Baby TALK Home-Visiting Evaluation Study

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Executive Summary

This Baby TALK Evaluation Study used a randomized controlled trial to test the impact of Baby TALK home-visiting services on child and maternal outcomes. This final report includes a summary of the study's research questions, research design, procedures for data collection and randomization, description of final study sample, measures, data analyses plan, the study findings, summary and consideration for future research, and limitations and lessons learned.

The sample of 62 parents with children between ages 3 and 26 months were recruited from eight Baby TALK sites in Chicago, Decatur, and Champaign, Illinois, for this research study. Thirty-four parents were randomly assigned to the treatment group and received Baby TALK home-visitation services, and 28 parents were randomly assigned to the control group and did not receive Baby TALK services. Although this study mainly aimed to test for the impacts of the Baby TALK home-visiting program, AIR also collected implementation data about the frequency, duration, content, and other details of the home visits.

Research Questions

The study aimed to answer five research questions:

- Research Question 1: After nine months, do parents receiving Baby TALK home-visiting services have lower levels of parental stress compared with parents in the control group who do not receive these services?
- Research Question 2: After nine months, do parents receiving Baby TALK home-visiting services exhibit better parenting skills and child-engagement outcomes compared with parents in the control group who do not receive these services?
- Research Question 3: After nine months, do parents receiving Baby TALK home-visiting services exhibit increased family resources compared with parents in the control group who do not receive these services?
- Research Question Q4: After nine months, do the infants and toddlers of the parents receiving Baby TALK home-visiting services exhibit better language developmental outcomes compared with infants in the control group whose parents do not receive these services?
- Research Question 5: To what extent are Baby TALK home-visiting services implemented with fidelity for the nine months during this research study?

Key Findings

The following key findings show the impact of the Baby TALK program on parent and child outcomes comparing control and treatment groups after nine months controlling for baseline measures and family characteristics.

Baby TALK has an impact on parental stress for some subgroups.

- Overall, parents receiving Baby TALK home-visiting services reported the same parental stress compared with parents in the control group.
- Lower income parents receiving Baby TALK home-visiting services reported lower parental stress compared with lower income parents in the control group.
- Younger parents receiving Baby TALK home-visiting services reported lower parental stress compared with younger parents in the control group.

Baby TALK does not have an impact on parenting skills and family resources.

- Generally, parents receiving Baby TALK home-visiting services did not report better parenting skills and parent-child engagement outcomes.
- Overall, parents receiving Baby TALK home-visiting services did not report increased family resources.

Baby TALK has an impact on language development.

- Overall, children of the parents receiving Baby TALK home-visiting services exhibited better language development outcomes compared with children in the control group.
- Among families with younger parents, children in families receiving Baby TALK home-visiting services exhibited better language development compared with children in the control group.
- Among families with parents with high school or higher education, children in families receiving Baby TALK home-visiting services exhibited better language development compared with children in the control group.

Implementation of Baby TALK visits were fewer than expected, but visits were reported as high quality when they did occur at least twice a month.

- Most families received less than two Baby TALK visits per month, and this lower-than-expected number of home visits may explain the lack of impact on some outcomes.
- When implemented, families reported home-visiting services occurred as planned, were helpful, and that they developed a good relationship with their Baby TALK home visitor.
- Among five families who received Baby TALK services as intended (at least two visits per month), parental stress decreased while child language development, family resources, and parenting skills increased.

Introduction

Motivation for the Study

Baby TALK leadership sought to evaluate the effectiveness of their home-visiting program using a rigorous study design. The Baby TALK home-visiting program is designed to include one-hour home visits to at-risk[1] mothers who are expecting a baby or have young children birth to 3 years old. The visits are to occur twice each month with a Baby TALK home visitor. Home visitors work with the mother to address the family's needs and to offer support on such topics as parental engagement, developmental milestones, and parental issues. Mothers can request longer or more frequent visits and have the opportunity to participate in monthly group sessions with other Baby TALK parents. Baby TALK home visitors also refer the mothers and members of their families to other social services as appropriate.

Independent consultants working with Baby TALK Inc., designed an evaluation using a randomized controlled trial (RCT) design to test the impacts of Baby TALK on child and maternal outcomes. Subsequently, Baby TALK hired American Institutes for Research (AIR) to execute the evaluation design. This report summarizes the research methodology and findings for the Baby TALK Home-Visiting Efficacy Pilot Study.

Organization of the Report

This report provides an overview of the evaluation study and a summary of the study's research questions. It follows with more details about the research methodology, including the RCT design, procedures for data collection and randomization, final study sample, measures used, the data analyses plan. The report concludes with study findings organized by research question, a summary and consideration for future research, and limitations and lessons learned.

Overview of Baby TALK Home-Visiting Evaluation Study

Baby TALK program staff recruited 62 families with infants and toddlers to initially participate in the study. Families were recruited from eight Baby TALK sites in Chicago, Decatur, and Champaign, Illinois, for this research study. AIR randomly assigned the families to receive either Baby TALK home-visitation services immediately (treatment group) or Baby TALK services only after the nine-month study period (control/waitlist group). AIR administered assessments and surveys before and after the program implementation period. After several families left the study, were not reached, or were removed for methodological reasons (see Explanation of Sample Attrition in Appendix B), the final sample for examining impacts of the Baby TALK program was 41 families. The small sample at follow-up does influence the confidence we had in our ability to detect impacts of the program on maternal and child outcomes. Although some effects were significant, other analyses may have had too few families to detect a significant effect. This study mainly aimed to understand the effectiveness of the home visits; however, AIR

[1] At-risk is defined as potentially disadvantaged for positive child outcomes, due to one or more risk factors such as low-income, single parenthood, unemployment, low education, racial or ethnic minority, or limited English proficiency.

also collected information about the frequency, duration, content, and other details of the home visits to understand more about how the program was implemented.

Research Questions

The study aimed to answer five key research questions:

- Research Question 1: After nine months, do parents receiving Baby TALK home-visiting services have lower levels of stress compared with parents in the control group who do not receive these services?
- Research Question 2: After nine months, do parents receiving Baby TALK home-visiting services exhibit better parenting skills and child-engagement outcomes compared with parents in the control group who do not receive these services?
- Research Question 3: After nine months, do parents receiving Baby TALK home-visiting services exhibit increased family resources compared with parents in the control group who do not receive these services?
- Research Question 4: After nine months, do the infants of the parents receiving Baby TALK home-visiting services exhibit better language developmental outcomes compared with infants in the control group whose parents do not receive these services?
- Research Question 5: To what extent are Baby TALK home-visiting services implemented with fidelity for nine months from their inception?

