

An Evaluation of the Children's Museum of Manhattan's
All the Way to K and Beyond!

Summary Report

by

Steven J. Holochwost
Elizabeth Stuk

PALMER-WOLF

**An Evaluation of the Children’s Museum of Manhattan’s
*All the Way to K and Beyond!***

Summary Report

December 15, 2017

Produced by:

The Palmer Wolf Corporation
8A Francis Avenue
Cambridge, MA 02138

Authors: Steven J. Holochwost & Elizabeth Stuk

Submitted to:

Leslie Bushara, Deputy Director, Education and Guest Services
Children’s Museum of Manhattan (CMOM)
The Tisch Building
212 West 83rd Street
New York, NY 10024

This document is for internal use only by the Children’s Museum of Manhattan. This document, or its contents, cannot be reproduced or externally distributed without the consent of CMOM and the Palmer Wolf Corporation.

How to cite this report: Holochwost, S. J., & Stuk, E. (2017). An Evaluation of The Children’s Museum of Manhattan’s *All the Way to K and Beyond!* Summary Report produced by the Palmer Wolf Corporation for the Children’s Museum of Manhattan

Table of Contents

Executive Summary.....	3
Background.....	5
Method.....	7
Findings.....	9
Conclusion.....	14
Works Cited.....	18
Appendix A: Technical Appendix.....	20
Appendix B: Quotations from Participants.....	27



Executive Summary

Early childhood is a crucial period for the development of a variety of language skills, and research has revealed that these skills strongly predict subsequent academic and socio-emotional development. The importance of these skills has driven researchers to investigate the factors that may promote them. The results of multiple studies suggest that early language skills are impacted by both the quantity and quality of linguistic interactions between young children and their parents and caregivers.

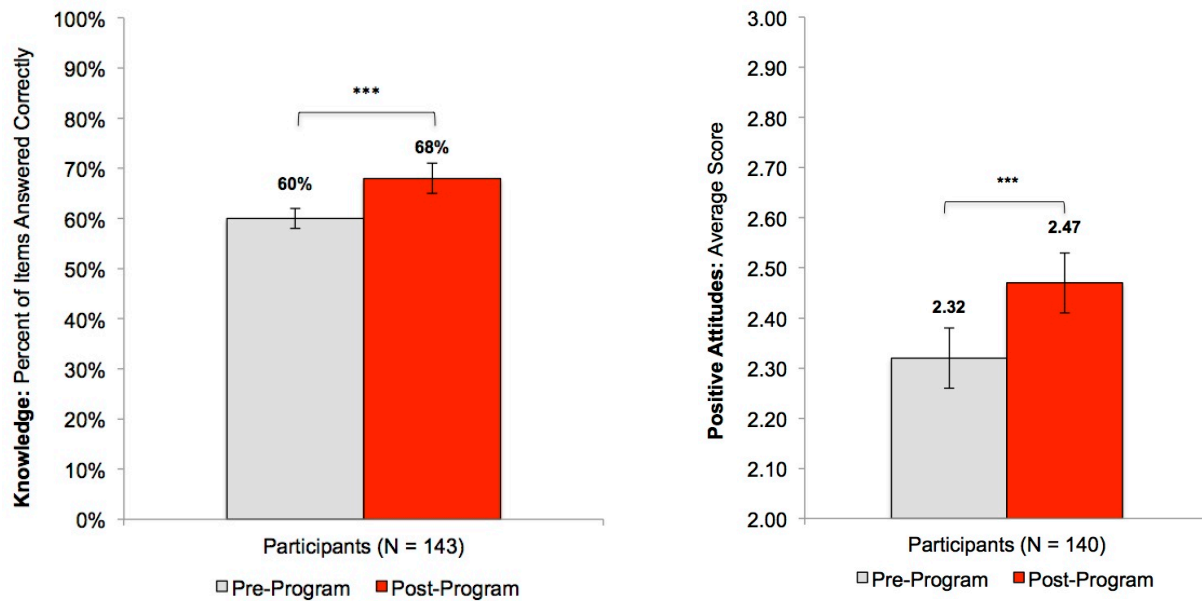
These findings have, in turn, spurred inquiries into the factors that may predict the quantity and quality of linguistic interactions. One factor is parents' socioeconomic status (SES), but for policymakers and practitioners seeking to enhance young children's early language development an understanding of factors more directly open to the influence of discrete, targeted programs would be more valuable. While the research literature on these malleable factors is relatively small, the available evidence suggests that parents' knowledge and beliefs about how children learn are related to parents' linguistic interactions with their children.

This research highlights the promise of a program like *All the Way to K and Beyond* ("ATWTK"), a citywide initiative developed by the Children's Museum of Manhattan ("CMOM") in collaboration with the New York City Administration for Children's Services (ACS) and Department of Education (DOE) with funding from the Meringoff Family and W.K. Kellogg Foundations. The goal of the program is to empower parents, caregivers, and educators to foster language and literacy learning among their young children (ages 0-5 years).

