491	0.4430	.0101237	0.8221
hoppct	305	+	0.6623	0.5708	.009605	0.8141
Test scale					.0107243	0.8306

### Endline

Test scale = mean(unstandardized items)

Item	Obs	Sign	item-test correlation	item-rest correlation	average interitem covariance	alpha
e_sizepct	250	+	0.3843	0.3480	.0282342	0.8904
e_sortpct	250	+	0.5861	0.5133	.0258357	0.8864
e_shapeidpct	250	+	0.5470	0.4880	.026674	0.8868
e_numberid~t	250	+	0.5411	0.5115	.0278177	0.8883
e_onetoone~t	250	+	0.6447	0.5909	.0259483	0.8840
e_addsubpct	250	+	0.6698	0.6174	.0257304	0.8831
e_puzzlepct	250	+	0.5551	0.5004	.0267552	0.8866
e_personal~t	250	+	0.3079	0.2674	.0284175	0.8914
e_friendspct	250	+	0.5366	0.4951	.0273742	0.8874
e_emotionpct	250	+	0.5794	0.5110	.0260566	0.8863
e_empathypct	250	+	0.5780	0.4957	.0256243	0.8876
e_conflict~t	250	+	0.5522	0.4572	.0255719	0.8900
e_expvocab~t	250	+	0.7410	0.7181	.0269177	0.8844
e_papct	250	+	0.4627	0.3834	.0268198	0.8902
e_letterid~t	250	+	0.4771	0.4255	.0273997	0.8885
e_letterso~t	250	+	0.7058	0.6571	.0254708	0.8819
e_writepct	250	+	0.5625	0.5080	.0267046	0.8864
e_oralcomp~t	250	+	0.7087	0.6590	.0253651	0.8818
e_drawhuma~t	250	+	0.6287	0.5702	.0259166	0.8845
e_foldpct	250	+	0.5605	0.5023	.0265898	0.8865
e_copyshap~t	250	+	0.5331	0.4627	.0264398	0.8877
e_hoppct	250	+	0.5290	0.4624	.0265868	0.8876
Test scale					.0265569	0.8913



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## Appendix C: Balance tests of baseline IDELA data (n=305)

Variable	Control	Treatment	P-value of Difference
Child's age in years	4.137 [0.034]	4.16 [0.053]	0.715
Child is female	54% [0.044]	58% [0.040]	0.534
Comparison by Size and Length	79% [0.034]	69% [0.029]	0.038*
Sorting and Classification	35% [0.034]	29% [0.034]	0.188
Shape Identification	20% [0.021]	20% [0.023]	0.959
Number Identification	4% [0.007]	4% [0.003]	0.933
One-to-One Correspondence	13% [0.019]	9% [0.016]	0.101
Addition and Subtraction	21% [0.021]	21% [0.024]	0.948
Puzzle Completion	20% [0.035]	16% [0.028]	0.358
Emergent Numeracy	27% [0.013]	24% [0.016]	0.102
Self-Awareness	57% [0.019]	54% [0.020]	0.277
Friends	25% [0.028]	23% [0.021]	0.582
Emotional Awareness/Regulation	12% [0.036]	9% [0.023]	0.502
Empathy/Perspective Taking	8% [0.021]	9% [0.027]	0.841
Solving Conflict	19% [0.057]	12% [0.030]	0.330
Social-Emotional	24% [0.025]	22% [0.016]	0.359
Expressive Vocabulary	16% [0.019]	16% [0.016]	0.891