Research Methodology

Research Design

For this study, Baby TALK staff recruited the families to participate in the study between January 2015 and January 2016. The recruited sample included a total of 62 parents with children between ages 3 and 26 months. Families participated in data collection at two time-points: first prior to random assignment and again, 10-months later. After recruitment and the first round of data collection, 34 parents were randomly assigned to the treatment group and received Baby TALK home visitation services. These families received diapers three times during the study as an incentive to participate. The 28 parents randomly assigned to the control (i.e., waitlist) group did not receive Baby TALK services until after their nine-month study period; they only received diapers three times during the study. All families who completed the follow-up assessment and surveys also received $25 gift cards.

The analysis sample at the end of the study included 41 families. Although the sample sizes and power (or the statistically ability to detect differences between the treatment and control groups) for the study was smaller than intended, the study analyses were able to detect statistically significant differences for some outcomes and, in some cases, for certain subgroups. However due to the smaller sample size and lower power than anticipated, AIR used a significance level of 90 percent chance that the effects detected were true effects.

Procedures for Data Collection and Randomization

During the first round of data collection, AIR data collectors visited 62 mothers and their young children in their homes. Data collectors conducted an assessment to determine initial child language development and asked mothers to complete four surveys to determine initial parental stress, parenting skills, family resources, and biographical information. After this initial visit, AIR researchers used a computer program to randomly assign families to either the treatment group or the control group. AIR randomized the families in pairs within each Baby TALK site and language spoken to ensure balanced random assignment across these criteria. AIR then notified the Baby TALK sites of the family assignments. In total, 33 families were assigned to the treatment group, and 29 families were assigned to the control group.[2] After randomization, families in the treatment group received home visitation services from Baby TALK staff for nine months.

On average, 10 months after their initial visit (about a month after the study services period ended), AIR attempted to conduct the second visit with all 62 mother and child dyads. During these second follow-up visits, families completed the same surveys and assessments that they completed during the first visit. In addition, data collectors asked mothers in the treatment group to complete the *Home Visit Interaction Survey*, which collected information about the implementation of the Baby TALK home-visiting intervention. AIR reached and conducted

[2] The group sizes were uneven across treatment and control because not all families within each subgroup had a matched family within site and language subgroup.

second, follow-up visits with 48 of the initial 62 families. Additional details about the reasons for the sample attrition are provided in Appendix B.

Evaluation Outcome Measures

The first four of our evaluation research questions focused on understanding differences between groups on four different outcomes: parental stress, parent-child engagement, family resources, and child language development. AIR used three surveys and an assessment to measure these outcomes:

Parental stress. To measure parental stress, AIR used the *Parenting Stress Index, Fourth Edition Short Form* (PSI-4-SF; Abidin, 2012). PSI-4-SF is a 36-item test with three main subscales including Parental Distress, Parent-Child Dysfunctional Interaction, and Difficult Child. The scale measures the extent of stress associated with parenting, not overall life stress. The PSI-4-SF also has a subdimension of items called Defensive Responding, which estimates the extent to which a parent is answering according to social desirability. The scale is available in English and Spanish, and reliability estimates of the total and subscales are above 0.90.

Parent-child engagement. To measure the level of engagement between the mother and her child, AIR developed a scale of 38 items on the Parent Intake Survey focused on sociability-communication, parental confidence, and daily routines. These scales were developed based on the Baby TALK curriculum's monthly home visitor encounter protocols. Items were adapted from the affiliation strategy questions. A factor analysis determined the scale measured one underlying construct of parent-child engagement. The scale was developed and administered in English and Spanish. Reliability estimates are not available for this measure.

Family resources. Family Resources Scale (FRS; Dunst & Leet, 1985) is a 30-item scale that has six subscales including Growth and Support, Necessities and Health, Physical Necessities and Shelter, Intrafamily Support, Child Care, and Personal Resources. Based on a framework of parental needs to positive outcomes, the scale measures the adequacy of household resources to fulfill those needs. The scale is available in English and Spanish, and reliability estimates are 0.92–0.95.

Early child language development. Preschool Language Scale, Fifth Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011) measures communication in infants to children 5 years old. Start and stop points normed for age ranges result in children receiving the number of items needed to estimate their ability. The scale has two components. The direct assessment component, the record form, has two subscales including Auditory Comprehension and Expressive Communication. It measures preverbal communications skills, verbal communication development through early literacy and reading skill development. The parent report component, the Home Communication Questionnaire, supplements the direct assessment for children birth to 30 months old and asks parents about their child's ability to communicate and use words. The scale is available in English and Spanish, and interrater reliability estimates are 0.95, and split-half reliability estimates are 0.90 to 0.97.

The fifth research question focused on understanding the implementation of the Baby TALK home-visitation program. To examine implementation, AIR designed the *Home-Visiting Interaction Survey* to capture the depth and breadth of the home visits. It gathers information such how often visits occurred, topics discussed during the visits, and the satisfaction the parents had with the visits. Treatment families were asked to complete these surveys at their follow-up visit to address the study's questions regarding implementation of the home-visiting intervention. Table 1 illustrates how the data collection instruments align to each of the five evaluation research question.

Table 1. Constructs and Measures Used to Address Study Research Questions

Research Questions	Constructs	Measures/Indicators as Collected at the Follow-Up Visit[a]	Family and Child Characteristics Included in the Analysis
RQ1	• Maternal stress	• PSI-4-SF	• Initial PSI-4-SF • Initial FRS score • Language of assessment • Parent's education • Parent's age • Child gender
RQ2	• Parenting skills • Parental child-engagement	• Parent Interaction Survey[b]	• Initial Parent Interaction Survey • Initial FRS score • Language of assessment • Parent's education • Parent's age • Child gender
RQ3	• Family resources	• FRS	• Initial Parent Interaction Survey • Initial FRS score • Language of assessment • Parent's education • Parent's age • Child gender
RQ4	• Language development	• PLS-5 • PLS-5: Home Communication Questionnaire	• Initial PLS-5 scores • Initial FRS score • Language of assessment • Parent's education • Parent's age • Child gender
RQ5	• Implementation fidelity	• Home Visiting Interaction Survey ○ Number and consistency of visits	• Not applicable

Research Questions	Constructs	Measures/Indicators as Collected at the Follow-Up Visit[a]	Family and Child Characteristics Included in the Analysis
		○ Topics covered at visits ○ Type of services • Quality of relationship with home visitor and satisfaction with services	

[b] Parenting skills were measured using a survey scale developed by AIR for this study based on existing literature and scales on skills for parenting very young children.

Analysis Approach

For research questions 1–4, AIR primarily examined the impact of the Baby TALK home-visitation services, comparing the treatment group to the control group using survey and assessment scores at the end of the study. AIR used a statistical technique called regression analysis, which examines multiple relationships at the same time. The relationship we are most interested in is the effect of the Baby TALK treatment or control assignment on the selected survey and assessment outcomes.