To develop the program model, CMOM established a national advisory board of experts in child development, and engaged the Science of Learning Institute (SLI) of Johns Hopkins University in conducting a needs assessment study in New York City and Baltimore. The pilot ATWTK program that is the focus of this report was conducted at CMOM and across New York City from May to August 2017. It consisted of 12 family workshops, five professional development sessions, and three family festivals that together reached approximately 1200 participants. It engaged participants in conversation about how children acquire language skills through the use of art, music and storytelling activities that were designed to be easily replicable at home or in the classroom. Following the program they attended, participants received ATWTK printed materials, with colorful illustrations and prompts for starting everyday conversations at home, school and in the community.

The purpose of our evaluation was to assess the promise of the ATWTK program and materials. To this end, 182 attendees (63 parents and 119 early childhood educators) completed survey measures prior to and following their participation in the program. As can be seen in the figure below, **program participation was associated with improved knowledge of language and literacy development, as well as more positive attitudes among parents and educators about what they can do to promote it. The size of these increases was substantial, surpassing the threshold established by the U.S. Department of Education for a finding to be considered "substantively important." Both parents and educators experienced these effects, and they were observed whether the participants' primary language was either English or Spanish.**

Figure. Participant Increases in Knowledge (left) and Positive Attitudes (right)



Note: *** indicates that the difference in pre- and post-program scores was statistically significant ($p < .0001$).

The associations between program participation and improved knowledge and attitudes may be attributable to the quality of the instruction. On average, participants reported a high level of satisfaction with the program (3.5 out of 4 points), and reported using the materials “a couple of times each week” with the children or students. Participants’ comments also suggested that participants valued the program and used the materials frequently:

“My mother is a Spanish speaker and has not only been using the ATWTK activities daily with my 16-month old son (she hung the poster on the refrigerator), but she now feels confident speaking in her native language to him more often. I have seen an increase in his ability to speak and recognize more words in Spanish.”

- Mother and program participant

“The ATWTK content will be easy and fun to use with daily activities in my classroom. Before the program I only thought of building literacy skills through reading, but now I see how it is part of talking about math and other classroom activities. I like the poster and am going to hang it in my classroom as a reminder.”

- ACS Childcare Provider, South Bronx

Why are these results important? Lower socioeconomic status (SES) is linked to less frequent and lower quality linguistic interactions between young children and their adult caregivers. These interactions are associated with the development of early language skills, which, in turn, predict academic achievement at school entry.

From a policy perspective, the question is how to break or disrupt this chain of relationships. Studies indicate that parents’ knowledge of and attitudes toward child development is related to their linguistic interactions with children, and therefore that one promising lever for intervention is to improve parents’ and caregivers’ knowledge and attitudes. While they await replication, **our results indicate that ATWTK accomplished this.**

Background

Early childhood is a crucial period for the development of a variety of language skills, from the production and comprehension of speech to the recognition of letter shapes and common words. Research has revealed that these skills strongly predict subsequent academic and socio-emotional development.¹ For example, one recent study of over 8,000 children found that toddlers with larger vocabularies exhibited higher levels of achievement in reading and mathematics at kindergarten entry.²

The importance of early language skills has driven researchers to investigate the factors that may promote them. The results of multiple studies suggest that early language skills are impacted by both the quantity and quality linguistic interactions between young children and their parents and caregivers.³ Researchers have reported that the **quantity** of words spoken by parents was closely related to the size of young children's vocabularies,⁴ and that the specific **qualities** of language input, such as the use of "parentese"⁵ or rare words,⁶ predicted children's productive speech.

These findings have, in turn, spurred inquiries into the factors that may predict the quantity and quality of linguistic interactions. One factor is parents' socioeconomic status (SES): one study estimated that children from high-SES families would hear an average of 32 million more words than children from families receiving public assistance.⁷ While this is an important finding, for policymakers and practitioners seeking to enhance young children's early language development an understanding of factors more directly open to the influence of discrete, targeted programs is just as important.

While the research literature on these malleable factors is relatively small, the available evidence suggests that parents' knowledge and beliefs about how children learn are related to parents' and educators' linguistic interactions with their children. For example, one study found that variations in the quantity and quality of parents' speech with their children was attributable to their knowledge of child development, rather than their vocabularies or loquaciousness.⁸ Other studies have documented parallel relations between parents' beliefs

¹ Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; NICHD Early Child Care Research Network, 2005; Ouellette, 2006.

² Morgan, Farkas, Hillemeier, Hammer, & Maczuga 2015. Note that the relations between vocabulary and outcomes held after accounting for (i.e., controlling for via statistical adjustments) maternal education, gestational and birth characteristics, and quality of the home environment and parenting.

³ See Cartmill (2016) for a recent review.

⁴ Hart & Risley (1995). Weisleder & Fernald (2013) extended these findings, reporting that toddlers whose parents addressed more speech to them at 19-months had larger vocabularies at 24-months than children who heard less child-directed speech.

⁵ Ramírez-Esparza, García-Sierra, & Kuhl (2014) found a positive correlation between the use of parentese and word production at 24-months of age.

⁶ Rowe (2012) found that the number of rare words (defined as words the average 4th grader does not know) children hear at 2^{1/2} years old predicts their vocabulary at 3^{1/2} years old after controlling for socioeconomic status (SES), overall quantity of parent speech, and the child's vocabulary at 2^{1/2}.

⁷ Hart & Risley (1995).