<b>Print Awareness</b>	30%	26%	0.331
	[0.030]	[0.027]	
<b>Letter Identification</b>	3%	6%	0.098~
	[0.010]	[0.014]	
<b>First Letter Sounds</b>	9%	9%	0.920
	[0.027]	[0.020]	
<b>Emergent Writing</b>	38%	40%	0.662
	[0.036]	[0.032]	
<b>Oral Comprehension</b>	33%	28%	0.340
	[0.038]	[0.031]	
<b>Emergent Literacy</b>	21%	21%	0.769
	[0.020]	[0.015]	
<b>Drawing a Person</b>	16%	14%	0.471
	[0.029]	[0.018]	
<b>Folding Paper</b>	33%	29%	0.525
	[0.047]	[0.037]	
<b>Copying a Shape</b>	34%	28%	0.231
	[0.040]	[0.027]	
<b>Hopping</b>	46%	40%	0.368
	[0.050]	[0.039]	
<b>Motor</b>	32%	28%	0.198
	[0.029]	[0.018]	
<b>Total IDELA</b>	26%	24%	0.228
	[0.019]	[0.013]	
<b>Short-term Memory</b>	43%	39%	0.232
	[0.027]	[0.019]	
<b>Inhibitory Control</b>	27%	30%	0.591
	[0.040]	[0.031]	
<b>Executive Function</b>	35%	34%	0.828
	[0.023]	[0.019]	
<b>Item Persistence</b>	80%	69%	0.009**
	[0.028]	[0.029]	
<b>Observed Persistence</b>	56%	56%	0.919
	[0.022]	[0.021]	
<b>Approaches to Learning</b>	68%	63%	0.056~
	[0.022]	[0.019]	
<b>N</b>	120	185	
<b>Clusters</b>	24	25	

The value displayed for t-tests are p-values.

\*\*\*, \*\*, \*, and ~ indicate significance at the  $p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$ , and  $p < 0.1$  critical level.



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## Appendix D: IDELA-CE balance tests (n=50)

Variable	Control	Treatment	P-value of Difference
Number of enrolled children in Anganwadi	17.04 [1.078]	21.64 [1.613]	0.022*
Number of children present on day of observation	9.76 [0.760]	13.32 [1.161]	0.014*
Attendance on day of observation	58% [0.027]	62% [0.033]	0.263
Teacher speaks Kannada	100% [0.000]	100% [0.000]	N/A
Teacher speaks Hindi	8% [0.055]	0% [0.000]	0.155
Teacher speaks Telugu	52% [0.102]	40% [0.100]	0.405
Teacher speaks Tamil	4% [0.040]	4% [0.040]	1
Teacher speaks English	12% [0.066]	4% [0.040]	0.307
Class contains Kannada-speaking children	100% [0.000]	100% [0.000]	N/A
Class contains Hindi-speaking children	20% [0.082]	28% [0.092]	0.518
Class contains Telugu-speaking children	60% [0.100]	60% [0.100]	1
Class contains Tamil-speaking children	0% [0.000]	8% [0.055]	0.155
Class contains English-speaking children	0% [0.000]	0% [0.000]	N/A
<b>N</b>	<b>25</b>	<b>25</b>	

The value displayed for t-tests are p-values.\*\*\*, \*\*, \*, and ~ indicate significance at the  $p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$ , and  $p < 0.1$  critical level.



## Appendix E: IDELA-Home Environment balance tests

Variable	Control	Treatment	P-value of Difference
<b>Mother's age</b>	26.372 [0.407]	26.191 [0.281]	0.714
<b>Mother is literate</b>	92% [0.020]	87% [0.025]	0.135
<b><i>Mother's level of education</i></b>			
<b>None/Not completed primary</b>	11% [0.022]	9% [0.021]	0.577
<b>Completed primary</b>	25% [0.054]	22% [0.036]	0.568
<b>Completed secondary</b>	43% [0.055]	47% [0.037]	0.572
<b>Completed higher education</b>	21% [0.044]	22% [0.033]	0.767
<b>Father's age</b>	32.25 [0.338]	32.304 [0.510]	0.929
<b>Father is literate</b>	88% [0.023]	81% [0.040]	0.150
<b><i>Father's level of education</i></b>			
<b>None/Not completed primary</b>	11% [0.021]	17% [0.028]	0.086
<b>Completed primary</b>	23% [0.043]	23% [0.038]	0.909
<b>Completed secondary</b>	41% [0.042]	39% [0.036]	0.813
<b>Completed higher education</b>	25% [0.043]	21% [0.038]	0.470
<b><i>Family members that live with the child:</i></b>			
<b>Mother</b>	89% [0.039]	88% [0.030]	0.856
<b>Father</b>	33% [0.097]	34% [0.077]	0.941
<b>Grandparent</b>	28% [0.062]	25% [0.051]	0.651
<b>Older brother/sister</b>	22% [0.073]	24% [0.061]	0.839
<b>Younger brother/sister</b>	12% [0.040]	17% [0.046]	0.427
<b>Number of children in family</b>	2.06 [0.088]	2.03 [0.112]	0.805



