



BOOK BABIES Randomized Control Study: 2021 Final Report



BOOK BABIES

Randomized Control Study: 2021 Final Report



Iheoma U. Iruka, Ph.D.**
Ximena Franco, Ph.D.
Fernando Andrade, Ph.D.

Equity Research Action Coalition at the UNC Frank Porter Graham
Child Development Institute with

The Center for Early Education Research and Evaluation at
HighScope Educational Research Foundation

June 23, 2021



Equity Research Action Coalition

UNC Frank Porter Graham Child Development Institute



book harvest

***At the start of this study, Iheoma U. Iruka was affiliated with HighScope Educational Research Foundation. At the time of the final report, Dr. Iruka was affiliated with the Department of Public Policy and Frank Porter Graham Child Development Institute at the University of North Carolina at Chapel Hill, where she is the founding director at the Equity Research Action Coalition.*

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
INTRODUCTION	6
METHODS	9
Recruitment and Enrollment	9
Data Collection	10
Measures	10
RESULTS	11
Child Demographics	11
Caregiver Demographics	11
Home Characteristics	12
Completed Home Visits/Data Collection.....	12
Attrition.....	13
Literacy and Reading Practices	18
Children’s Production and Comprehension Vocabulary	21
DISCUSSION AND CONCLUSION	25
APPENDIX	28



EXECUTIVE SUMMARY

In March 2019 Book Harvest engaged HighScope Educational Research Foundation to conduct a longitudinal Randomized Control Trial (RCT) evaluation of Book Babies. The goal of this two-site longitudinal study was to examine the impact of the five-year Book Babies intervention on parents' reading practices, children's literacy and language skills, and kindergarten readiness. Unfortunately, the evaluation study was paused in April 2020 due to the COVID-19 pandemic and was unable to resume. This is the final report, which was produced after the lead principal investigator transferred her affiliation to the University of North Carolina at Chapel Hill.



Study Findings

Findings are based on data collected through April 30, 2020.

Demographic findings:

- Child, caregiver, and home demographics were generally equivalent across the three groups (Book Babies, Books Only, Control) in both locations, with some slight differences in age of child and number of hospitalizations, single-parent status, education and income level, ethnicity (at one site), and age of parents.
- In both locations (Durham and Winston-Salem), the level of poverty across all study groups is striking: 93% of Durham families reported an annual family income of less than \$35,000, with 48% reporting an annual family income of less than \$15,000. In Winston-Salem, 87% of all families reported an annual family income of less than \$35,000, with 31% reporting an annual family income of less than \$15,000. (N.B.: the federal poverty level for a family of four is \$27,750)



Parents in the full intervention group (Books Babies) from both locations reported higher rates of ease in their ability to read, engage in daily reading, and point at text than the Books Only and Control groups.

Assessment findings¹:

- Full Intervention group parents in both locations reported higher rates of ease in their ability to read, engage in daily reading, and point at text than the Books Only and Control groups.
- Full Intervention group parents in both locations reported the same or higher level of parent literacy practices than the Books Only and Control groups.
- Spanish-speaking children in the Full Intervention groups in both locations showed more growth in their production and comprehension scores compared to the Books Only and Control groups.
- Almost half of the Book Babies sample in the Durham site (49%) was lost by April 30, 2020.

Although this study ended prematurely due to the COVID-19 pandemic, the final report indicates that more Book Babies parents are engaging in literacy-promoting activities compared to parents in the two control groups, and that children in the Book Babies group show stronger early literacy skills, especially in Spanish-speaking families.

¹ It is important to note is that, due to the very young ages of the children, all the findings to date are based on parent report. In 2020, when many of the children in the first cohort in the Durham evaluation were at least three years old, direct assessments should have been conducted to provide more and richer data to help answer the four research questions (see below) among the three groups in both locations. However, the study was unable to resume given the COVID-19 pandemic.

INTRODUCTION

Book Harvest provides an abundance of books and ongoing literacy support to families and their children from birth and serves as a model for communities committed to ensuring that children are lifelong readers and learners. Since it launched in 2011, the organization has provided more than 1.5 million books to children in central North Carolina and beyond. In 2013, Book Harvest started Book Babies, a literacy coaching and book provision program for children and their families that starts at birth and runs for five full years (www.bookharvest.org).



Families in the Book Babies program receive home visits beginning at a child's birth and continuing through the child's fifth birthday.² Through these visits, a trained Book Babies home visitor delivers 20 carefully curated, developmentally appropriate books to participating families each year. During the first four years of the program, families receive three visits per year. During the last year of the program, families receive one informational visit between August and December focused on the transition to kindergarten. During each visit, the home visitor and parent review specific early literacy concepts and strategies for the parent to implement during daily reading routines. Other supports offered to

enrolled families during the five-year program include text messages with early literacy tips, community gatherings, and supports for pre-kindergarten and kindergarten applications and enrollment. The goal of the Book Babies program is to improve early literacy skills and help increase children's preparedness for entry into kindergarten.

² Adjustments are being made to the program following this evaluation.



The theoretical framework guiding Book Babies is that providing families with literacy coaching and supports, along with an abundance of age-appropriate and culturally appropriate books, will ensure that all children enter kindergarten meeting literacy benchmarks as measured by formative assessments. The supports provided to families include working

with families from birth to kindergarten entry; providing a regular schedule of home visits by trained professionals; providing opportunities to build and enhance family relationships and social capital; providing support and assistance to parents for enrolling their children in pre-kindergarten programs and kindergarten; and actively and regularly engaging parents to provide feedback to make program improvements.

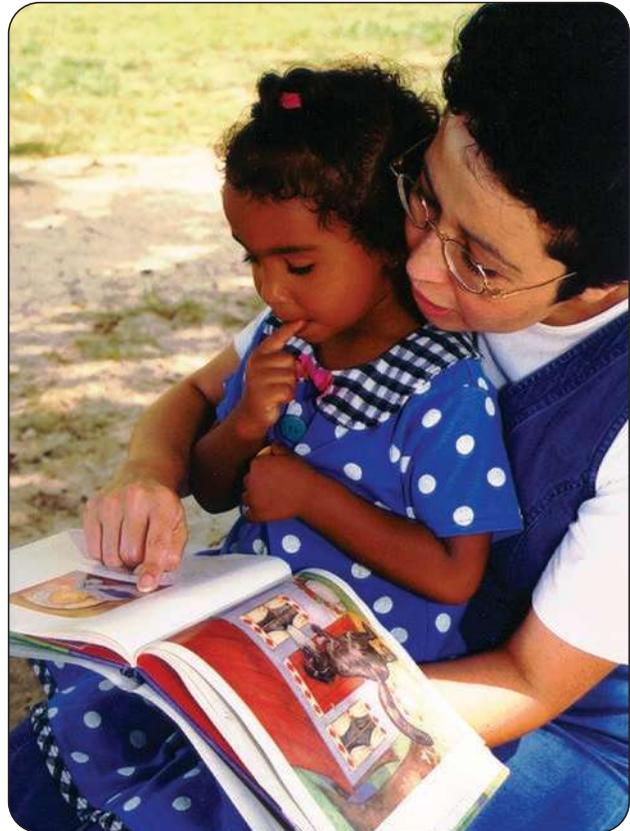
The HighScope Educational Research Foundation (HighScope) and Book Harvest began collaborating in March 2019 to evaluate the impact of the Book Babies program through a randomized control test (RCT) study. Specifically, HighScope was slated to conduct a six-year rigorous RCT study with sites in Durham (@ Book Harvest) and Winston-Salem (@ Imprints Cares). The study plan was to follow the children from birth until entry into kindergarten and conduct surveys, observations, and direct assessments of children's early literacy and language development. The evaluation questions were as follows:

- **Research Question #1:** Is the development of the early language abilities of Book Babies children better than the Books Only and Control groups?
- **Research Question #2:** Do Book Babies parents utilize the Dialogic Reading strategies modeled throughout the home visits to promote interactive reading with their children, support comprehension, and enhance attention to text in their daily reading routines?
- **Research Question #3:** Do Book Babies children show better developmentally appropriate knowledge of emergent literacy skills than the Books Only and Control groups?
- **Research Question #4:** Do more Book Babies children meet literacy benchmarks at kindergarten entry compared to the Books Only and Control groups?

However, due to the COVID-19 pandemic, the program developers decided to end the RCT in 2020. This is the final report of the RCT.

2017–2019 Duke Study

In partnership with Book Harvest in 2017, Duke University’s Center for Child and Family Policy began implementation of the RCT. There were 421 families in the Durham study (Book Babies=140, Books Only=141, Control Group=140). As of December 2018, 22 families had withdrawn from the Book Babies group, 17 from the Books Only group, and 9 families from the Control group. The Duke University report showed no significant differences in child and family indicators with the exception of single parent status; caregivers in the Control group were more likely to report being single parents. This report also found that at Visit 4, when most of the babies were 12–15 months of age, the children in the Book Babies group were likely to have more children’s books and to engage in more daily reading than the Books Only and Control groups. It is important to note that this report included only a portion of the Durham sample.