This regression technique allowed for testing for treatment effects on maternal and child outcomes while controlling for the influence of other variables that may account for initial survey and assessments scores and key family characteristics. These characteristics included family resources, language of assessment, parent education level,[3] and child gender.[4]

For research question 5, AIR qualitatively summarized survey and assessment responses for the five families who received at least two home visits a month during the research study to better understand the implementation of Baby TALK home visiting services.

[3] Education was measured as having less than a high school education compared to high school or higher education. Mother's education served as the best proxy for socioeconomic status because the sample had some variation across the sample. Characteristics such as income and receiving income support services did not vary across the sample.
[4] Although the families in the sample are clustered within centers, the number of centers was not sufficient to account for center effects in this study and was a limitation for testing for effects of receiving services from different centers or different home visitors. Baby TALK and AIR were aware of this limitation even in a sample with 80–120 families. In a full RCT with a larger sample, we could test for center or visitor effects.

Participants

The final sample for analysis had 41 families: 23 treatment and 18 control families. All participants were mothers, except for one father in the treatment group (no mother information was available on the survey data). In addition, one family in the control group did not have father information available in the survey data.

Because randomization was balanced within the known language spoken at home, 57 percent of the treatment group and 56 percent of the control group spoke Spanish. The remaining families spoke English at home.

At the initial visit, among the treatment group, 17 percent of parents had less than a high school education, and 78 percent of parents had high school or higher education. Among the control group, 39 percent had less than high school, and 61 percent had high school or higher education.

At the initial visit, the average age of the parents was 29.5 years old; average parental age in the control families was 29.9 years old, and the average age in the treatment families was 29.1 years old. The youngest parent was 18 years old, the oldest parent was 44 years old, and the sample represented almost all ages in between.

The children in the sample included 24 boys and 17 girls. The treatment group had 57 percent boys and 43 percent girls, and the control group had 61 percent boys and 39 percent girls.

Table 2 summarizes the characteristics of the final sample (N = 41) used in the regression analyses. Table B1 in Appendix B presents additional descriptive characteristics and information about the initial sample and families who left the study.

Table 2. Final Sample Characteristic of the Treatment and Control Groups

Characteristic	Treatment Group (N = 23)	Control Group (N = 18)
	Number of families (%)	Number of families (%)
Spanish-speaking homes	13 (57%)	10 (56%)
Less than high school education	4 (17%)	7 (39%)
Low income (less than $20,000)	7 (39%)	8 (44%)
Male child	13 (57%)	11 (61%)
	Average	Average
Average parental age	29.1	29.9

Note: In chi-square tests, no statistical differences were found among sample characteristics when comparing treatment and control families and initial and final samples.

Findings

At the beginning the study, the family characteristics and baseline measures of parental stress, parent-child engagement, family resources, and child language development were not statistically different between the treatment and control groups. This demonstrates "baseline equivalency," or that the two groups started out at the same levels relative to the outcomes that the intervention aims to impact. At the end of the study, analysis detected differences between some outcomes (parental stress and child language development) for the treatment and control groups. In this section, we describe the specific impact findings related to each of the five research questions.

Additional statistical details are in Appendix C: Overall sample means are found in Table C2 and subgroup sample means are found in Table C3. Regression details are found in Tables C4–C12.

Research Question 1: After nine months, do parents receiving Baby TALK home-visiting services have lower levels of stress compared with parents in the control group who do not receive these services?

Answer: Yes, but differences were found only for two subgroups: lower income families and younger parents. After nine months, lower income and younger parents receiving Baby TALK home-visiting services report lower levels of parental stress compared with parents in the control group.

For the overall sample, parenting stress levels for the treatment and control groups were not significantly different at follow-up, taking into consideration initial parenting stress levels and family characteristics.[5] However, two specific subgroups of families had statistically significant differences in parental stress levels at follow-up.

First, the families in the treatment group with incomes $20,000 or less on average reported lower parental stress levels at follow-up compared to families with similar income levels in the control group.

Second, younger parents (29 years old or younger) in the treatment group on average reported lower parental stress levels at follow-up compared to their peers in the control group.[6]

Research Question 2: After nine months, do parents receiving Baby TALK home-visiting services exhibit better parenting skills and child-engagement outcomes compared with parents in the control group who do not receive these services?

Answer: No, after nine months, parents receiving Baby TALK home-visiting services did not report better parenting skills and parental child-engagement outcomes.

[5] The characteristics for each analysis in Research Questions 1–3 included family resources, language of assessment, parent's age, parent's income, parent's education, and child gender.

[6] Although one might assume that these findings are redundant because the same families comprised the younger subgroup and the lower income subgroup, we found that only 25 percent of the younger parents were also in the lower income subgroup. These findings represent comparisons of two different subgroup analyses.

Average scores of parenting skills and parental child-engagement outcomes for families in the treatment and control groups were not statistically different at follow-up, considering baseline scores and family characteristics. Parents in the treatment group reported the same parent-child engagement practices as measured by the Home Visiting Interaction Survey as the control group after nine months of Baby TALK services.

Research Question 3: After nine months, do parents receiving Baby TALK home-visiting services exhibit increased family resources compared with parents in the control group who do not receive these services?

Answer: No, after nine months, parents receiving Baby TALK home-visiting services did not report increased family resources.

Average scores of family resources were not significantly different for families in the treatment and control groups, considering initial reports of family resources and family characteristics.[7] Parents reported the resources available to support the participants' parenting through the FRS, and these scores were the same for treatment group and control group after nine months of Baby TALK services, after accounting for other family characteristics.

Research Question 4: After nine months, do the infants of the parents receiving Baby TALK home-visiting services exhibit better language developmental outcomes compared with infants in the control group whose parents do not receive these services?

Answer: Yes, after nine months, children of the parents receiving Baby TALK home visiting services exhibited better language developmental outcomes compared with children in the control group, especially among younger parents and those with high school or higher education.

After nine months of program implementation services, children's language development in the treatment group was significantly higher than the control group, considering initial child language development scores and family characteristics. The average child's language development as measured by the PLS-5 scores was higher for the treatment group compared to the control group after nine months of Baby TALK services. In other words, the analysis suggests that for the overall sample, being in the Baby TALK treatment group had a positive impact on children's language development, and in particular for the Auditory Comprehension scale.

In addition, our analysis suggests that two specific subgroups of families may have driven this difference in child language development scores for the entire sample. First, children with younger parents (29 years or younger) in the treatment group had a statistically significantly higher average child language development compared to their peers in the control group. Second, children with parents in the treatment group with a high school or higher education had a

[7] The characteristics for each analysis in Research Questions 1–3 included family resources, language of assessment, parent's age, parent's income, parent's education, and child gender.

statistically significantly higher average child language development score at follow-up compared to their peers in the control group.[8]

Research Question RQ5: To what extent are Baby TALK home-visiting services implemented with fidelity for nine months from their inception?