⁸ Rowe, 2008.

about what they and other parents can and should do to promote the development of early language skills and the degree to which parents practice those behaviors themselves.⁹

This research highlights the promise of a program like *All the Way to K and Beyond* (“ATWTK”), a citywide initiative developed by the Children’s Museum of Manhattan (“CMOM”) in collaboration with the New York City Administration for Children’s Services (ACS) and Department of Education (DOE) with funding from the Meringoff Family and W.K. Kellogg Foundations. The goal of the program is to empower parents, caregivers, and educators to foster language and literacy learning among their young children (ages 0-5 years).

To develop the program model, CMOM established a national advisory board of experts in child development, and engaged the Science of Learning Institute (SLI) of Johns Hopkins University in conducting a needs assessment study in New York City and Baltimore. The pilot ATWTK program that is the focus of this report was conducted at CMOM and across New York City from May to August 2017. It consisted of 12 family workshops, five professional development sessions, and three family festivals that together reached approximately 1200 participants. It engaged participants in conversation about how children acquire language skills through the use of art, music and storytelling activities that were designed to be easily replicable at home or in the classroom. Following the event they attended, participants received ATWTK printed materials, with colorful illustrations and prompts for starting everyday conversations at home, school and in the community.

The purpose of our evaluation was to assess this promise. Specifically, we sought to understand whether and to what extent program participation is associated with enhanced knowledge of early childhood language and literacy development, improved attitudes about the role parents and educators can play in promoting that development, and increased levels of behaviors that support language development. As such, our evaluation addressed three specific questions:

- **Question 1:** Is program participation associated with improved knowledge of language and literacy development?
- **Question 2:** Is participation associated with more positive attitudes about what parents and educators can do to promote that development?
- **Question 3:** Is participation associated with increased levels of behaviors that support language and literacy development?

⁹ Bingham, 2007; DeBaryshe, 1995; Donahue, Pearl, & Hertzog, 1997. Note that the literature regarding caregiver-child interactions and language development is comparably small, but also indicates that children’s development is impacted by those interactions (see Bandel et al., 2014).

Method

To address these questions we used a single-group, summative evaluation design that employed survey measures. A total of 182 parents and early childhood educators (ECEs) agreed to participate in the evaluation.

- 63 (35%) of these attendees were parents, and the remaining 119 (65%) were ECEs.
- Nearly all attendees (96%) were women, and nearly three-quarters (73%) identified as Latino or Hispanic.
- Fifty parents (79% of all parents) completed both the pre- and post-program surveys, while 7 (11%) completed the follow-up survey.
- A slightly higher proportion of educators (87%) completed both the pre- and post-program surveys, while 13 (11%) completed the follow-up survey.

Just prior to participating in the family workshop or professional development session, parents and ECEs were asked to complete a measure that assessed their knowledge of young children's language and literacy development and their attitudes about the extent to which they could promote their children's or students' development. Immediately following the session, parents and ECEs completed a survey that asked the same questions regarding knowledge and attitudes, as well as additional sets of questions about the frequency with which parents or ECEs engaged in behaviors thought to promote language and literacy development and their satisfaction with the workshop or session.

In the fall of 2017 the 37 parents and 62 ECEs who had agreed to complete the follow-up survey were contacted and asked to do so. As noted above, 7 parents and 13 educators completed the survey, which asked participants to estimate the frequency with which they engaged in behaviors that support language and literacy development over the previous six to eight weeks, and the extent to which those activities involved the use of materials distributed by CMOM. For parents, the survey asked about the extent to which they engaged in these behaviors with their child, while for ECEs the survey asked about behaviors in the classroom setting. The survey was administered online, but was formatted so that it could be completed using the web-browser application on a smart phone. If participants did not complete the online survey within three weeks, they were called and asked to complete the survey over the phone.

Table 1. Summary of Data Collected at Each Point in Time

	Pre-Program Survey	Post-Program Survey	Follow-Up Survey (8 – 12 weeks)
Knowledge	Initial Data Point	Final Data Point	
Attitudes	Initial Data Point	Final Data Point	
Behavior		Initial Data Point	Final Data Point
Satisfaction		Only Data Point	

Our analyses focused on the three guiding questions outlined above. To assess whether participation in the program was associated with improved knowledge of language and literacy development we compared parents' and ECEs' responses on the surveys administered just prior to and immediately following the workshop or session. To examine whether participation was associated with increased levels of behaviors that support language and literacy development we compared parents' and ECEs' reports of the frequency with which they engage in these behaviors provided following the workshop or session with the frequency with which they reported engaging in those behaviors on the follow-up survey (for details on how these comparisons were made, please see Appendix A: Technical Appendix). We also examined attendees' level of satisfaction with the workshop or session they attended.