The 2019–20 HighScope Study

This final report provides 2019–20 information about the Book Babies study for children in the Durham and Winston-Salem sites. In this report, we provide information about the sample, attrition, and analyses examining the effectiveness of Book Babies in comparison to the Books Only and Control groups as it concerns reading practices in the home and children’s early vocabulary skills. Specifically, we examine the following questions:

1. Who are the children and families in this study in the Durham and Winston-Salem sites, and are there significant differences between the Book Babies group in comparison to the Books Only and Control groups?
2. What are the unit attrition rates across the groups, and do they differ?
3. Are there significant differences between the Book Babies group in comparison to the Books Only and Control groups in book reading practices, such as daily reading, routines, and children having a favorite book?
4. Are there significant group differences between the Book Babies group in comparison to the Books Only and Control groups in children’s early language skills based on parental reporting?

METHODS

Recruitment and Enrollment

All of Durham’s families and children were recruited prior to HighScope’s engagement with Book Harvest. The majority of Winston Salem’s families and children were recruited after HighScope’s engagement with Book Harvest. The Imprints Cares team in Winston-Salem led recruitment. The primary sources for recruitment were local agencies that interacted with parents of newborns and young infants, including the county health department, home visiting organizations, and medical centers, as well as word of mouth from family members and friends and Book Babies events. To be eligible for this study, infants had to be eligible for Medicaid and/or WIC in Forsyth County as reported by parents, infants had to be younger than 16 weeks of age at the time of enrollment, and the caregivers could not have previously participated in Book Babies.

There were three randomized groups: (1) Book Babies, which was the full intervention group; (2) Books Only, which received child-appropriate books but no other interventions; and (3) Control, which received cash only as an incentive to stay in the study. Prior to April 10, 2019, families were randomized as soon as they were referred. This process was a concern, as not all referred families could be reached and consented into the program, potentially leading to high attrition. Thus, as of April 10, 2019, families were randomized once they verbally consented to participate in the study. During the verbal consent process, families were informed about the study and informed they could be randomized into one of the three groups.





The Durham site had the following number of randomized families with consent forms still participating in the study as of April 30, 2020 (after 8-9 visit periods): Book Babies=97, Books Only=103, Control=126.

The Winston-Salem site had the following number of randomized families still participating in the study as of April 30, 2020 (after 4-5 visit periods): Book Babies=77, Books Only=82, Control=88.

Data Collection

After families consented and were randomized into one of the three groups, home visits (for the Book Babies group) and data collection (for the Books Only and Control groups) were scheduled. Visits were to occur consistent with the Book Babies protocol when children reached a prescribed age. Visits that did not occur before the next window opened were considered skipped. Many attempts were made to connect with families to conduct the visits, including phone, text, email, social media, family/friends, and visiting the last known address.

Measures

Study Assessment Form (SAF). The SAF consists of questions home visitors and data collectors ask of the caregivers at each visit. These questions capture child and caregiver demographics, languages spoken at home, reading practices, bedtime routines, and the child's favorite activities and books.

MacArthur-Bates Communicative Development Inventory-Short Form (CDI-SF). The CDI-SF is a parent report that assesses 9-30 months of children's comprehensive and productive vocabulary in English. When parents indicate that they or their children speak Spanish, they are also assessed using the Spanish version of the CDI-SF.

RESULTS

Child Demographics

Child demographics at Visit #1 (enrollment) are provided in Tables 1a (Durham) and 1b (Winston-Salem). This table illustrates whether there are differences in child age, weight at birth, ethnicity, gender, hospitalization for more than 2 weeks, diagnosis with any medical condition, and childcare participation. We provide effect sizes to indicate the meaningfulness of any differences between Book Babies (BB) and the Books Only (BO) and Control (CO) groups. Effect sizes of around .2 represent a small effect size, around .5 represent a medium effect size, and equal to or greater than .8 represent a large effect size. There were no significant differences between the groups with the exception that children in the Book Babies group were younger in the Durham site and more children in the Book Babies group in the Winston-Salem site have been hospitalized for more than two weeks compared to the Books Only group.

Caregiver Demographics

Caregiver demographics at Visit #1 (enrollment) are provided In Tables 2a (Durham) and 2b (Winston-Salem). This table illustrates whether there are differences in caregiver age, ethnicity, gender, educational level, employment status, and single-parent status. We provide effect sizes to indicate the meaningfulness of any differences between Book Babies (BB) and the Books Only (BO) and Control (CO) groups. There were no significant differences among the groups with four exceptions: (1) there were fewer single parents in the BB group compared to the BO and CO groups; (2) parents in the BB group were more educated compared to the BO and CO groups in the Durham site; (3) there were fewer Hispanic caregivers in the BB groups compared to the BO and CO groups; and (4) parents in the CO group were younger compared to BB and BO groups in the Winston-Salem site.

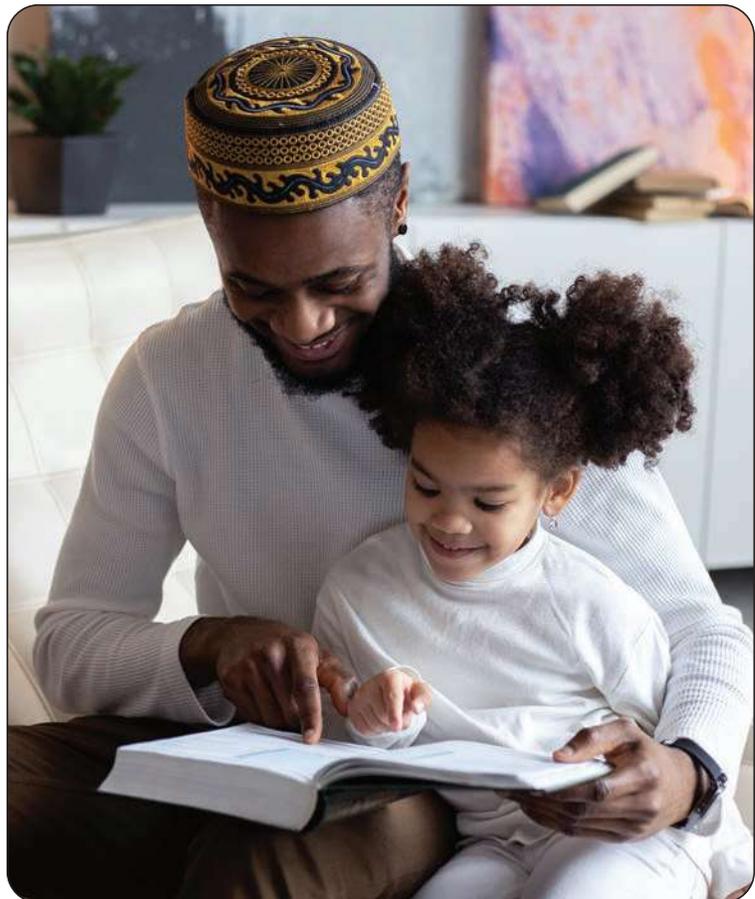


Table 1a: Child Demographics for Durham Site at Visit #1 (Enrollment)

Demographic		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Age in days ^a	Mean	34.24	39.17	40.76	-.26	-.37
	Median	30	35	37		
	Sd	18.42	20	16.83		
Weight at birth	Mean	113.53	113.85	109.55	-.02	-.19
	Median	113	113	109		
	Sd	21.92	19.5	20.95		
Ethnicity (%)	African American	43	41	42	0.04	0.02
	Hispanic	48	52	50	0.08	0.04
	Other	9	7	8	0.07	0.04
Gender (%)	Female	49	52	46	0.06	0.06
	Male	51	48	54	0.06	0.06
Hospitalized for more than 2 weeks (%)	Hospitalized	2	3	4	0.06	0.12
	Not hospitalized	98	97	96	0.06	0.12
Diagnosed with any medical condition (%)	Medical diagnostic	9	5	8	0.16	0.04
	No diagnostic	91	95	92	0.16	0.04
Childcare participation (%)	Childcare	3	5	6	0.10	0.15
	No Childcare	97	95	94	0.10	0.15

Note. Effect size: .2=small; .5=medium, >.8=large

^aStatistically significant difference: younger children in Book Babies

Table 1b: Child Demographics for Winston-Salem Site at Visit #1 (Enrollment)

Demographic		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Age in days	Mean	46.56	40.05	45.30	.23	.04
	Median	28.76	27.43	30.63		
	Sd	36	31	35		
Weight at birth	Mean	106.96	107.36	105.38	-.02	.06
	Median	114	108	108		
	Sd	25.38	23.58	29.02		
Ethnicity (%)	African American	56	48	39	0.16	0.34
	Hispanic	29	43	45	0.29	0.33
	Other	15	10	16	0.15	0.03
Gender (%)	Female	49	55	49	0.12	0.00
	Male	51	45	51	0.12	0.00
Hospitalized for more than 2 weeks (%) ^a	Hospitalized	14	2	11	0.48	0.09
	Not hospitalized	86	98	89	0.48	0.09
Diagnosed with any medical condition (%)	Medical diagnostic	10	3	8	0.30	0.07
	No diagnostic	90	97	92	0.30	0.07
Childcare participation (%)	Childcare	1	2	1	0.08	0.00
	No Childcare	99	98	99	0.08	0.00

Note. Effect size: .2=small; .5=medium, >.8=large

^aStatistically significant difference: More babies in the Book Babies group have been hospitalized than in the Books Only group.