Answer: Although home visits occurred less frequently than twice a month for most families, the parents who were visited as intended reported their home visit experience as high quality, having a good relationship with their Baby TALK home visitor. The five families that received Baby TALK services as intended reported less parental stress and increases in child language development, family resources, and parenting skills.

As mentioned previously, treatment families completed a Home Visiting Interaction Survey after receiving nine months of Baby TALK services. In these surveys, families reported on the frequency, content, and quality of the Baby TALK visits they received.

Frequency of Visits

Based on information collected from the Home Visiting Interaction Survey, the majority of families (14, or 70 percent) received 10 or fewer visits during the nine months. This frequency of visits is not aligned the Baby TALK's implementation goal of two home visits per month (a total of at least 18 visits during the nine month period). The number of visits varied notably from three to 29; 12 of these families received eight or fewer visits during the nine-month study period, which is less than once a month, while two families received 10 visits, and one family received 15 visits. Five other families each received 20 or more visits.[9]

In order to understand more about the implementation of the Baby TALK home-visiting programs, we conducted greater descriptive analysis of what the five families who received at least two visits a month look like. The following sections includes description of demographic and outcome data for the five families who received at least 18 visits, or approximately two home visits a month, during the nine months of the research study. We limited this section to descriptive findings because a sample of five is too small to allow for quantitative, statistical tests of significance.

Family Demographics

The same Baby TALK program site, CU-Early, in the Champaign-Urbana area in Illinois, recruited and provided services to the five families who received at least two visits a month during the nine months of the Baby TALK study. Table 4 contains demographic information for the five families in the areas of language, parent education level, number of children in the household, housing type, household income, and extended family support.

[8] Although one might assume that these findings are redundant because the same families comprised the younger subgroup and the high school or higher education income subgroup, we found that only 25 percent of the younger parents were also in the lower income subgroup. These findings represent comparisons of two different subgroup analyses.

[9] Nine families did not complete the Home Visiting Interaction Survey to report the number of visits received.

Table 4. Demographics of Families Who Received at Least Two Visits a Month

Family	Language	Parent Educational Level	Number of Other Children in Household	Housing Type	Income	Family Support From Extended Family
Family 1	English	Associate degree	1	Home with your own family	$50,000–$60,000	Yes
Family 2	Spanish	Bachelor degree	2	Home with your own family	$10,000–$20,000	Yes
Family 3	English	High school degree or equivalent	2	Home with your own family	Not reported	Yes
Family 4	Spanish	High school degree or equivalent	5	Home you share with another family	$10,000 or less	Yes
Family 5	Spanish	High school degree or equivalent	0	Home you share with another family	$10,000–$20,000	Yes

Reports of the Baby TALK Relationship-Based Home Visits

Similarly to the overall sample, all five families reported in the survey that their Baby TALK home visitor was always on time and kept scheduled appointments. They expressed that they trusted their home visitors. Both parents and Baby TALK home visitors mutually chose the topics of discussion for these home visits to meet the needs of that particular family; for example, some focused on parent engagement with a young child, while others discussed family resources. Although the perceived helpfulness of the information outcomes varied for these five families, the five families and all other families in the sample reported that the amount of information that they received matched their needs.

Research Study Outcomes

The following section focuses on the research study outcomes for the five families who received at least two home visits a month during the nine-month period of the intervention. Across all three measures, outcomes varied for these five families in the areas of literacy, family resources, and parental stress.

PLS-5

For families 2, 3, and 4, children showed an increase in standardized PLS-5 scores at follow-up compared to baseline. In families 1 and 5, children showed a decrease in PLS-5 scores.

FRS

All five families reported having some family resources at baseline on the FRS. Generally, families reported an increase in extended-family support at follow-up on the FRS. All five families reported increased family resources across five scales (Growth Support, Health Necessities, Physical Necessities, Intrafamily Support, and Personal Resources) at follow-up compared to baseline. One family reported a decrease from baseline to follow-up on the Child Care scale (where a parent reports child care arrangements or options).

PSI-4-SF

Four of the five families reported less parenting stress at follow-up compared to baseline. Family 4 reported more stress at follow-up. However, this particular family had more stressors in the home compared to the other four families, such as more children in the home, sharing a home with another family, and a lower income.

In summary, for these five families who received at least two home visits a month from Baby TALK staff, the data indicate that the parents value the home visit experience and most families see positive outcomes in the areas of parental stress, family resources, and child language development skills.

Summary and Considerations for Future Research

Overall, this study found significant differences between the Baby TALK treatment and control groups in child language development overall and specifically for younger parents and those with at least a high school education. The study also found significant differences between the treatment and control groups in outcomes for parental stress among younger and lower income parents. Although the sample sizes and power (or the statistically ability to detect differences between the treatment and control groups) for the study was smaller than intended, the study analyses were able to detect statistically significant differences for parenting stress and child language development for some outcomes and, in some cases, for certain subgroups. The study did not find differences between the treatment and control groups for parenting skills and family resources.

This study also found that not all sites implemented home visits as frequently as expected by the Baby TALK model. Most families received only one visit per month instead of two visits per month as suggested by the program. Very few families received more than the 18 home visits expected during the nine-months of the program intervention. Although the home visits did not occur at the frequency expected, when the sessions did occur, parent survey responses suggest that the quality of the home visitor–family interactions and extent to which the sessions met the families' goals were high. Most families expressed positive experiences with their Baby TALK home visitor and exhibited a willingness to participate. The visitors and parents felt comfortable in the sessions. The sessions covered a variety of topics, and families felt they were getting the information they needed.

Based on these findings, we suggest some considerations for future evaluation studies of the Baby TALK model. First, we cannot determine from this study if increasing the frequency of the visits and the length of treatment would have an effect nor can we identify the "right" number of visits that will make an impact. Second, more than 80 percent of the families participating in the study were already accessing at least one social service supports at baseline (see Table B1), so home visitors may be able to focus more on approaches to reducing stress and increasing language development practices than on general concerns and resources.

Limitations and Lessons Learned

The initial purpose for this study was to serve as a pilot for a larger randomized evaluation of Baby TALK home visiting services. When reviewing the findings for this pilot study, it is important to recognize the limitations for this research study, which included challenges for the Baby TALK staff to recruit "hard-to-reach" families and attrition of highly transient families, which all led to a small sample size. The following section presents three lessons learned in this project that should be considered in future research studies.

Lesson 1: Importance of program staff buy-in for recruitment and implementation

Program stakeholder buy-in and support is important for an evaluation impact study. Both program leaders and the researchers preparing to embark on a study that involves random assignment must recognize that home-visiting service providers may not be comfortable with the idea of delaying services to families. In our study, we speculated that a potential reason we had difficulty with recruitment is that not all home visitors were comfortable with not serving all families immediately and, thus, did not recruit families into the study at the rate we originally proposed. However, complete buy-in is necessary for those staff to be motivated to recruit enough families for the study. Increasing staff buy-in may also help with the implementation fidelity portion of the study. For instance, if all Baby TALK staff are invested in the research study, they may be more likely to implement the minimum of two home visits a month requirement.