Findings

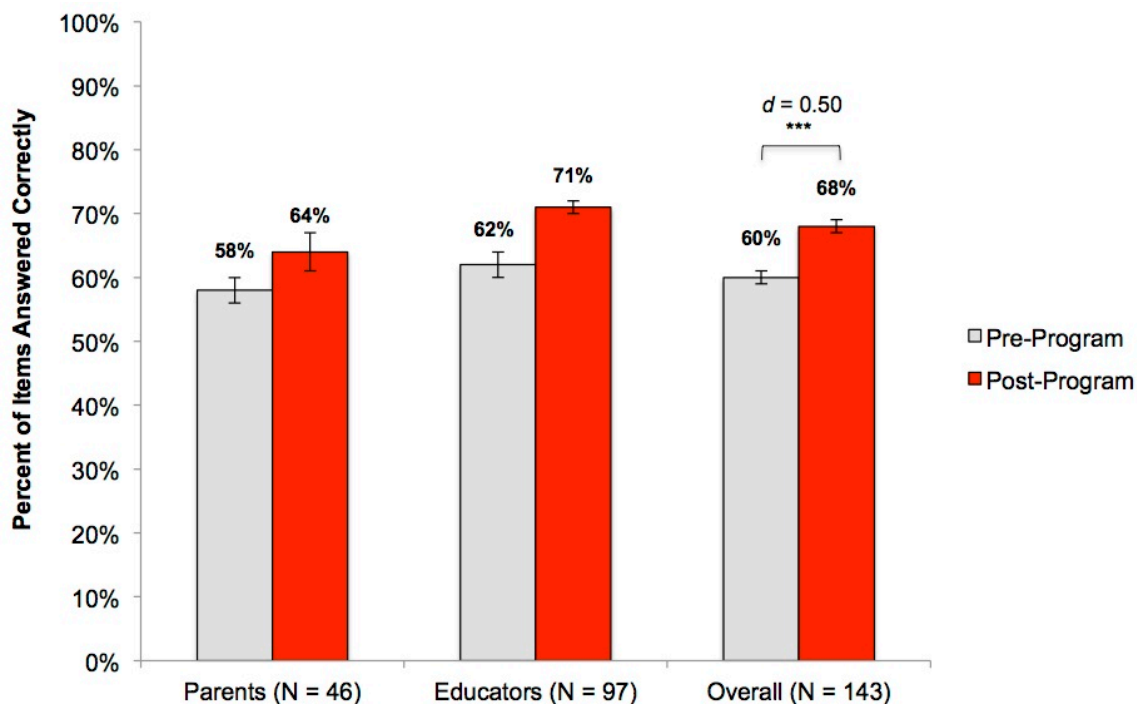
The presentation of findings below is organized by guiding question.

- **Question 1:** Is program participation associated with improved knowledge of language and literacy development?

To address this question we compared participants' knowledge of language and literacy, measured just prior to the workshop of session they attended, to their knowledge as assessed just following the workshop or session. In each case participants answered ten questions about children's language and literacy development, and scores were calculated as the percent of items correct out of the ten items asked.

As can be seen in Figure 1, overall participants exhibited a statistically significant increase in their levels of knowledge,¹⁰ increasing by an average of eight percentage points. This corresponds to an effect size of 0.50, which is twice the threshold for a finding to be considered “substantively important.”¹¹ Our analyses indicated that the benefits of program participation were similar for both parents and educators.

Figure 1. Change in Knowledge of Language & Literacy Development



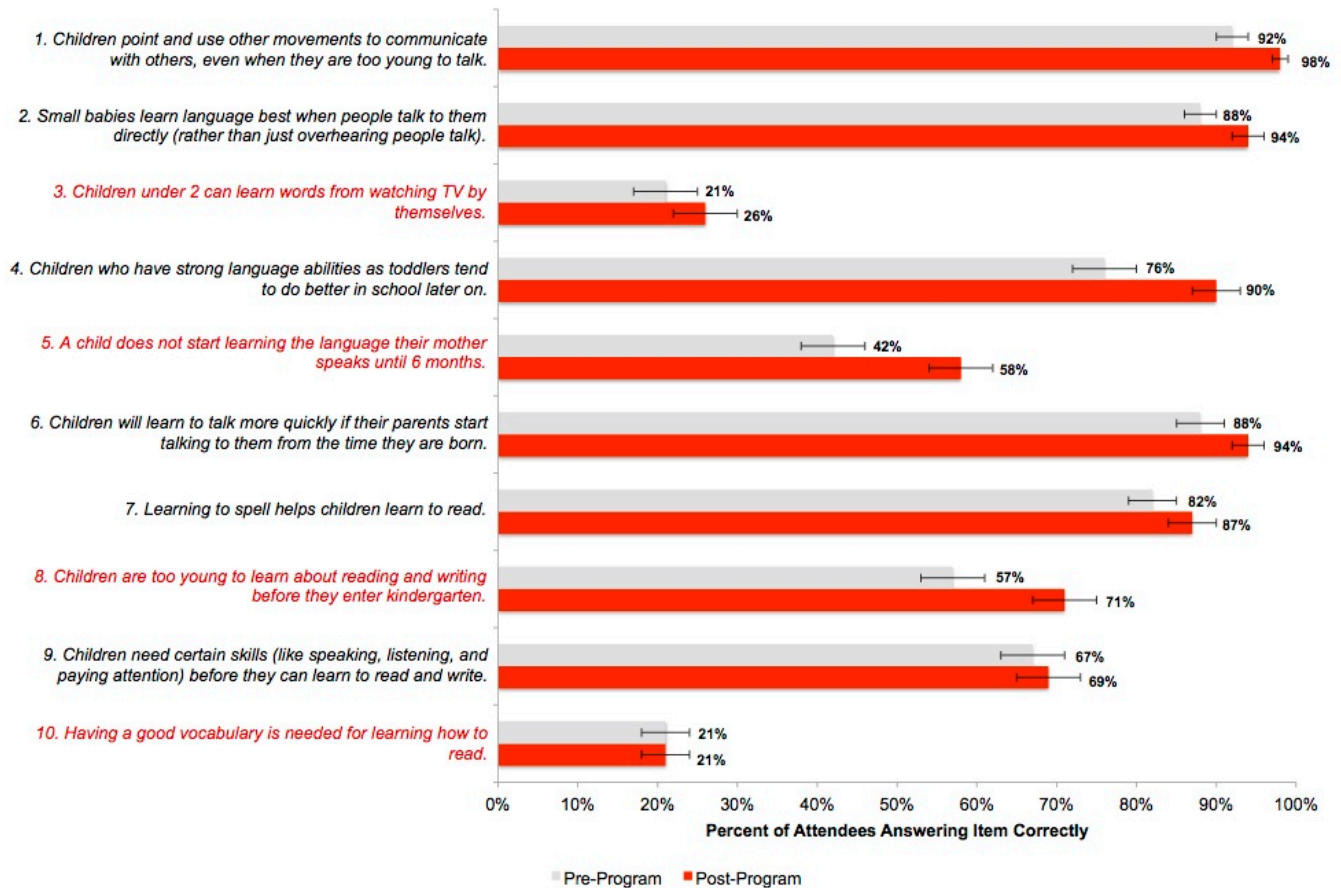
Note: Estimates from the multilevel models described in Appendix A are reported. Error bars correspond to two times the standard error of the estimate. *** indicates that the difference in pre- and post-program scores was statistically significant ($p < .0001$).