Table 2a: Caregiver Demographics for Durham Site at Visit #1 (Enrollment)

Demographic		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Caregiver age	Mean	28.45	28.59	27.81	-.02	.10
	Median	27.28	27.8	27.47		
	Sd	6.54	6.64	6.07		
Ethnicity (%)	African American	44	42	42	0.04	0.04
	Hispanic	50	51	51	0.02	0.02
	Other	7	7	6	0.00	0.04
Gender (%)	Female	95	97	100	0.10	0.45
	Male	5	3	0	0.10	0.45
Educational level (%) ^a	College or more	16	14	9	0.06	0.21
	Some College	18	18	20	0.00	0.05
	High School	29	30	23	0.02	0.14
	Less than High School	37	38	48	0.02	0.22
Employment status (%)	Employed	28	27	22	0.02	0.14
	Homemaker	12	10	19	0.06	0.19
	Leave or disabled	4	7	9	0.13	0.21
	Student	2	2	3	0.00	0.06
	Unemployed	54	53	48	0.02	0.12
Single parent (%) ^a	Not single	73	62	57	0.24	0.34
	Single	27	38	43	0.24	0.34

Note. SD = Standard deviation; Effect size: .2=small; .5=medium, >.8=large

^a Statistically significant difference: Parents in the Book Babies group were more educated. There were also fewer single parents in the Book Babies group.

Table 2b: Caregiver Demographics for Winston-Salem Site at Visit #1 (Enrollment)

Demographic		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Caregiver age	Mean	27.66	27.9	25.55	-.04	.32
	Median	27.92	27.37	24.95		
	Sd	6.29	6.46	6.93		
Ethnicity (%) ^a	African American	56	48	39	0.16	0.34
	Hispanic	29	50	43	0.43	0.29
	Other	15	2	18	0.51	0.08
Gender (%)	Female	100	98	99	0.28	0.20
	Male	0	2	1	0.28	0.20
Educational level (%) ^a	College or more	10	12	6	0.06	0.15
	Some College	37	24	21	0.28	0.36
	High School	28	34	42	0.13	0.29
	Less than High School	25	30	31	0.11	0.13
Employment status (%)	Employed	17	21	11	0.10	0.17
	Homemaker	34	32	34	0.04	0.00
	Leave or disabled	30	28	26	0.04	0.09
	Student	6	4	3	0.09	0.15
	Unemployed	13	15	24	0.06	0.29
Single parent (%)	Not single	69	75	73	0.13	0.09
	Single	31	25	27	0.13	0.09

Note. SD = Standard deviation; Effect size: .2=small; .5=medium, >.8=large

^a Statistically significant difference: In the Book Babies group, there were fewer Hispanic parents. In the Control group, the parents were younger.



Home Characteristics

Home characteristics at Visit #1 (enrollment) are provided in Tables 3a (Durham) and 3b (Winston-Salem). These tables illustrate family income, home language, number of books at home, number of adults at home, number of children, and possession of a library card among all three groups. There were no significant differences among the groups with one exception: the BO group had a higher income than the BB and CO groups in the Winston-Salem site.

Completed Home Visits/Data Collection

Completed home visits/data collection information is provided in Figure 1a (Durham site) and 1b (Winston-Salem site). The Book Babies program involves home visits, and data collection periods were set to mimic the BB home visit schedule. As of April 30, 2020, ten home visits/data collection periods were possible for some Durham families; seven home visits/data collection were possible for some Winston-Salem families. After visit #1, there is a pattern, with more Control families completing more home visits/data collection compared to the Book Babies and Books Only groups. This difference may be due to the option of Books Only and Control groups completing the information by phone and receiving their cash payments and books by mail.

Table 3a: Home Characteristics for Durham Site at Visit #1 (Enrollment)

Home characteristics		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Family income (%)	\$0-\$14,999	48	48	37	0.00	0.22
	\$15,000-\$34,999	45	43	51	0.04	0.12
	\$35,000 or more	8	9	12	0.04	0.13
Primary home language (%)	English	49	47	51	0.04	0.04
	Spanish	47	48	46	0.02	0.02
	Other	4	6	2	0.09	0.12
Number of books at home (%)	21 or more	7	12	13	0.17	0.20
	6-20 books	23	27	31	0.09	0.18
	Fewer than 6	70	62	56	0.17	0.29
Number of adults at home (%)	One	18	16	19	0.05	0.03
	Two	59	57	59	0.04	0.00
	Three or more	23	27	23	0.09	0.00
Number of children (%)	One	23	23	20	0.00	0.07
	Two	35	41	33	0.12	0.04
	Three or more	42	36	47	0.12	0.10
Has a library card (%)	Library card	49	49	39	0.00	0.20
	No library card	51	51	61	0.00	0.20

Note. Effect size: .2=small; .5=medium, >.8=large

Table 3b: Home Characteristics for Winston-Salem Site at Visit #1 (Enrollment)

Home characteristics		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Family income (%) ^a	\$0-\$14,999	31	27	48	0.09	0.35
	\$15,000-\$34,999	56	47	43	0.18	0.26
	\$35,000 or more	13	27	9	0.36	0.13
Primary home language (%)	English	70	67	61	0.06	0.19
	Spanish	28	32	38	0.09	0.21
	Other	2	1	1	0.08	0.08
Number of books at home (%)	21 or more	8	7	4	0.04	0.17
	6-20 books	24	21	28	0.07	0.09
	Fewer than 6	69	71	68	0.04	0.02
Number of adults at home (%)	One	13	16	10	0.09	0.09
	Two	62	64	60	0.04	0.04
	Three or more	25	20	30	0.12	0.11
Number of children (%)	One	28	33	22	0.11	0.14
	Two	24	22	26	0.05	0.05
	Three or more	48	45	52	0.06	0.08
Has a library card (%)	Library card	45	47	39	0.04	0.12
	No library card	55	53	61	0.04	0.12

Note. Effect size: .2=small; .5=medium, >.8=large

^a Statistically significant difference: Income was higher in the Books Only group.