<b>Child's preferred language:</b>			
<b>English</b>	7%	1%	0.389
	[0.066]	[0.011]	
<b>Hindi</b>	1%	4%	0.203
	[0.009]	[0.020]	
<b>Kannada</b>	76%	80%	0.590
	[0.068]	[0.040]	
<b>Korada</b>	1%	0%	0.314
	[0.007]	[0.000]	
<b>Odia</b>	0%	1%	0.299
	[0.000]	[0.005]	
<b>Telugu</b>	13%	9%	0.494
	[0.043]	[0.029]	
<b>Urdu</b>	3%	5%	0.381
	[0.021]	[0.019]	
<b>Languages spoken in home:</b>			
<b>English</b>	7%	2%	0.386
	[0.059]	[0.012]	
<b>Hindi</b>	2%	9%	0.120
	[0.011]	[0.041]	
<b>Kannada</b>	80%	84%	0.573
	[0.066]	[0.038]	
<b>Korada</b>	1%	0%	0.314
	[0.007]	[0.000]	
<b>Nepali</b>	1%	0%	0.321
	[0.007]	[0.000]	
<b>Odia</b>	0%	1%	0.299
	[0.000]	[0.005]	
<b>Tamil</b>	0%	1%	0.320
	[0.000]	[0.005]	
<b>Family owns a...</b>			
<b>Radio</b>	18%	18%	0.981
	[0.035]	[0.031]	
<b>TV</b>	91%	93%	0.452
	[0.023]	[0.019]	
<b>Refrigerator</b>	23%	34%	0.099
	[0.049]	[0.038]	
<b>Bicycle</b>	57%	62%	0.273
	[0.034]	[0.030]	
<b>Motorbike</b>	36%	45%	0.201
	[0.053]	[0.049]	
<b>Mobile phone</b>	95%	98%	0.142
	[0.020]	[0.011]	





<b>Electricity</b>	97%	99%	0.331
	[0.016]	[0.007]	
<b>Land</b>	37%	42%	0.593
	[0.070]	[0.063]	
<b>Livestock</b>	25%	29%	0.575
	[0.061]	[0.049]	
<b>Number of types of possessions</b>	4.784	5.191	0.089
	[0.176]	[0.158]	
<b>Caregiver believes child has a disability</b>	1%	2%	0.881
	[0.009]	[0.009]	
<b>Type of disability</b>			
<b>Communication/language</b>	0%	1%	0.328
	[0.000]	[0.005]	
<b>Cognitive</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Sensory integration/attention</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Physical</b>	1%	1%	0.721
	[0.007]	[0.007]	
<b>Visual</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Auditory</b>	0%	0%	N/A
	[0.000]	[0.000]	
<b>Other type of disability</b>	1%	0%	0.321
	[0.007]	[0.000]	
<b>Caregiver worries about cognitive development of child</b>	53%	42%	0.297
	[0.081]	[0.073]	
<b>Caregiver worries about physical development of child</b>	55%	52%	0.789
	[0.085]	[0.069]	

The value displayed for t-tests are p-values.\*\*\*, \*\*, and \* indicate significance at the  $p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$ , and critical levels.