¹⁰ A statistically-significant finding is one that exceeds a reasonable likelihood of having not been observed in error. This likelihood is typically set at 5%, but here it was set at 2.5% to accommodate multiple inferential tests. See Appendix A for additional details.

¹¹ United States Department of Education (2015), p. 25.

While program participants exhibited a significant and substantial increase in their knowledge of children's language and literacy development, a larger increase was observed for some topic areas than other. As can be seen in Figure 2, the proportion of parents and educators answering certain items correctly increased substantially for certain items (e.g., questions 4, 5, and 8), while the proportion of items answered correctly remained essentially unchanged for items 9 and 10.

Figure 2. Change in Knowledge by Item



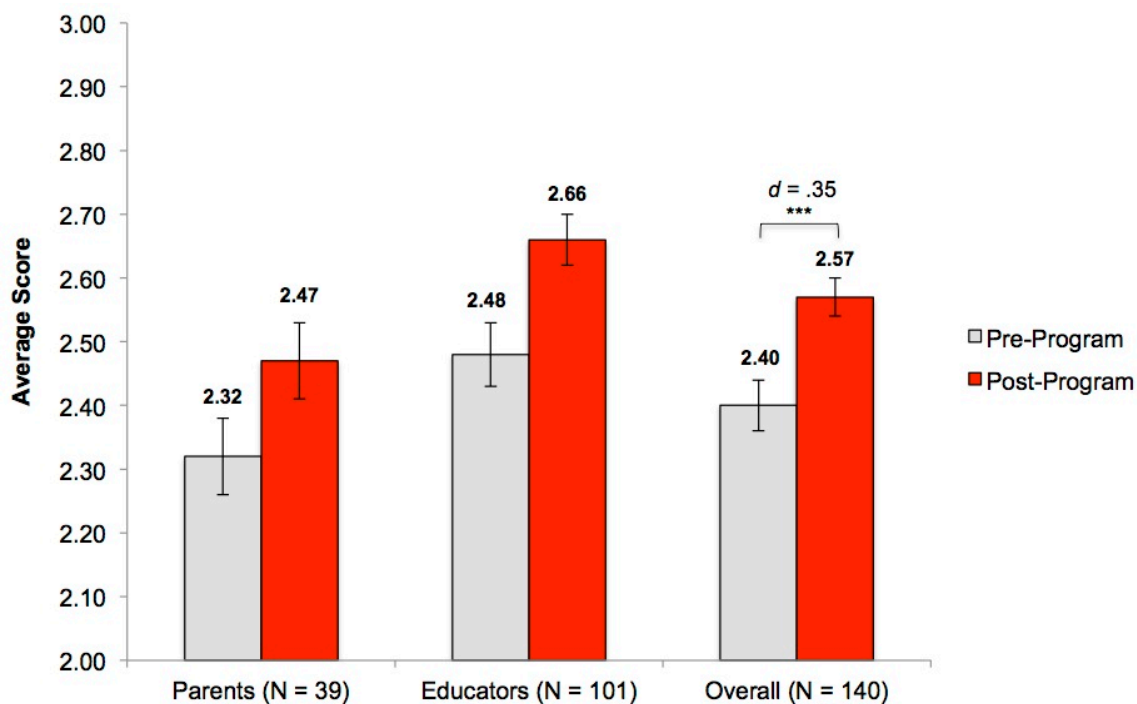
Note: All items appear as they did on the parent version of the survey. Items in red were phrased such that correct response was “disagree” or “strongly disagree.”