Figure 1a: Completed Visits for Durham Site

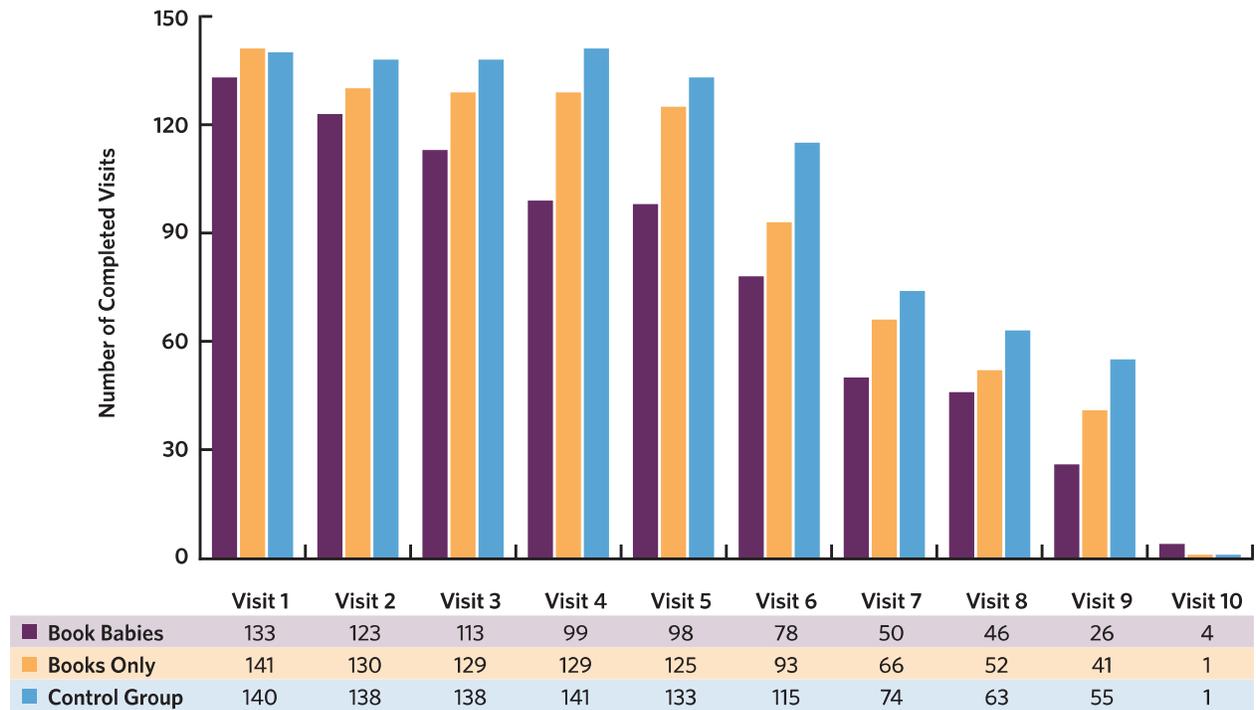
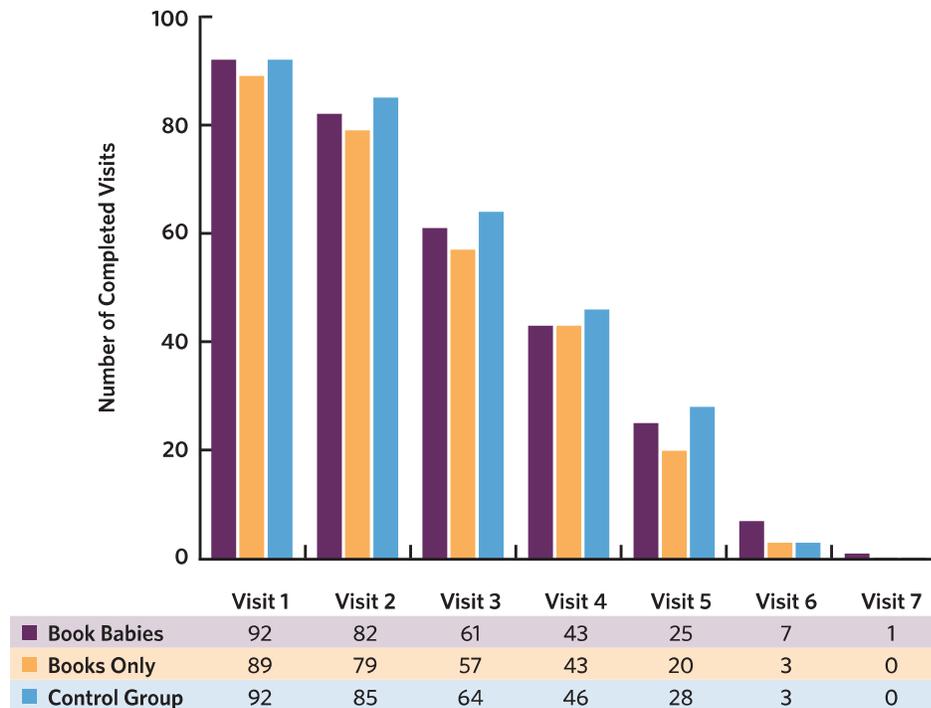


Figure 1b: Completed Visits for Winston-Salem Site



Attrition

According to What Works Clearinghouse (WWC), “Attrition is the loss of sample during the course of a study. It occurs when individuals initially randomly assigned in a study are not included when researchers examine the outcome of interest. Attrition is a common issue in education research, and it occurs for many reasons.” Due to the longitudinal nature of this study, it is critical to examine the extent to which participants remained in the study over time and whether it differed across treatment groups.

Based on the number of participants randomized and those still in the study, the attrition rate for the Durham site is 49% for Book Babies, 44% for Books Only, 35% for Control; for the Winston-Salem site: 26% for Book Babies, 23% for Books Only, 20% for Control (see Table 4a). The overall attrition is within the acceptable range for WWC. The differential attrition is 5% and 14% for the Durham site, which is considered high for the WWC acceptable rate, regardless if one uses the conservative or liberal standard (see Figure 2). The differential attrition is 2% and 5% for the Winston-Salem site, which is within the acceptable range for the WWC conservative attrition standard. We provide additional attrition information for SAF and CDI (see Appendix Tables A1a-A2b).

Table 4a. Retention and Attrition Rates as of April 30, 2020

Site	Randomized Sample	Current Sample	Attrition Rates	Differential Attrition ^a
Durham				
Book Babies	191	97	49%	--
Books Only	184	103	44%	5%
Control	193	126	35%	14%
Winston-Salem				
Book Babies	104	77	26%	--
Books Only	107	82	23%	3%
Control	111	88	20%	5%

Note. ^a differential attrition is compared to the Book Babies rate

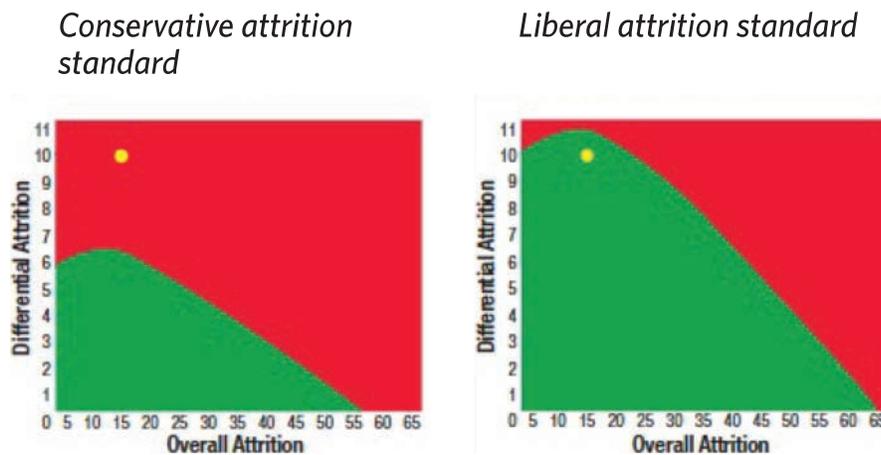
Table 4b. Retention and Attrition Rates of Actual Enrollment as of April 30, 2020

Site	Randomized Sample	Current Sample	Attrition Rates	Differential Attrition ^a
Durham				
Book Babies	133	97	27%	--
Books Only	141	103	27%	0%
Control	140	126	10%	17%
Winston-Salem				
Book Babies	92	77	11%	--
Books Only	89	82	11%	6%
Control	92	88	11%	11%

Note. ^a differential attrition is compared to the Book Babies rate

We also examined the attrition rate based on actual enrollment. The attrition rate for the Durham site is 27% for Book Babies, 27% for Books Only, 10% for Control; for the Winston-Salem site: 11% for Book Babies, 11% for Books Only, 11% for Control (see Table 4b). The overall attrition is still within the acceptable range for WWC. The differential attrition ranges from 0%-17% for the Durham site, which is considered high for WWC acceptable rate, regardless if one uses the conservative or liberal standard (see Figure 2). The differential attrition ranges from 1%-11% for the Winston-Salem site, which is within the acceptable range for the WWC conservative attrition standard.

Figure 2. WWC Conservative and Liberal Attrition Standards



Literacy and reading practices

Literacy and reading practices across the groups for the Durham and Winston-Salem sites are shown in Tables 5a and 5b. The data for visits 1 and 2 are combined to maximize power and reduce the amount of missing data. We examined the following from the parent interview: (1) parents' ability to read, as there is indication that parental literacy level is linked to reading practices; (2) daily reading practices; (3) parents pointing to text when reading; and (4) child has a favorite book, as this can be an indicator of a child's interest in literacy. In the Durham site, more Book Babies parents report that they were able to read easily to their child compared to the BO and CO groups (see Table 5a). Specifically, 87% of Book Babies caregivers in the Durham site reported that they read easily compared to 79% of BO and 70% of CO groups. In the Winston-Salem site, more children in the Book Babies group reported having a favorite book compared to the other groups. Specifically, 31% of Book Babies reported having a favorite book compared to 18% of BO and 12% of CO groups. There were no other significant differences across the groups at each site. Next, we examined the extent to which these parenting practices changed from visit 3 to visit 5 for the Durham and Winston-Salem sites.