## Appendix F: Model building process

	(1) Total IDELA	(2) Total IDELA	(3) Total IDELA	(4) Total IDELA	(5) Total IDELA
Treatment	-0.0256 (0.0237)	-0.0293 (0.0243)	0.0115 (0.0263)	0.00410 (0.0274)	0.00195 (0.0262)
Endline	0.163*** (0.0232)	0.120*** (0.0265)	0.163*** (0.0234)	0.124*** (0.0262)	0.123*** (0.0261)
Treatment X Endline	0.0681* (0.0305)	0.0680* (0.0302)	0.0681* (0.0307)	0.0680* (0.0305)	0.0680* (0.0303)
Child's age (in years)		0.0646*** (0.0165)		0.0587*** (0.0158)	0.0593*** (0.0157)
Child is female		0.00387 (0.0142)		0.00593 (0.0140)	0.00582 (0.0139)
Number of students enrolled in center			-0.00578*** (0.00136)	-0.00518*** (0.00139)	-0.00480*** (0.00131)
Teacher's education level (Reference category: 8 <sup>th</sup> grade)					
10 <sup>th</sup>			0.0263 (0.0189)	0.0180 (0.0199)	
12 <sup>th</sup>			0.0430 (0.0351)	0.0456 (0.0366)	
Diploma			0.220*** (0.0351)	0.209*** (0.0368)	
Degree			0.0814** (0.0244)	0.0672** (0.0246)	
Teacher experience at center, Reference: Less than one year)					
3 to 5 years			-0.130*** (6.66e-16)	-0.104*** (0.00778)	
More than 5 years			-0.0691* (0.0341)	-0.0412 (0.0391)	
Constant	0.267*** (0.0196)	-0.00310 (0.0669)	0.403*** (0.0483)	0.126 (0.0954)	0.0998 (0.0705)
Observations	500	500	500	500	500
R <sup>2</sup>	0.328	0.358	0.380	0.404	0.389



## Appendix G: Final model applied to IDELA core domains

	(1) Motor	(2) Emergent Literacy	(3) Emergent Numeracy	(4) Social- Emotional	(5) Total IDELA
Treatment	-0.0172 (0.0393)	0.0207 (0.0291)	-0.0156 (0.0244)	0.0200 (0.0295)	0.00195 (0.0262)
Endline	0.105** (0.0382)	0.0998** (0.0293)	0.119*** (0.0248)	0.169*** (0.0370)	0.123*** (0.0261)
Treatment X Endline	0.113* (0.0442)	0.0599 (0.0351)	0.0915** (0.0328)	0.00773 (0.0393)	0.0680* (0.0303)
Child's age (in years)	0.115*** (0.0242)	0.0306 (0.0177)	0.0486** (0.0148)	0.0434* (0.0181)	0.0593*** (0.0157)
Child is female	0.0212 (0.0231)	-0.000864 (0.0152)	0.0105 (0.0133)	-0.00763 (0.0188)	0.00582 (0.0139)
Number of students enrolled in center	-0.00487* (0.00216)	-0.00425** (0.00147)	-0.00374** (0.00135)	-0.00636*** (0.00147)	-0.00480*** (0.00131)
Constant	-0.0759 (0.112)	0.164* (0.0753)	0.138* (0.0657)	0.173* (0.0858)	0.0998 (0.0705)
Observations	500	500	500	500	500
$R^2$	0.308	0.218	0.369	0.295	0.389

Robust clustered standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



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## Appendix H: Models of attrition

	(1) Log odds of attrition	(2) Log odds of attrition	(3) Log odds of attrition	(4) Log odds of attrition
Log odds of attrition				
Treatment Status	-0.168 (0.319)	-0.156 (0.339)	-0.0867 (0.421)	0.0237 (0.427)
Child's age at baseline		-0.770* (0.390)		-0.787* (0.400)
Total IDELA		-1.426 (1.535)		-1.384 (1.710)
Child's sex		-0.110 (0.317)		-0.0769 (0.320)
Number of students enrolled in center			0.00392 (0.0224)	-0.00175 (0.0233)
<i>Teacher's education level</i> (Reference category: 8 <sup>th</sup> grade)				
10 <sup>th</sup>			-0.860 (0.607)	-0.706 (0.551)
12 <sup>th</sup>			-1.049 (0.707)	-1.045 (0.644)
Diploma			0.420 (0.695)	0.574 (0.644)
Degree			-0.868 (1.944)	-2.077* (0.969)
<i>Teacher experience at center,</i> (Reference: Less than one year)				
1 to 3 years			0.120 (1.651)	-0.190 (0.933)
3 to 5 years			-0.124 (1.440)	-0.601 (0.777)
More than 5 years			-0.0373 (1.634)	-0.678 (0.779)
Constant	-1.397*** (0.263)	2.128 (1.434)	-0.685 (1.760)	3.446 (1.962)
Observations	306	305	306	305
R <sup>2</sup>				