- **Question 2:** Is participation associated with more positive attitudes about what parents and educators can do to promote that development?

Here we compared parents' and educators' attitudes about their ability to promote language and literacy development as measured just prior to and immediately following their participation in the workshop or session. Attitudes were assessed by asking parents and educators how much they agreed with a series of five statements about their capacity to promote their child or students' language and literacy development. An overall score was calculated as the mean across the five items.

Figure 3 presents change in attitudes among parents, educators, and all participants. A statistically-significant increase in participants' assessment of their ability to improve their child or students' language and literacy development was observed for the sample as a whole. The size of the effect was 0.35, which exceeds the threshold for a substantively important finding. As was the case for knowledge, program participation was associated with improved attitudes among parents and educators.

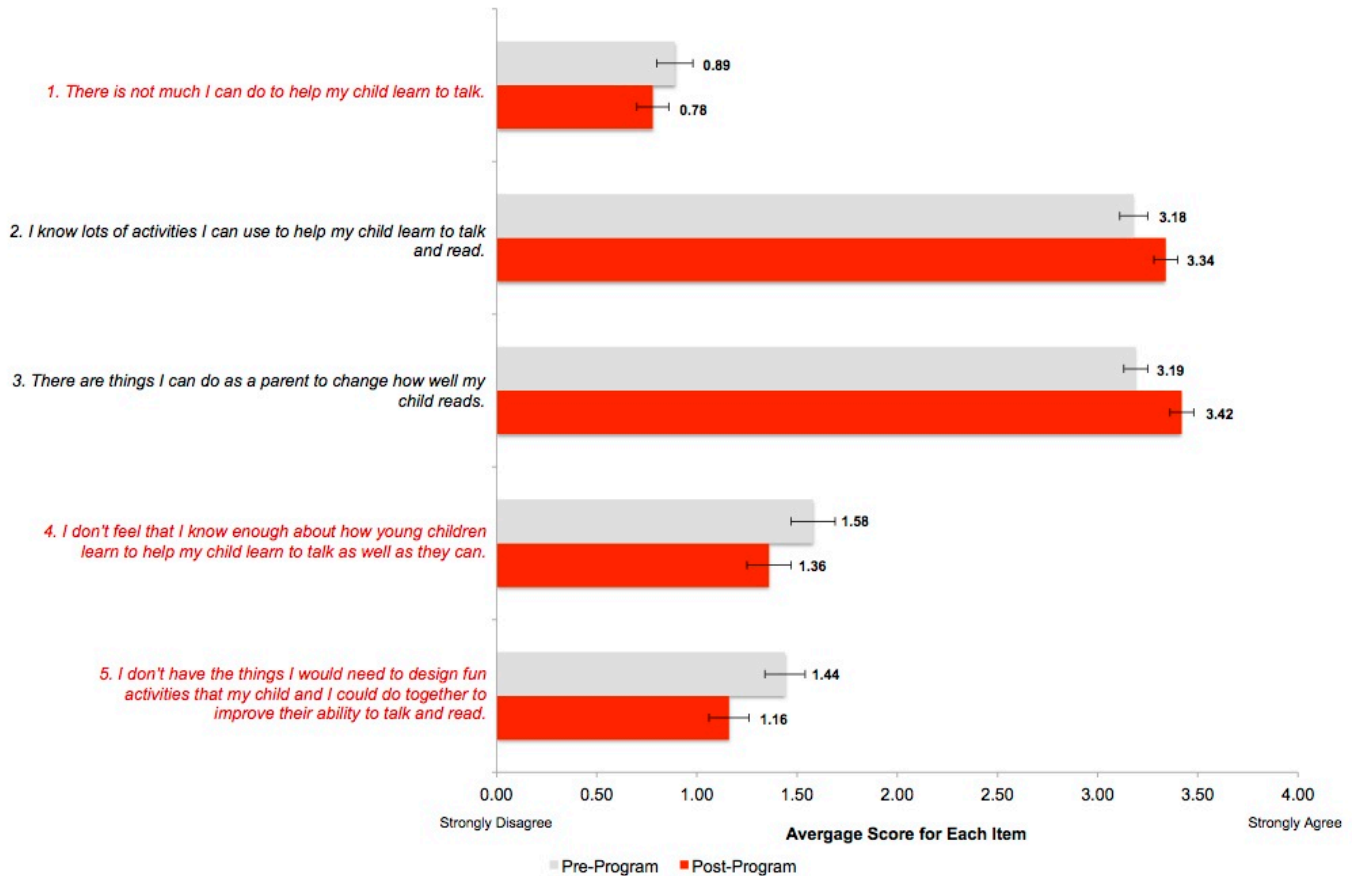
Figure 3. Change in Attitudes about Promoting Language & Literacy Development



Note: Estimates from the multilevel models described in Appendix A are reported. Error bars correspond to two times the standard error of the estimate. *** indicates that the difference in pre- and post-program scores was statistically significant ($p < .0001$).

As was the case for the questions assessing knowledge, while there was an overall improvement in attitudes the degree of improvement was not the same for all items. A particularly large improvement was observed for the fifth and final item, which asked whether parents and educators felt they had access to materials to create activities designed to foster their child's or students' language and literacy development, suggesting that *ATWTK* achieved one of its primary goals.