Table 5a: Literacy and Reading Practices for Durham Site

Reading		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Parents' reading ability (%) ^a	Difficult	2	4	3	0.12	0.06
	Enough	10	17	27	0.21	0.45
	Easily	87	79	70	0.21	0.42
Parents read to the child (%)	5 or more days	23	23	23	0.00	0.00
	Two to four days	39	30	30	0.19	0.19
	One day	12	15	13	0.09	0.03
	Not reading to child	26	32	34	0.13	0.17
Parents point to text while reading (%)	Not pointing	16	18	13	0.05	0.09
	Pointing	58	48	53	0.20	0.10
	Not reading to child	25	33	34	0.18	0.2
Child has a favorite book (%)	Has favorite book	16	17	21	0.03	0.13
	No favorite book	84	83	79	0.03	0.13

Note. Effect size: .2=small; .5=medium, >.8=large

^a Statistically significant difference: More parents in the Book Babies group read easily.

Table 5b: Literacy and Reading Practices for Winston-Salem Site

Reading		Effect size difference				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Parents' reading ability (%)	Difficult	0	3	3	0.35	0.35
	Enough	19	31	18	0.28	0.03
	Easily	81	66	79	0.34	0.05
Parents read to the child (%)	5 or more days	17	16	14	0.03	0.08
	Two to four days	39	39	36	0.00	0.06
	One day	2	7	7	0.25	0.25
	Not reading to child	41	39	44	0.04	0.06
Parents point to text while reading (%)	Not pointing	9	18	22	0.27	0.37
	Pointing	50	44	35	0.12	0.30
	Not reading to child	41	38	43	0.06	0.04
Child has a favorite book (%) ^a	Has favorite book	31	18	12	0.30	0.47
	No favorite book	69	82	88	0.30	0.47

Note. Effect size: .2=small; .5=medium, >.8=large

^a Statistically significant difference: Parents in the Book Babies group more frequently report that their child has a favorite book.

Next, we examined the extent to which these parenting practices changed from visit 3 to visit 5 for the Durham and Winston-Salem sites.

The findings for the Durham site were as follows (see Appendix A3a):

- Parents who reported that they read “easily” remained at 91% and at 88% from visits 3 to 5 for the Book Babies and Books Only groups respectively, compared to 70%-85% for the Control group. (ES = .01 - .19)
- The percentage of Book Babies parents who reported reading “5 or more days” increased from 56% to 61% between visits 3 and 5; for the Books Only group, the percentage went from 44% to 48%; and for the Control group, the percentage went from 27% to 33%. (ES = .26 - .57)
- The percentage of Book Babies parents who reported “pointing” remained at 98% between visit 3 and visit 5; for the Books Only group, it increased from 84% to 89%; and for the Control group, it increased from 76% to 91%. (ES = .39 - .3)
- The percentage of Book Babies parents who reported their child had a favorite book increased from 52% to 61% from visit 3 to visit 5; it increased from 39% to 64% for the Books Only group, and it increased from 34% to 52% for the Control group. (ES = -.06 - .18)



The findings for the Winston-Salem site were as follows (see Appendix A3b):

- Parents who reported that they read “easily” increased from 81% to 94% from visits 3 to 5 for the Book Babies group compared to 77 to 81% for the Books Only group and 66 to 79% for the Control group. (ES = .11 - .46)
- The percentage of Book Babies parents who reported reading “5 or more days” decreased from 56% to 50% between visits 3 and 5; for Books Only, the percentage decreased from 31% to 27%; and for the Control group it decreased from 32% to 29%. (ES = .48 - .43)
- The percentage of Book Babies parents who reported “pointing” decreased from 100% to 94% between visit 3 and visit 5; for the Books Only group, it increased from 90% to 91%; and for the Control group, it increased from 84% to 96%. (ES = .11 - .09)
- The percentage of Book Babies parents who reported their child had a favorite book increased from 44% to 67% from visit 3 to visit 5; for the Books Only group, the percentage increased from 38% to 60%; and for the Control group, the percentage increased from 35% to 43%. (ES = .15 - .49)

Children’s Production and Comprehension Vocabulary

Children’s productive and comprehensive vocabulary scores, as reported by parents in the CDI Level I during visits 4 and 5 for the Durham site and visits 3 and 4 for the Winston-Salem site, are shown by language in Tables 6a-6b and Figures 2a-2d.

DURHAM SITE

Production Scores. As shown in Table 6a and Figure 2a, the Books Only and Control groups in the Durham site had higher English production scores than the Book Babies group in visit 4. By visit 5, the Control group had higher English scores than the Book Babies and the Books Only groups (see Figure 2a). The Control group in the Durham site also had higher Spanish production scores at visit 4 than the Book Babies and Books Only groups. By visit 5, the Book Babies group had significantly higher Spanish scores than the Books Only and Control groups (see Figure 2a).

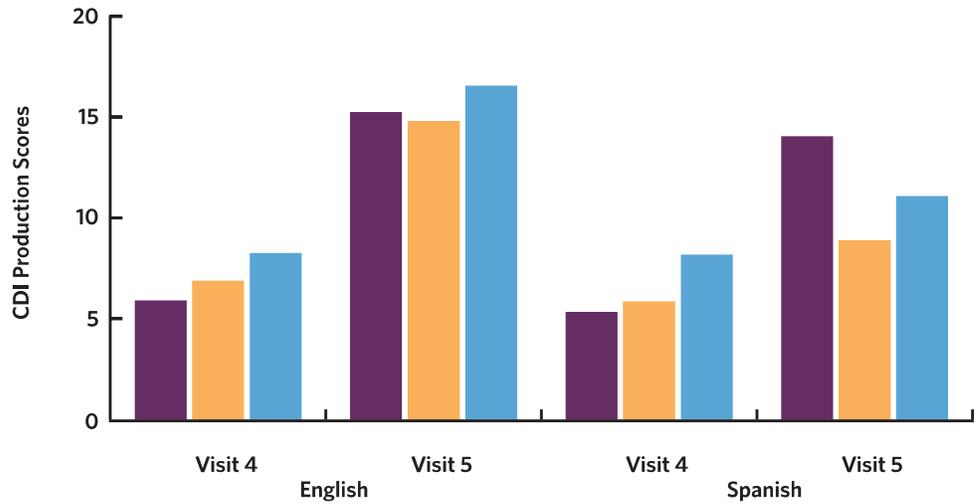
Comprehension Scores. As shown in Table 6a and Figure 2b, the Control group had higher English comprehension scores than the Book Babies and the Books Only group in visit 4. By visit 5, the Control group had slightly higher English comprehension scores than the Book Babies group (see Figure 2b). The Books Babies group in the Durham site had significantly higher Spanish comprehension scores at visit 4 and visit 5 than the Books Only and Control groups (see Figure 2b).

Table 6a: CDI Production and Comprehension Vocabulary Scores in English and Spanish for Durham Site

CDI Variable		Book Babies (BB)		Books Only (BO)		Control (CO)	
		Visit 4	Visit 5	Visit 4	Visit 5	Visit 4	Visit 5
Production scores (English)	Mean	5.90	15.25	6.89	14.81	8.26	16.55
	SD	5.55	12.70	5.89	13.16	10.12	18.15
	N	51	51	37	37	70	70
	Effect size				-0.08		-0.05
Production scores (Spanish)	Mean	5.33	14.06	5.86	8.89	8.18	11.09
	SD	2.74	14.76	5.94	6.29	15.85	10.91
	N	15	15	29	29	33	33
	Effect size				-0.47		-0.38
Comprehension scores (English)	Mean	31.33	49.06	34.08	44.62	39.47	49.23
	SD	23.94	26.95	26.55	27.10	25.43	26.26
	N	51	51	37	37	70	70
	Effect size				-0.23		-0.20
Comprehension scores (Spanish)	Mean	43.27	56.06	28.17	44.00	33.51	40.24
	SD	25.09	23.96	22.89	18.25	26.27	20.24
	N	15	15	29	29	33	33
	Effect size				-0.36		-0.60