Lesson 2: Independent staff to recruit families for research study

For future studies, if resources and logistics allow, have independent staff recruit families into the study to avoid potential conflict of interest. Having independent recruiters, who are not the direct service providers, may be one approach to avoid potential slow-down and bias in recruiting study participants. If resources and logistics do not allow independent staff to recruit participates, providing an incentive for staff members who successfully recruit families and motivate further recruitment may be helpful.

Lesson 3: Study sample recruitment a challenge for "hard-to-reach" populations

The target families for the Baby TALK program may be considered "hard-to-reach" and hard-to-retain because these families typically have many disadvantages and family and life stressors. Stressors may include low-income professions, unconventional work hours, low-wages, and unstable housing. Adding to this obstacle, recruitment for an infant study occurs around the time the family is having a new baby, which is already a busier and more stressful time in a family's life. Keeping these challenges in mind, another lesson learned would be to have several recruitment strategies in place to ensure the sample size needed for the study is reached. An

independent recruitment team should consider the following strategies for future Baby TALK evaluation studies:

- Give Baby TALK staff an incentive for recruiting families for the study.
- Host recruitment events for families to learn about the study and consent process and to sign consent forms.

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Appendix A: Further Description of Analysis Approach

AIR tested regression models for each family and child outcome of interest to answer our research questions. We examined the overall final sample and several subgroups within the final sample. In each model, we controlled for the initial score on the given outcome and several other family characteristics.

The approach for missing data was listwise deletion for each analysis. That is, if a participant was missing a given score, they were not included in that particular analysis, but they were included in analyses for which they did have scores.

Outcomes were tested for skewness, which is a nonnormal distribution where majority of scores fall at the low or high end of a distribution instead of the middle. Distributions were found to be normal; all skewness test values were between –2 and 2, as recommended (George & Mallery, 2010).

Following is an example of one statistical model (see Exhibit 1).

Exhibit 1. Sample Regression Model

$$Y_i = \beta_0 + \beta_1(BaselineScore) + \beta_1(ParentAge)_i + \beta_2(ChildGender)_i + \beta_3(ParentIncome)_i + \beta_4(ParentEducation) + \beta_5(Family\,\mathrm{Re}sources)_i + \beta_6(Language)_i + \beta_7(TreatmentCondition)_i + e_i$$

Where

- Y_i is the outcome measure for each analysis
- β_0 is the intercept, which is the constant of the outcome measure for each analysis
- β_1 is the relationship between baseline and outcome measures for each analysis
- β_{2-7} are the relationships between family characteristics (family resources, language of assessment, parents age, parent's income, parent's education, and child gender) and outcomes for each analysis
- β_8 is the relationship between the treatment condition and the outcome for each analysis
- e_i is a random error associated with family, assumed to be independently and identically distributed

Typically, with multiple comparisons one would use adjusted significance levels to determine which results were significant using a stricter significance level. However due to the smaller

sample size and lower power than anticipated, AIR used a significance level of 90 percent. The power in the study could detect a minimum effect size of 0.5.

Often a concern with RCT studies is contamination of the sample, when a participant assigned to the control ends up being treated or vice versa. This evaluation had no contamination of sample with crossovers (e.g., assigned to treatment and ended up in control; assigned to control and ended up in treatment). All families who were intended to receive treatment received at least three visits. Two families were originally assigned to control and inadvertently received notice they were in treatment (they did not choose to switch), so AIR treated them as treatment-on-treated (actual placement) rather than intent-to-treat (original group placement).

Appendix B: Further Description of Sample

The initial, baseline sample had 62 families, including 34 in the treatment group and 28 in the control group. At the start of the study, the characteristics listed in Table B1 were similar (or not significantly different) for the treatment and control group.

Fourteen families left the study over the nine-month period between the initial assessment and the follow-up assessment: five from the treatment group and nine from the control group. According to standard methodology practice (Dunning, 2011), another seven families had to be removed from the final sample because their paired counterpart in the randomization process had left the study. Removing pairs from a study because of attrition reduces the chances that the treatment and control groups will become unbalanced. The 41 families who completed the Baby TALK study and could remain in the final sample represented 23 treatment and 18 control families. The following sections provide additional details about the families who left the study compared to those who stayed and includes additional characteristics such as receipt of social services.

Of the 14 families who left the study, 79 percent of them completed surveys and assessments in English (11 families), and 21 percent completed the surveys in Spanish (three families). At the initial visit, the average parental age was 28.8 years old. About 93 percent of these families (13 families) were participating in at least one support program such as child support, energy assistance, payments for foster care, public housing or Section 8, Supplemental Nutrition Assistance Program (SNAP) or food stamps, Supplemental Security Income (SSI) or social security, Temporary Assistance to Needy Families (TANF) or welfare, unemployment insurance, and Women Infants Children (WIC) supplemental food program. The two mostly commonly accessed support programs were the WIC supplemental food program (93 percent) and SNAP or food stamps (57 percent). Of the 10 families who reported their average annual income, 80 percent (eight families) earned less than $50,000. Of the mothers, 50 percent reported as Black and 43 percent reported as White (7 percent missing race data). All 14 families who left the study lived in a home with only their family living there, and about 43 percent (six families) had three or more children living in the home.

Overall, 48 of the original 61 families remained in the study, including the seven families who were purposefully removed due to their randomization pair leaving. Of these 48 families, 50 percent of them completed surveys and assessments in English (24 families), and 50 percent completed the surveys in Spanish (24 families). At the initial visit, the average parental age was 29.09 years old. The two mostly commonly accessed support programs were the WIC supplemental food program (83 percent) and SNAP or food stamps (48 percent). Of the 37 families who reported their average annual income, 66 percent (32 families) earned less than $50,000. Of the mothers, 23 reported as percent Black, 16 percent as White, and 15 percent considered themselves in some other race category (35 percent missing race data). About 88 percent (42 families) who remained in the study lived in a home with only their family living there, and about 19 percent (nine families) had three or more children living in the home.

Table B1 contains demographic information on the characteristics of the initial 62 families at baseline and of the 41 families in the final sample used in analysis according to whether they were part of the treatment group or the control group.