Figure 4. Change in Attitudes by Item



Note: All items appear as they did on the parent version of the survey. Items in red were phrased such that stronger disagreement corresponds to more positive attitudes.

- **Question 3:** Is participation associated with increased levels of behaviors that support language and literacy development?

While there was a modest increase in the frequency with which parents and educators reported engaging in behaviors that support language and literacy development, it was not statistically significant. In the following section we discuss reasons why this may have been the case.¹² **However, parents and educators did report using the materials provided at the workshop fairly frequently; on average, participants that they used these materials with the children or students “a couple of times each week.”**



¹² In our initial evaluation plan, we had hoped to examine the marginal benefits of attending family festivals hosted by the Museum to parents' knowledge, attitudes, and behaviors, above and beyond the benefits conferred by the workshops. However, only ten parents who participated in the workshops indicated that they also attended one or more family festivals. As a result, the standard errors for the estimates of marginal benefits were very large and the results of the analyses were unreliable. A similar problem arose when we analyzed whether attending multiple workshops was associated with especially large increases in knowledge, only 8 parents attended multiple workshops.

Conclusion

Two of the three guiding questions addressed by our evaluation can be answered in the affirmative: **program participation was associated with improved knowledge of language and literacy development, as well as more positive attitudes among parents and educators about what they can do to promote it. These effects were substantial, and, to extent that can be addressed here, universal, in that both they were observed across both parents and educators, and for people whose primary language was either English or Spanish.**¹³

Why is this important? In the first section of this report, we noted that families' socioeconomic status (SES) is associated with parents' linguistic interactions with their young children. These interactions (and those with educators) are associated with the development of early language skills, which, in turn, predict academic achievement at school entry. In other words, the bond between low SES and poorer academic achievement may be forged, in part, through the effects that less frequent and lower quality linguistic interactions have on young children's language and literacy development.

From a policy perspective, the question becomes how to break or disrupt this chain of relationships. The literature indicates that parents' knowledge of child development and their attitudes about what they can do to foster that development are related to their linguistic interactions with children, suggesting that one promising lever for intervention is to improve parents' and caregivers' knowledge and attitudes. While they await replication, **our results indicate that *ATWTK* accomplished this.**

Ideally, it would have been possible for us to demonstrate that program participation was also associated with increased levels of behaviors that support language and literacy development. Indeed, we had anticipated examining whether the degree of improvement in knowledge and/or attitudes predicted the size of this increase. Unfortunately, behaviors were measured in the follow-up survey and getting parents and caregivers to complete the survey proved very difficult, which may reflect the challenges faced by program participants.¹⁴ As a result, the association between program participation and behaviors reported above is based on a small proportion of the sample, and may not capture what

¹³ As noted in Appendix A, the possibility that participants with a certain role or who spoke a particular language might benefit disproportionately from the program was assessed by testing interaction effects. These interaction effects were not significant, and therefore there is no evidence that the associations between program participation and knowledge or attitudes held only for certain groups of participants.

¹⁴ These challenges may include varying work schedules featuring evening hours and the need to care of their children, whether participants were parents or educators. Anticipating these circumstances, we asked participants to indicate whether we could contact them, their preferred method of contact, and when we should contact them if their preferred method was the phone. Invitations to an online survey were sent via email to participants indicating that they would prefer to be contacted this way. The survey was formatted so that it could be completed on a computer or smartphone. Participants were sent multiple reminder emails and were then called at the time(s) indicated on multiple occasions. With the exception of the email invitation, the same procedures were followed for participants indicating that their preferred method of contact was phone.

would have been found if a larger number of participants had completed the follow-up survey.