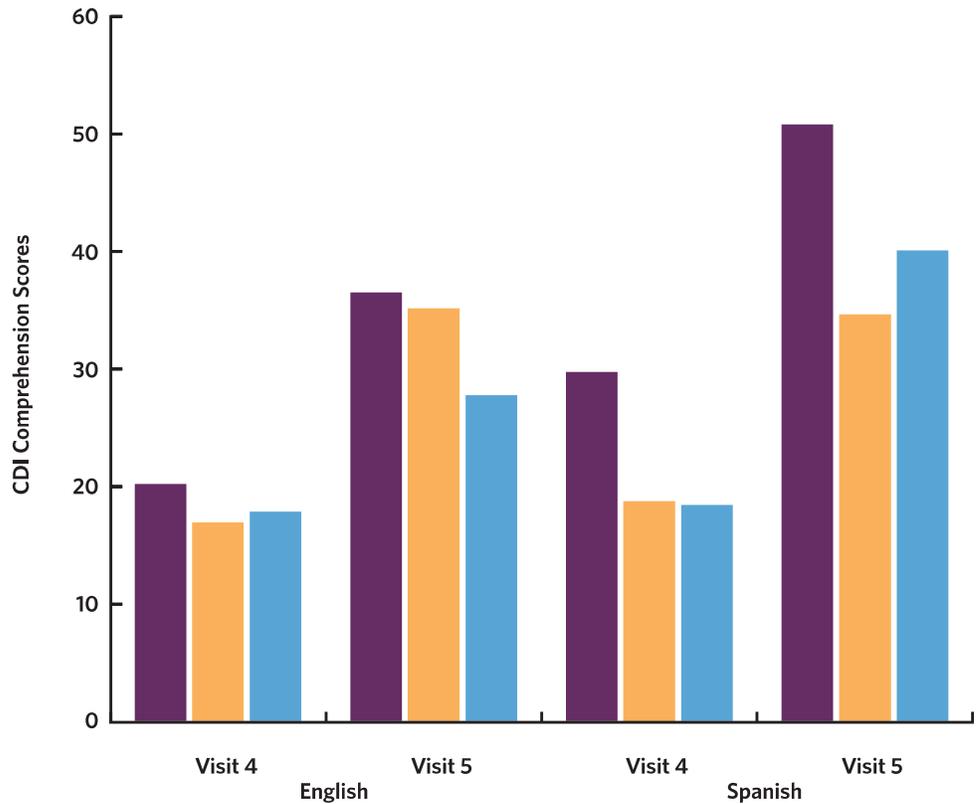
Note. SD=Standard Deviation; Effect size: .2=small; .5=medium, >.8=large

Figure 2a: CDI Production Vocabulary Scores in English and Spanish for Durham Site



	English		Spanish	
	Visit 4	Visit 5	Visit 4	Visit 5
Book Babies	5.9	15.25	5.33	14.06
Books Only	6.89	14.81	5.86	8.89
Control Group	8.26	16.55	8.18	11.09

Figure 2b: CDI Comprehension Vocabulary Scores in English and Spanish for Durham Site



	English		Spanish	
	Visit 4	Visit 5	Visit 4	Visit 5
Book Babies	31.33	49.06	43.27	56.06
Books Only	34.08	44.62	28.17	44
Control Group	39.47	49.23	33.51	40.24

WINSTON-SALEM SITE

Production Scores. As shown in Table 6b and Figure 2c, the Book Babies group in the Winston-Salem site had higher English production scores than the Books Only and Control groups at visit 3. This advantage held by the Book Babies group continued in visit 4 (see Figure 2c). The Book Babies group was relatively even with the Control group at visit 3 and visit 4.

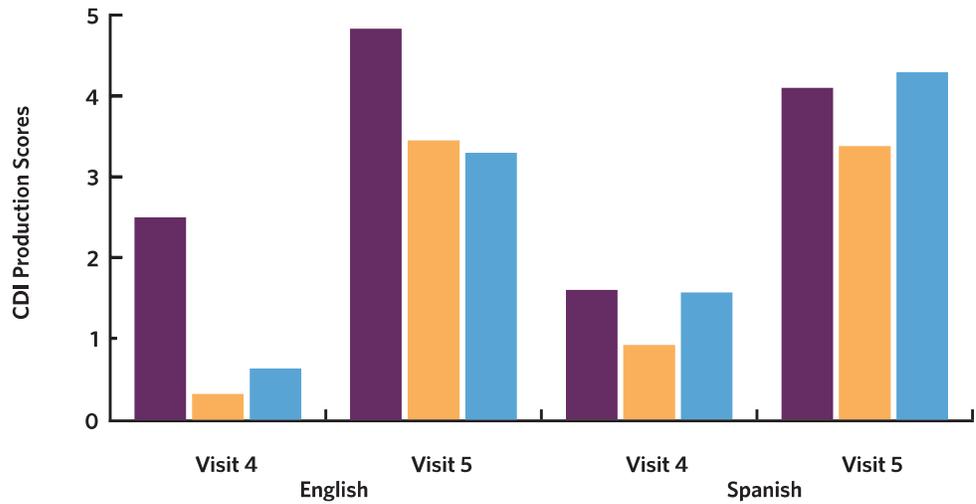
Comprehension Scores. As shown in Table 6b and Figure 2d, the Book Babies group had slightly higher English comprehension scores than the Books Only and Control groups at visit 3. This advantage for the Book Babies group still remained at visit 4 (see Figure 2d). The Book Babies group had higher Spanish comprehension scores at visit 3 than the Book Only and Control groups. By visit 4, the Book Babies group increased this advantage over the Books Only and Control groups (see Figure 2d).

Table 6b: CDI Production and Comprehension Vocabulary Scores in English and Spanish for Winston-Salem Site

CDI Variable		Book Babies (BB)		Books Only (BO)		Control (CO)	
		Visit 3	Visit 4	Visit 3	Visit 4	Visit 3	Visit 4
Production scores (English)	Mean	2.5	5.69	0.32	3.45	0.63	3.30
	SD	4.83	6.64	0.57	3.46	0.88	4.66
	N	16	16	22	22	27	27
	Effect size				0.11		-0.01
Production scores (Spanish)	Mean	1.60	4.10	0.92	3.38	1.57	4.29
	SD	1.43	2.42	1.11	1.89	3.18	5.06
	N	10	10	13	13	14	14
	Effect size				0.04		0.06
Comprehension scores (English)	Mean	20.13	36.5	16.86	35.14	17.78	27.81
	SD	16.95	14.99	15.13	23.34	18.54	18.50
	N	16	16	22	22	27	27
	Effect size				0.02		-0.36
Comprehension scores (Spanish)	Mean	29.7	50.8	18.69	34.61	18.35	40.07
	SD	31.45	23.17	14.61	21.18	19.11	23.63
	N	10	10	13	13	14	14
	Effect size				-0.35		-0.11

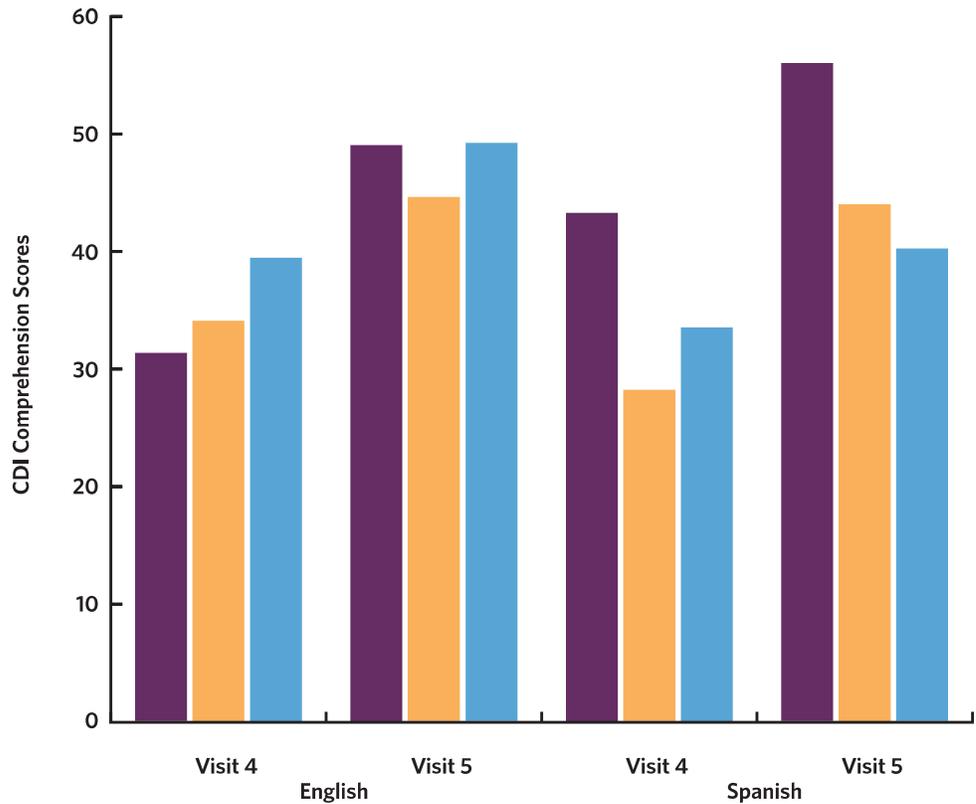
Note. SD=Standard Deviation; Effect size: .2=small; .5=medium, >.8=large

Figure 2c: CDI Production Vocabulary Scores in English and Spanish for Winston-Salem Site



Book Babies	2.5	4.83	1.6	4.1
Books Only	0.32	3.45	0.92	3.38
Control Group	0.63	3.3	1.57	4.29

Figure 2d: CDI Comprehension Vocabulary Scores in English and Spanish for Winston-Salem Site



Book Babies	20.13	36.5	29.7	50.8
Books Only	16.86	35.14	18.69	34.61
Control Group	17.78	27.71	18.35	40.07

DISCUSSION AND CONCLUSION

This final report examines the effectiveness of the Book Babies intervention in comparison to the Books Only and Control groups as it concerns reading practices in the home and children's early vocabulary skills. This report is based on collected data as of April 30, 2020.