Table B1. Characteristics of Families in the Initial Sample and Families in the Final Study Sample, by Treatment or Control Group

Characteristic	Families in the Initial Sample (*N* = 62)				Families in the Final Study Sample (*N* = 41)			
	Treatment		Control		Treatment		Control	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	**33**		**29**		**23**		**18**	
Language spoken at home								
English	19	56%	16	57%	10	43%	8	44%
Spanish	15	44%	12	43%	13	57%	10	56%
Mother's age (at initial visit)								
Average age (in years)	28.6		29.6		29.1		29.9	
18 or younger	1	3%	0	0%	1	4%	0	0%
19 to 22	6	18%	3	11%	2	9%	2	11%
23 to 25	6	18%	2	7%	5	22%	1	6%
26 to 28	3	9%	6	21%	2	9%	4	22%
29 to 31	5	15%	8	29%	3	13%	5	28%
32 to 34	7	21%	2	7%	6	26%	1	6%
35 or older	6	18%	6	21%	4	17%	4	22%
Participating in social assistance programs								
Child support	4	12%	4	14%	2	9%	3	17%
Energy assistance	3	9%	3	11%	1	4%	0	0%
Payments for foster care	0	0%	0	0%	0	0%	0	0%
Public housing or Section 8	5	15%	3	11%	2	9%	2	11%
SNAP or food stamps	16	47%	15	54%	7	30%	10	56%
SSI or social security	5	15%	2	7%	3	13%	1	6%
TANF or welfare	3	9%	6	21%	1	4%	3	17%
Unemployment insurance	1	3%	1	4%	0	0%	1	6%

Characteristic	Families in the Initial Sample (*N* = 62)				Families in the Final Study Sample (*N* = 41)			
	Treatment		Control		Treatment		Control	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	**33**		**29**		**23**		**18**	
WIC supplemental food program	28	82%	25	89%	17	74%	16	89%
Child's gender								
Male	15	44%	14	50%	13	57%	11	61%
Female	19	56%	14	50%	10	43%	7	39%
Mother's race								
Black	10	29%	8	29%	3	13%	4	22%
White	12	35%	10	36%	10	43%	6	33%
Other	2	6%	5	18%	0	0%	4	22%
Missing	4	12%	5	18%	4	17%	4	22%
Mother's education								
Did not complete high school	6	18%	11	39%	4	17%	7	39%
Completed high school or above	27	79%	17	61%	18	78%	11	61%
Currently at a job	7	21%	13	46%	4	17%	8	44%
Annual household income[a]								
$20,000 or less	17	65%	9	43%	7	44%	8	50%
More than $20,000	9	35%	12	57%	9	56%	8	50%
Number of other children in the home[b]								
0 children	5	15%	3	11%	4	17%	2	11%
1 child	8	24%	8	29%	5	22%	5	28%
2 children	14	41%	5	18%	9	39%	5	28%
3 children	1	3%	7	25%	0	0%	3	17%
4 children	2	6%	1	4%	1	4%	0	0%
5 children	2	6%	0	0%	2	9%	0	0%
6 children	1	3%	1	4%	1	4%	0	0%

Characteristic	Families in the Initial Sample (*N* = 62)				Families in the Final Study Sample (*N* = 41)			
	Treatment		Control		Treatment		Control	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	**33**		**29**		**23**		**18**	
Number of siblings in the home[c]								
0 siblings	7	21%	2	6%	5	22%	2	11%
1 sibling	10	29%	9	26%	5	22%	6	33%
2 siblings	10	29%	5	15%	8	35%	5	28%
3 siblings	4	12%	6	18%	3	13%	1	6%
4 siblings	1	3%	1	3%	0	0%	1	6%
5 siblings	0	0%	0	0%	0	0%	0	0%
6 siblings	0	0%	1	3%	0	0%	0	0%
Type of living arrangements[d]								
Home you share with another family	5	15%	1	4%	4	17%	1	6%
Home with only your family	29	85%	27	96%	19	83%	17	94%

[a] Fifteen families in the initial sample and nine families in the final sample did not provide information on household income.

[b] Four families in both the initial and final samples did not provide information on the number of other children in the home.

[c] Six families in the initial sample and five families in the final sample did not provide information on the number of siblings in the home.

[d] Six families in the initial sample did not provide information on their type of living arrangements.

Note: In chi-square tests, no statistical differences were found among sample characteristics when comparing treatment and control families and initial and final samples.

Table B2 contains demographic information on the characteristics of the 14 families who left the Baby TALK study on their own accord and of the 48 families who remained in the study and participated in the follow-up visits. We statistically compared the families who left the study and the families who stayed**.** Overall, the characteristics of the families who left the study overall, and the remaining 48 families, were not significantly different from each other. The initial characteristics between the treatment and control families among those who left and those who remained also were not statistically different. However, the ability to detect statistical differences may be significantly limited by the small subsample sizes.

Table B2. Characteristics of Families Who Left the Study and Families Who Remained in the Study

Characteristic	Families Who Left the Study (*N* = 14)		Families Who Remained in the Study (*N* = 48)	
	Number	Percent	Number	Percent
Total	**14**	**100%**	**48**	**100%**
Language				
English	11	79%	24	50%
Spanish	3	21%	24	50%
Age (at initial visit)				
Average age (in years)	48.8		29.1	
18 or younger	0	0%	1	2%
19 to 22	2	14%	7	15%
23 to 25	1	7%	7	15%
26 to 28	3	21%	6	13%
29 to 31	4	29%	9	19%
32 to 34	1	7%	8	17%
35 or older	3	21%	9	19%
Participating in social assistance programs				
Child support	2	14%	6	13%
Energy assistance	4	29%	2	4%
Payments for foster care	0	0%	0	0%
Public housing or Section 8	2	14%	6	13%
SNAP or food stamps	8	57%	23	48%
SSI or Social Security	1	7%	6	13%
TANF or welfare	3	21%	6	13%
Unemployment insurance	0	0%	2	4%
WIC supplemental food program	13	93%	40	83%
Child's gender				
Male	2	14%	27	56%
Female	12	86%	21	44%
Mother's race				
Black	7	50%	11	23%
White	6	43%	16	33%
Other	0	0%	7	15%
Missing	1	7%	8	17%
Mother's education				
Did not complete high school	5	36%	12	25%
Completed high school or above	9	64%	35	73%

Characteristic	Families Who Left the Study (*N* = 14)		Families Who Remained in the Study (*N* = 48)	
	Number	Percent	Number	Percent
Total	**14**	**100%**	**48**	**100%**
Number of other children in home				
0 children	2	14%	6	13%
1 child	4	29%	12	
2 children	2	14%	17	35%
3 children	4	29%	4	8%
4 children	1	7%	2	4%
5 children	0	0%	2	4%
6 children	1	7%	1	2%
Number of siblings in home				
0 siblings	1	7%	8	17%
1 sibling	5	36%	14	29%
2 siblings	1	7%	14	29%
3 siblings	4	29%	6	13%
4 siblings	1	7%	1	2%
5 siblings	0	7%	0	0%
6 siblings	1	0%	0	0%
Type of living arrangements				
Home you share with another family	0	0%	6	13%
Home with only your family	14	100%	42	88%

Note: In chi-square tests, no statistical differences were found among sample characteristics when comparing families who left the study and families who stayed in the study.