Robust clustered standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



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## Appendix I: Balance tests of baseline data without attrition (n=250)

Variable	Control	Intervention	P-value of Difference
Child's age in years	4.15 [0.036]	4.203 [0.059]	0.445
Child is female	0.515 [0.042]	0.601 [0.043]	0.159
Comparison by Size and Length	80% [0.033]	70% [0.031]	0.044*
Sorting and Classification	37% [0.038]	30% [0.039]	0.176
Shape Identification	21% [0.024]	20% [0.021]	0.561
Number Identification	5% [0.009]	4% [0.003]	0.8
One-to-One Correspondence	13% [0.019]	9% [0.019]	0.18
Addition and Subtraction	22% [0.022]	22% [0.022]	0.915
Puzzle Completion	19% [0.034]	16% [0.030]	0.541
Emergent Numeracy	28% [0.015]	25% [0.016]	0.1
Self-Awareness	58% [0.021]	55% [0.021]	0.359
Friends	25% [0.028]	23% [0.022]	0.561
Emotional Awareness/Regulation	12% [0.033]	9% [0.024]	0.457
Empathy/Perspective Taking	9% [0.022]	10% [0.031]	0.73
Solving Conflict	17% [0.056]	14% [0.036]	0.618
Social-Emotional	24% [0.023]	22% [0.017]	0.494
Expressive Vocabulary	16% [0.021]	16% [0.017]	0.943



<b>Print Awareness</b>	31%	27%	0.346
	[0.035]	[0.030]	
<b>Letter Identification</b>	4%	7%	0.133
	[0.012]	[0.017]	
<b>First Letter Sounds</b>	10%	9%	0.825
	[0.030]	[0.022]	
<b>Emergent Writing</b>	38%	42%	0.41
	[0.033]	[0.036]	
<b>Oral Comprehension</b>	33%	28%	0.321
	[0.039]	[0.032]	
<b>Emergent Literacy</b>	22%	21%	0.837
	[0.021]	[0.016]	
<b>Drawing a Person</b>	16%	14%	0.575
	[0.035]	[0.018]	
<b>Folding Paper</b>	32%	30%	0.771
	[0.047]	[0.040]	
<b>Copying a Shape</b>	35%	30%	0.354
	[0.043]	[0.032]	
<b>Hopping</b>	49%	41%	0.263
	[0.052]	[0.041]	
<b>Motor</b>	33%	29%	0.256
	[0.031]	[0.018]	
<b>Total IDELA</b>	27%	24%	0.285
	[0.020]	[0.013]	
<b>Short-term Memory</b>	44%	39%	0.132
	[0.024]	[0.020]	
<b>Inhibitory Control</b>	27%	30%	0.529
	[0.043]	[0.031]	
<b>Executive Function</b>	35%	35%	0.825
	[0.026]	[0.019]	
<b>Item Persistence</b>	81%	72%	0.033*
	[0.030]	[0.029]	
<b>Observed Persistence</b>	56%	56%	0.922
	[0.024]	[0.024]	
<b>Approaches to Learning</b>	68%	64%	0.156
	[0.024]	[0.022]	
<b>N</b>	120	185	
<b>Clusters</b>	24	25	

The value displayed for t-tests are p-values.

\*\*\*, \*\*, \*, and ~ indicate significance at the  $p < 0.001$ ,  $p < 0.01$ ,  $p < 0.05$ , and  $p < 0.1$  critical level.



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