This report also examines the study's attrition rates. Of concern is the differential attrition for the Durham site, especially the higher attrition for the Book Babies group, which is around 49%. This attrition rate is much higher than anticipated, which impacts the study's generalizability. The differential attrition is likely a reflection of the latitude provided to the Books Only and Control groups, which did not require a home visit. For example, Books Only and Control group families were able to leave the county and still be followed in the study. We also recognize that the attrition rate is considerably high in Durham due to how the randomization was done for all the families (this was also the case for 1/3 of the families in the Winston-Salem sample): families were randomized as soon as contact information was received rather than when research staff actually connected with families. That is, as soon as families were recommended, they were randomized by the research team regardless of whether the information was accurate and whether the family actually was interested in the study. This means that many families that were randomized were never reached and told about the study.

Children assessed in Spanish in the Book Babies group in the Durham site showed more growth in their production and comprehension scores compared to the Books Only and Control groups; this pattern was similar for the Winston-Salem site.

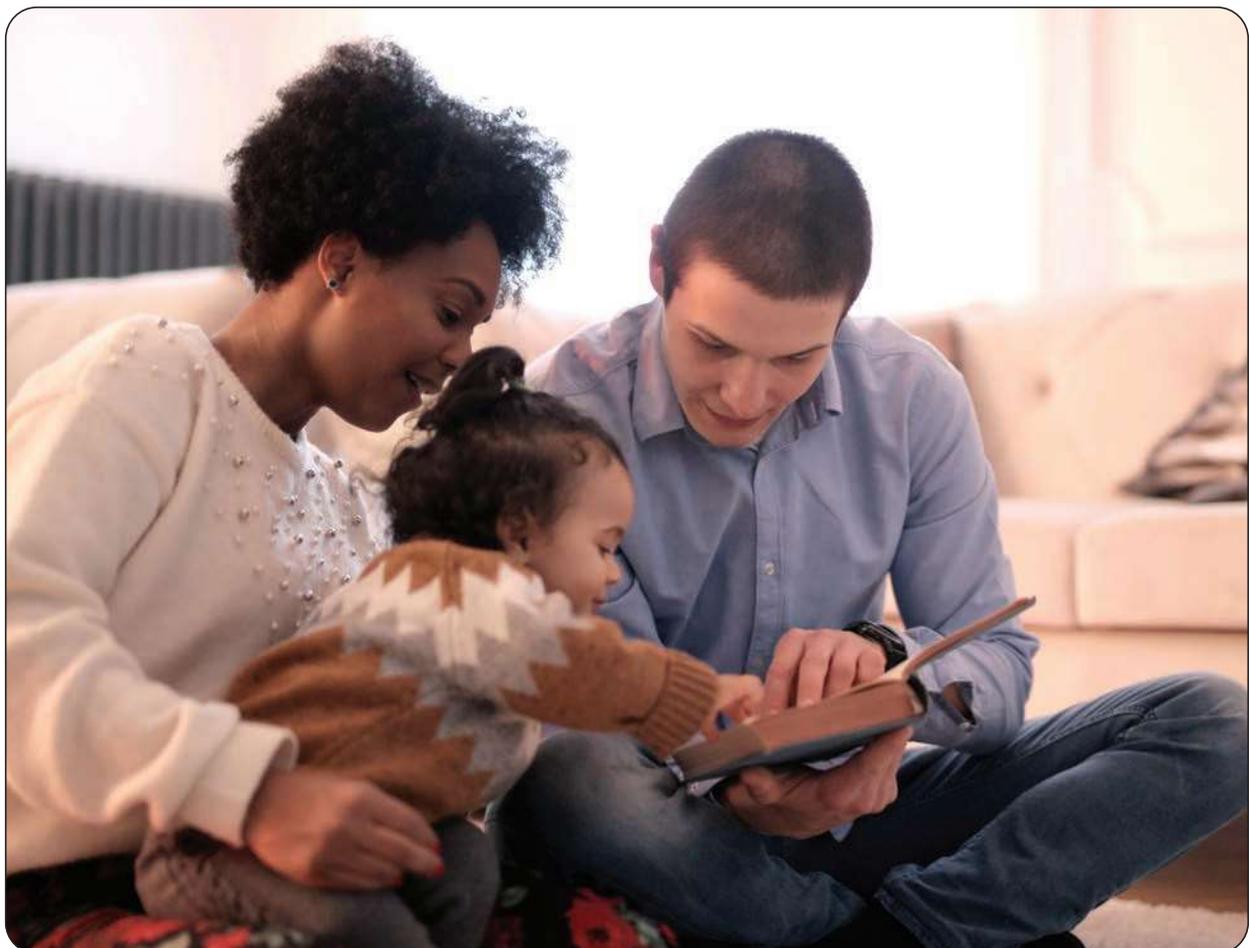
There is some preliminary indication that children assessed in Spanish—which may include bilingual children also assessed in English—are benefiting more from the Book Babies intervention than their peers assessed only in English.

Examination of parent literacy practices beginning in visit 3 indicates that more Book Babies parents are reporting ease in their ability to read and are engaging in daily reading and in pointing. In addition, more report their children having a favorite book in comparison to the Books Only and Control groups. When examined over time, there was indication that Book Babies parents reported the same or higher level of parenting practices than the Books Only and Control groups. This indicates that more Book Babies parents are engaging in consistent literacy-focused activities and practices compared to the Control group.

Examination of growth in early literacy indicated that children in the Durham site assessed in English in the Book Babies group showed similar growth to children in the Books Only and Control groups; in the Winston-Salem site, children assessed in English in the Book Babies group showed more growth in Production than children in the Books Only and Control groups. In contrast, the children assessed in Spanish in the Book Babies group in the Durham site showed more growth in their production and comprehension scores compared to the Books Only and Control groups; this pattern was similar for the Winston-Salem site. Thus, there is some preliminary indication that children assessed in Spanish—which may include bilingual children also assessed in English—are benefiting more from the Book Babies intervention than their peers assessed only in English.

When considering these current findings, caution should be taken. First, only one cohort of the Durham site families had been assessed by visit 5. Second, the number of Spanish-speaking families at each site is smaller relative to the English-speaking families, especially in Winston-Salem. Second, due to the complex pattern of data collection, some missing data, and two different versions of the early literacy measure dependent on child age (CDI Level 1 and CDI Level 2), our results are underpowered. We might have seen different results if the study had been able to continue. Nevertheless, there is some indication that more Book Babies parents are engaging in literacy-promoting activities compared to control groups, and children in the Book Babies group are showing stronger early literacy skills, especially in the case of Spanish-speaking children.

Unfortunately, this evaluation study led by HighScope Educational Research Foundation (with the final report being written by Iheoma U. Iruka after she returned to the University of North Carolina at Chapel Hill) was unable to continue after April 2020 primarily due to the COVID-19 pandemic.



APPENDIX

Table A1a. Overall and Differential Attrition for SAF Items for Durham Site

Outcome	Group	N Randomized	N sample	N attrition	Attrition rate	BB attrition rates	Differential attrition	Total randomized	Total sample	Total attrition	Overall attrition
Bed time routine	Book Babies	191	85	106	0.55	0.55	0.00	568	279	289	0.51
	Books only	184	85	99	0.54	0.55	0.02	568	279	289	0.51
	Control	193	109	84	0.44	0.55	0.12	568	279	289	0.51
Favorite book	Book Babies	191	82	109	0.57	0.57	0.00	568	265	303	0.53
	Books only	184	78	106	0.58	0.57	0.01	568	2265	303	0.53
	Control	193	105	88	0.46	0.57	0.11	568	2265	303	0.53
Parents' reading ability	Book Babies	191	85	106	0.55	0.55	0.00	568	279	289	0.51
	Books only	184	85	99	0.54	0.55	0.02	568	279	289	0.51
	Control	193	109	84	0.44	0.55	0.12	568	279	289	0.51
Daily reading	Book Babies	191	84	107	0.56	0.56	0.00	568	275	293	0.52
	Books only	184	83	101	0.55	0.56	0.01	568	275	293	0.52
	Control	193	108	85	0.44	0.56	0.12	568	275	293	0.52
Pointing to text while reading	Book Babies	191	85	106	0.551	0.55	0.00	568	279	289	0.51
	Books only	184	85	99	0.54	0.55	0.02	568	279	289	0.51
	Control	193	109	84	0.44	0.55	0.12	568	279	289	0.51

Note. Attrition rates are for visit 5.