Appendix C: Regression Analysis Findings by Outcome

This appendix includes descriptive statistics, such as means and standard deviations of survey scores for treatment and control at baseline and follow-up (Table C1).

The mean scores at baseline for the families in the final sample were not significantly different using *t*-tests. This demonstrates baseline equivalency. Mean scores at follow-up were not compared with *t*-tests but are presented in Table C1 for reference. The means were compared in the regression models, which accounted for additional factors, and the statistical results are presented further in Tables C4–C12.

Table C1. Means and Standard Deviations for Outcomes at Baseline and Follow-up for the Final Sample of Participating Parents (*N* = 41)

	Baseline		Follow-up	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**
PSI-4-SF (Total)	67.12	25.71	68.56	23.89
PSI-4-SF Parent-Child Dysfunctional Interaction	19.93	8.86	20.00	8.41
PSI-4-SF Parental Distress	25.05	10.13	25.79	9.88
PSI-4-SF Difficult Child	22.15	8.91	22.77	7.50
Parenting Survey	33.43	5.09	37.09	5.26
FRS (Total)	113.20	19.22	116.13	16.22
PLS-5 Percentile Scores				
Total	47.15	32.26	46.24	29.85
Auditory Comprehension	53.20	33.56	46.74	30.05
Expressive Communication	38.34	30.02	47.91	28.97
PLS-5 Standardized Scores				
Total	97.35	18.54	98.62	15.85
Auditory Comprehension	101.68	19.23	99.32	16.68
Expressive Communication	92.71	17.10	98.24	14.82

Table C2. Means and Standard Deviations for Outcomes at Baseline and Follow-up for the Final Sample by Treatment or Control Group (*N* = 41)

	Baseline				Follow-up			
	Treatment		Control		Treatment		Control	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
PSI-4-SF (Total)	68.91	28.32	64.83	22.53	66.68	15.58	71.00	32.03
PSI-4-SF Parent-Child Dysfunctional Interaction	20.00	9.23	19.83	8.63	19.23	5.79	21.00	11.05
PSI-4-SF Parental Distress	26.30	11.67	23.44	7.76	25.68	8.13	25.94	12.04
PSI-4-SF Difficult Child	22.61	9.17	21.56	8.78	21.77	4.51	24.06	10.18
Parenting Survey	32.90	4.73	34.13	5.61	37.72	4.76	36.37	5.85
FRS (Total)	113.23	20.06	113.17	18.70	118.55	13.69	112.81	19.14
PLS-5 Percentile Scores								
Total	49.35	32.73	44.18	32.37	53.88	30.79	38.59	27.66
Auditory Comprehension	26.43	35.15	49.06	31.93	55.76	31.17	37.71	26.80
Expressive Communication	70.48	29.93	35.22	30.71	54.24	28.06	41.59	29.30
PLS-5 Standardized Scores								
Total	97.26	20.46	97.47	16.20	103.18	15.96	94.06	14.82
Auditory Comprehension	102.13	20.76	101.11	17.64	104.65	17.92	94.00	13.87
Expressive Communication	93.57	17.64	91.61	16.84	101.35	14.43	95.12	14.98

Table C3. Means and Standard Deviations for Outcomes at Baseline and Follow-up for Final Subgroups Samples, by Treatment or Control Group With Significant Regression Tests

	Baseline				Follow-up			
	Treatment		Control		Treatment		Control	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Younger parents (29 years old or younger)								
PSI-4-SF (Total)	62.30	19.60	62.50	24.72	62.00	14.37	70.63	29.36
PLS-5 Auditory Comprehension[a]	57.60	33.28	37.38	30.43	54.67	22.30	38.75	24.57
Lower income								
PSI-4-SF (Total)	71.71	19.50	67.00	24.72	70.43	17.14	80.29	25.90
Child language development (Spanish or English)								
PLS-5 Total	97.26	20.46	97.47	16.20	103.18	15.96	94.06	14.82
PLS-5 Auditory Comprehension	102.13	20.76	101.11	17.64	104.65	17.92	94.00	13.87
High school education or higher								
PLS-5 Total	96.06	18.46	92.40	17.21	102.93	16.07	94.00	14.37
PLS-5 Auditory Comprehension	99.67	19.25	96.64	19.34	105.00	17.88	91.91	12.92

[a] Data are based on mean percentile scores.

Parental Stress (PSI-4-SF)

Among the younger parents (29 years old or younger), parents in the Baby TALK treatment on average had a lower parental stress by about 20 points (0.4 of a standard deviation) on the PSI-4-SF scale at follow-up compared to parents in the control group differences in stress controlling for other factors ($p = 0.02$). This effect was above and beyond the effect of child gender and parent income, which were also significant factors in lower stress levels in younger parents (see Table C4).

Table C4. Regression Coefficients for PSI-4-SF Total Score for Younger Parents

Variable (Characteristic) [a]	*B*	SE *B*	β
PSI-4-SF	0.95	0.17	0.88
Child gender	16.08	7.73	0.32*
FRS total baseline	0.13	0.16	0.11
Educational level	15.22	8.84	0.23
Family income	19.00	6.70	0.42**
Parent age at baseline	6.98	6.47	0.15
Treatment	**–19.95**	**6.38**	**–0.44*** **

*Significant at $p = .08$; ** Significant at $p = .03$, ***Significant at $p = .02$; R^2 change for model including treatment is 0.13, $F = 9.8$, $p = .02$.

[a] Language spoken at home was omitted as a covariate because it had no correlation with the outcome variable.

Among the parents with lower incomes ($20,000 or less), parents in the Baby TALK treatment had decreased parental stress levels by about 30 points (0.7 of a standard deviation) on the PSI-4-SF, compared to parents in the control group ($p = 0.01$). This effect was above and beyond effects of child gender, parent education, and parent age, which were also factors in lower stress levels in lower income parents (see Table C5).

Table C5. Regression Coefficients for PSI-4-SF Total Score for Lower Income Families

Variable (Characteristic)[a]	*B*	SE *B*	β
PSI-4-SF	1.16	0.19	1.17*
Child gender	20.27	7.53	0.46**
FRS total baseline	0.20	0.22	0.19
Educational level	23.65	7.587	0.46***
Family income	–12.55	9.88	–0.28
Parent age at baseline	17.16	7.83	0.37****
Treatment	–30.31	7.74	–0.70*****

*Significant at $p = .002$; **Significant at $p = .04$, ***Significant at $p = .03$, **** Significant at $p = .08$, *****Significant at $p = .01$; R^2 change for model including treatment is 0.13, $F = 15.3$, $p = .01$.