Table A1b. Overall and Differential Attrition for SAF Items for Winston-Salem Site

Outcome	Group	N Randomized	N sample	N attrition	Attrition rate	BB attrition rates	Differential attrition	Total randomized	Total sample	Total attrition	Overall attrition
Bed time routine	Book Babies	104	27	77	0.74	0.74	0.00	322	110	212	0.66
	Books only	107	39	68	0.64	0.74	0.10	322	110	212	0.66
	Control	111	44	67	0.60	0.74	0.140	322	110	212	0.66
Favorite book	Book Babies	104	27	77	0.74	0.74	0.00	322	103	212	0.68
	Books only	107	39	68	0.64	0.74	0.10	322	103	212	0.68
	Control	111	37	74	0.67	0.74	0.07	322	103	212	0.68
Parents' reading ability	Book Babies	104	27	77	0.74	0.74	0.00	322	110	212	0.66
	Books only	107	39	68	0.64	0.74	0.10	322	110	212	0.66
	Control	111	44	67	0.60	0.74	0.14	322	110	212	0.66
Daily reading	Book Babies	104	27	77	0.74	0.74	0.00	322	110	212	0.66
	Books only	107	39	68	0.64	0.74	0.10	322	110	212	0.66
	Control	111	44	67	0.60	0.74	0.14	322	110	212	0.66
Pointing to text while reading	Book Babies	104	27	77	0.74	0.74	0.00	322	110	212	0.66
	Books only	107	39	68	0.64	0.74	0.10	322	110	212	0.66
	Control	111	44	67	0.60	0.74	0.14	322	110	212	0.66

Note, Attrition rates are for visit 5.

Table A2a. Overall and Differential Attrition for CDI Items for Durham Site

Language	Variable	Group	N Randomized	N sample	N attrition	Attrition rate	BB attrition rates	Differential attrition	Total randomized	Total sample	Total attrition	Overall attrition
English	Comprehension	Book Babies	191	51	140	0.73	0.73	0.00	568	158	410	0.72
		Books only	184	37	147	0.80	0.73	0.07	568	158	410	0.72
		Control	193	70	123	0.64	0.73	0.10	568	158	410	0.72
English	Production	Book Babies	191	51	140	0.73	0.73	0.00	568	158	410	0.72
		Books only	184	37	147	0.80	0.73	0.07	568	158	410	0.72
		Control	193	70	123	0.64	0.73	0.10	568	158	410	0.72
Spanish	Comprehension	Book Babies	191	15	176	0.92	0.92	0.00	568	77	491	0.86
		Books only	184	29	155	0.84	0.92	0.08	568	77	491	0.86
		Control	193	33	160	0.83	0.92	0.09	568	77	491	0.86
Spanish	Production	Book Babies	191	16	176	0.92	0.92	0.00	568	77	491	0.86
		Books only	184	22	155	0.84	0.92	0.08	568	77	491	0.86
		Control	193	33	160	0.83	0.92	0.09	568	77	491	0.86

Note. Attrition rates are for visit 5.

Table A2b. Overall and Differential Attrition for CDI Items for Winston-Salem Site

Language	Variable	Group	N Randomized	N sample	N attrition	Attrition rate	BB attrition rates	Differential attrition	Total randomized	Total sample	Total attrition	Overall attrition
English	Comprehension	Book Babies	104	16	88	0.85	0.85	0.00	322	65	257	0.80
		Books only	107	22	85	0.79	0.85	0.05	322	65	257	0.80
		Control	111	27	84	0.76	0.85	0.09	322	65	257	0.80
English	Production	Book Babies	104	16	88	0.85	0.85	0.00	322	65	257	0.80
		Books only	107	22	85	0.79	0.85	0.05	322	65	257	0.80
		Control	111	27	84	0.76	0.85	0.09	322	65	257	0.80
Spanish	Comprehension	Book Babies	104	10	94	0.90	0.90	0.00	322	37	285	0.89
		Books only	107	13	94	0.88	0.90	0.03	322	37	285	0.89
		Control	111	14	97	0.87	0.90	0.03	322	37	285	0.89
Spanish	Production	Book Babies	104	10	94	0.90	0.90	0.00	322	37	285	0.89
		Books only	107	13	94	0.88	0.90	0.03	322	37	285	0.89
		Control	111	14	97	0.87	0.90	0.03	322	37	285	0.89

Note. Attrition rates are for visit 4.

Table A3b. Differences Between Visits 3 and 4 for SAF Items for Winston-Salem Site

		Effect sizes				
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Parents' reading ability (visit 3)	Difficult (%)	0	0	2	0	-0.28
	Easily (%)	81	77	66	0.1	0.34
	Enough (%)	19	23	32	-0.1	-0.3
Parents' reading ability (visit 5)	Easily (%)	94	91	79	0.11	0.46
	Enough (%)	6	9	21	-0.11	-0.46
	N totals	16	22	24		
Daily reading (visit 3)	None (%)	0	0	2	0	-0.28
	One day (%)	4	5	5	-0.05	-0.05
	Two to four days (%)	41	64	61	-0.46	-0.4
	Five or more days (%)	56	31	32	0.51	0.49
Daily reading (visit 5)	None (%)	6	5	0	0.48	0.43
	Two to four days (%)	44	68	71	-0.49	-0.55
	Five or more days (%)	50	27	29	0.48	0.43
	N totals	16	22	24		
Pointing while reading (visit 3)	Not pointing (%)	0	10	14	-0.64	-0.77
	Not reading (%)	0	0	2	0	-0.28
	Pointing (%)	100	90	84	0.64	0.82
Pointing while reading (visit 5)	Not pointing (%)	0	4	4	-0.45	-0.4
	Not reading (%)	6	5	0	0.04	0.49
	Pointing (%)	94	91	96	0.11	-0.09
	N totals	16	22	24		
Favorite book (visit 3)	Has favorite book (%)	44	38	35	0.12	0.18
	No favorite book (%)	56	62	65	-0.12	-0.18
Favorite book (visit 5)	Has favorite book (%)	67	60	43	0.15	0.49
	No favorite book (%)	33	40	57	-0.15	-0.49
	N totals	15	20	21		
Bed time routine (visit 3)	Has bed time routine (%)	85	95	75	-0.34	0.25
	No bed time routine (%)	15	5	25	0.34	-0.25
Bed time routine (visit 5)	Has bed time routine (%)	75	64	71	0.24	0.09
	No bed time routine (%)	25	36	29	-0.24	-0.09
	N totals	16	22	24		

Table A3a. Differences Between Visits 3 and 5 for SAF Items for Durham Site

					Effect sizes	
		Book Babies (BB)	Books Only (BO)	Control (CO)	BB vs BO	BB vs CO
Parents' reading ability (visit 3)	Difficult (%)	2	1	3	0.08	-0.06
	Easily (%)	91	88	70	0.1	0.55
	Enough (%)	6	11	27	-0.18	-0.6
Parents' reading ability (visit 5)	Difficult (%)	0	0	3	0	-0.35
	Easily (%)	91	88	85	0.1	0.19
	Enough (%)	9	12	12	-0.10	-0.10
	N totals	85	85	109		
Daily reading (visit 3)	None (%)	1	4	5	-0.2	-0.25
	One day (%)	3	8	14	-0.23	-0.42
	Two to four days (%)	40	44	54	-0.08	-0.28
	Five or more days (%)	56	44	27	0.24	0.62
Daily reading (visit 5)	None (%)	2	6	2	-0.21	0.00
	One day (%)	2	2	1	0	0.15
	Two to four days (%)	35	43	64	-0.16	-0.59
	Five or more days (%)	61	48	33	0.26	0.57
	N totals	84	83	108		
Pointing while reading (visit 3)	Not pointing (%)	1	13	19	-0.54	-0.7
	Not reading (%)	1	4	5	-0.2	-0.25
	Pointing (%)	98	84	76	0.54	0.74
Pointing while reading (visit 5)	Not pointing (%)	1	13	19	-0.54	-0.7
	Not reading (%)	1	4	5	-0.2	-0.25
	Pointing (%)	98	84	76	0.54	0.74
	N totals	85	85	109		
Favorite book (visit 3)	Has favorite book (%)	52	39	34	0.26	0.37
	No favorite book (%)	48	61	66	-0.26	-0.37
Favorite book (visit 5)	Has favorite book (%)	61	64	52	-0.06	0.18
	No favorite book (%)	39	36	48	0.06	-0.18
	N totals	82	78	105		
Bed time routine (visit 3)	Has bed time routine (%)	74	60	72	0.3	0.05
	No bed time routine (%)	26	40	28	-0.3	-0.05
Bed time routine (visit 5)	Has bed time routine (%)	74	71	63	0.07	0.24
	No bed time routine (%)	26	29	37	-0.07	-0.24
	N totals	85	85	109		