[a] Language spoken at home was omitted as a covariate because it had no correlation with the outcome variable

Child Language Development (PLS-5)

In the overall sample, children in Baby TALK treatment families had higher child language development by about 10 points (0.3 of a standard deviation on the PLS-5 at follow-up than children in control families (p = .06). This effect was above and beyond family income, which was also a factor in increased child language development (see Table C6).

Table C6. Regression Coefficients for PLS-5 Standardized Total Score for the Overall Sample

Variable (Characteristic)	*B*	SE *B*	β
PLS-5 total at baseline	0.09	0.19	0.11
Child gender	5.62	5.39	0.21
FRS total baseline	0.06	0.16	0.08
Educational level	3.10	8.86	0.08
Parent age at baseline	–0.30	0.47	–0.13
Income	–11.82	5.76	–0.44*
Language spoken at home	3.53	6.13	0.13
Treatment	10.26	5.45	0.38**

*Significant at p = .06; **Significant at p = .08; R^2 change for model including treatment is 0.12, F = 3.5, p = .06.

In the overall sample, children in Baby TALK treatment families had higher auditory comprehension by 24 percentile points (0.5 of a standard deviation) on the PLS-S at follow-up than children in control families (p = .06; see Table C7).

Table C7. Regression Coefficients for PLS-5 Percentile Score for Auditory Comprehension for the Overall Sample

Variable (Characteristic)	*B*	SE *B*	β
PLS-5 auditory comprehension baseline	–0.04	0.25	–0.05
Child gender	9.72	11.72	0.18
FRS total baseline	0.27	0.33	0.19
Educational level	–12.72	18.85	–0.16
Parent age at baseline	–0.78	0.99	–0.17
Income	–20.48	12.36	–0.38
Language spoken at home	2.51	16.45	0.05
Treatment	24.15	11.97	0.45*

*Significant at p = .06; R^2 change for model including treatment is 0.16, F = 4.07, p = .06.

In the overall sample, children in Baby TALK treatment families had higher auditory comprehension by about 13 points (0.5 standard deviation) on the PLS-5 at follow-up than children in control families (p = .05). This effect was above and beyond family income, which was also a factor in increased auditory comprehension (see Table C8).

Table C8. Regression Coefficients for PLS-5 Standardized Score for Auditory Comprehension for the Overall Sample

Variable (Characteristic)	*B*	SE *B*	β
PLS-5 auditory comprehension baseline	–0.06	0.25	–0.07
Child gender	3.48	6.31	0.12
FRS total baseline	0.11	0.18	0.14
Educational level	–6.37	10.20	–0.14
Parent age at baseline	–0.36	0.53	–0.14
Income	–12.69	6.83	–0.43*
Language spoken at home	3.84	8.66	0.13
Treatment	13.47	6.31	0.46**

* Significant at $p = .08$, **Significant at $p = .05$; R^2 change for model including treatment is 0.17, $F = 4.6$, $p = .05$.

Among families with younger parents (29 years old and younger), children in the Baby TALK treatment had higher auditory comprehension by 48 points on the PLS-5 scale (one standard deviation) compared to children in the control group ($p = .05$). This effect was above and beyond effects of family income and language spoke at home, which were also factors in percentile scores for auditory comprehension (see Table C9).

Table C9. Regression Coefficients for PLS-5 Percentile Scores for Auditory Comprehension for Younger Parents

Variable (Characteristic)	*B*	SE *B*	β
PLS-5 auditory comprehension baseline	–0.08	0.22	–0.10
Child gender	–26.75	19.82	–0.47
FRS total baseline	0.42	0.32	0.31
Educational level	–44.35	26.93	–0.50
Income	–51.48	18.98	–1.04*
Language spoken at home	–31.65	12.59	–0.64**
Treatment	48.25	17.47	0.96*

*Significant at $p = .05$, **Significant at p. = 07; R^2 change for model including treatment is 0.26, $F = 7.6$, $p = .05$.

Among the parents with at least a high school education, children in the Baby TALK treatment had higher language development by about 10 points (0.4 standard deviation) on the PLS-5 scale ($p = .09$). This effect was above and beyond effects of family income, which were also factors in increased language in households with less than a high school education (see Table C10).

Table C10. Regression Coefficients for PLS-5 Total Standardized Score for Parents with High School Education or Higher

Variable (Characteristic)	*B*	SE *B*	β
PLS-5 Baseline	0.10	0.21	0.12
Child gender	3.87	5.71	0.14
FRS total baseline	0.09	0.18	0.11
Parent age at baseline	–0.30	0.49	–0.13
Income	–13.23	6.07	–0.47*
Language spoken at home	3.52	6.34	0.13
Treatment	10.26	5.58	0.36**

*Significant at $p = .05$ ** Significant at $p = .09$; R^2 change for model including treatment is 0.12, $F = 3.4$, $p = .09$.

Among the parents with at least a high school education, children in the Baby TALK treatment had higher auditory comprehension by about 13 points on the PLS-5 (0.4 of a standard deviation) compared to children in the control group ($p = .05$). This effect was above and beyond effects of family income, which was also a factor in auditory comprehension (see Table C11).

Table C11. Regression Coefficients for PLS-5 Standardized Scores Auditory Comprehension for Parents With High School Education or Higher

Variable (Characteristic)	*B*	SE *B*	β
PLS-5 auditory comprehension baseline	0.07	0.27	0.07
Child gender	1.11	6.62	0.04
FRS total baseline	0.13	0.19	0.15
Parent age at baseline	–0.31	0.54	–0.12
Income	–13.80	7.06	–0.44*
Language spoken at home	1.29	8.98	0.04
Treatment	13.34	6.37	0.43**

*Significant at $p = .07$, **Significant at $p = .05$; R^2 change for model including treatment is 0.16, $F = 4.4$, $p = .05$.

Among the parents with at least a high school education, children in the Baby TALK treatment had increased for auditory comprehension by about 23 percentile scores points (0.4 of a standard deviation) on the PLS-5 scale, compared to children in the control group ($p = .07$). This effect was above and beyond effects of family income, which was also a factor in auditory comprehension (see Table C12).

Table C12. Regression Coefficients for PLS-5 Percentile Scores for Auditory Comprehension for Parents With High School Education or Higher

Variable (Characteristic)	*B*	SE *B*	β
PLS-5 baseline	0.10	0.26	0.11
Child gender	4.04	12.13	0.07
FRS total baseline	0.32	0.34	0.21
Parent age at baseline	–0.70	0.98	–0.15
Income	–23.11	12.65	–0.41*
Language	–2.57	16.60	–0.05
Treatment	23.22	11.85	0.41**

*Significant at $p = .09$, **Significant at $p = .07$; R^2 change for model including treatment is 0.15, $F = 3.8$, $p = .07$.

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