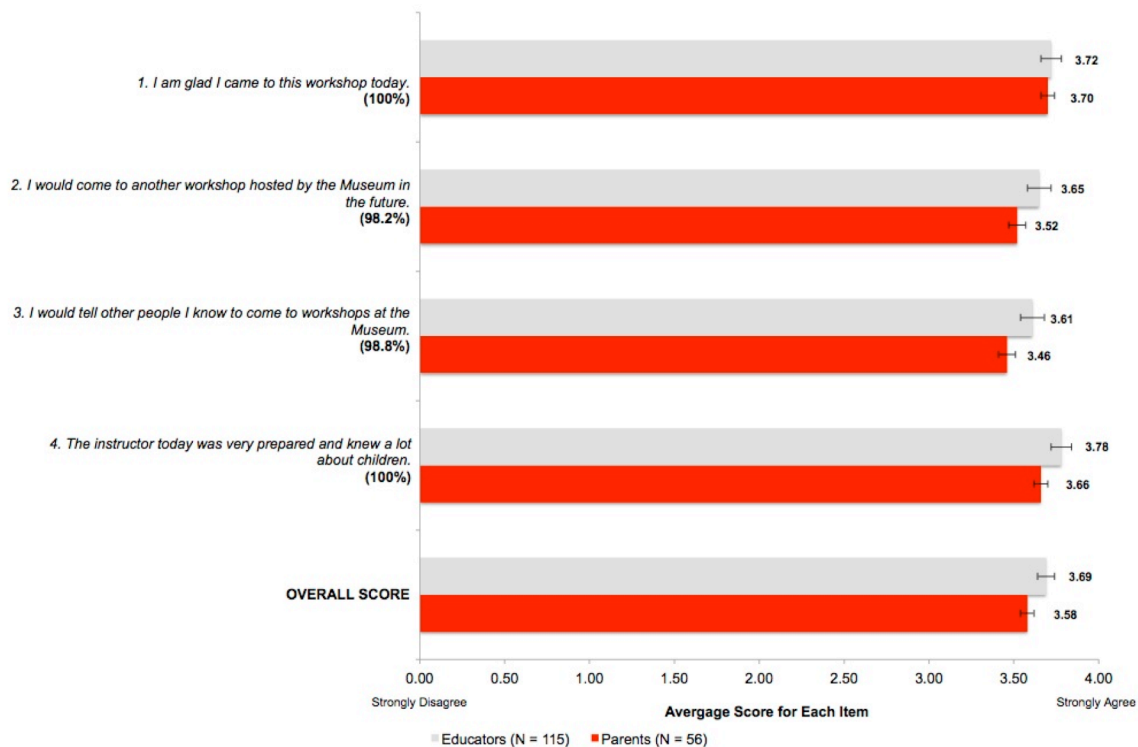
The associations between program participation and improved knowledge and attitudes may be attributable to the quality of the instruction. While this was not directly assessed, participants reported high levels of satisfaction with the program. On average, participants reported a level of satisfaction of approximately 3.5 out of 4 points, though there was a trend towards higher levels of satisfaction among educators. See the box below for additional information.



Participants' Satisfaction with the Program

Participants were asked to respond to four questions designed to assess their satisfaction with the program. Figure 5 displays mean responses to the four questions as a set and for each individual item for both parents and educators. As can be seen, responses are consistently high for each item and across both groups of participants. Perhaps most impressive is the fact that nearly all participants – between 98 and 100% – either agreed or strongly agreed with each item.

Figure 5. Levels of Satisfaction



Note: All items appear as they did on the parent version of the survey; the wording of items was slightly different for educators. Percentages under each question correspond to the proportion of the sample selecting “Agree” or “Strongly Agree” for that item.

A number of participants volunteered comments or feedback about the program. In general, these testimonials also reflected high levels of satisfaction with and enthusiasm for the program, with one site coordinator noting that “Parents are always asking, ‘Are they coming back next week?’” Comments included:

“My mother is a Spanish speaker and has not only been using the All the Way to K activities daily with my 16-month old son (she hung the poster on the refrigerator), but she now feels confident speaking in her native language to him more often. I have seen an increase in his ability to speak and recognize more words in Spanish.”

- Mother and program participant

“The ATWTK content will be easy and fun to use with daily activities in my classroom. Before the program I only thought of building literacy skills through reading, but now I see how it is part of talking about math and other classroom activities. I like the poster and am going to hang it in my classroom as a reminder.”

- ACS Childcare Provider, South Bronx

A complete list of comments can be found in Appendix B.

In summary, our evaluation yielded evidence that *ATWTK* improves parents' and caregivers' knowledge and attitudes regarding young children's language and literacy development. Just as important, the program achieved these effects among parents and caregivers living in areas of economic disadvantage. *ATWTK* may therefore offer a means to foster young children's early language development by improving their parents' and caregivers' knowledge and attitudes about it. This recommends the continuation and expansion of this very promising program.



Works Cited

- Bandel, E., Aiken, N., Vogel, C. A., Boller, K., & Murphy, L. (2014). *Observed Quality and Psychometric Properties of the CLASS-T in the Early Head Start Family and Child Experiences Survey*. OPRE Technical Brief 2014-34. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.
- Bingham, G. E. (2007). Maternal literacy beliefs and the quality of mother-child book-reading Interactions: Associations with children's early literacy development. *Early Education and Development, 18*, 23-49.
- Cartmill, E. A. (2016). Mind the gap: Assessing and addressing the word gap in early education. *Policy Insights from the Behavioral and Brain Sciences, 3*, 185-193.
- DeBaryshe, B. D. (1995). Maternal belief systems: Linchpin in the home reading process. *Journal of Applied Developmental Psychology, 16*, 1-20.
- Dickinson, D. K., McCabe, A., Anastasopoulos, L., Peisner-Feinberg, E. S., & Poe, M. D. (2003). The comprehensive language approach to early literacy: The interrelationships among vocabulary, phonological sensitivity, and print knowledge among preschool-aged children. *Journal of Educational Psychology, 95*, 465-481.
- Donahue, M. L., Pearl, R., & Herzog, A. (1997). Mothers' referential communication with preschoolers: Effects of children's syntax and mothers' beliefs. *Journal of Applied Developmental Psychology, 18*, 133-147.
- Gagnier, K. M., Holochwost, S. J., Fisher, K. R., & Lewis, S. (In Preparation). Measuring caregivers' language and literacy knowledge, beliefs, and self-reported behaviors.
- Hart, B., & Risley, T. R. (1995). Meaningful differences in the everyday experience of young American children. Paul H Brookes Publishing.
- Morgan, P. L., Farkas, G., Hillemeier, M. M., Hammer, C. S., & Maczuga, S. (2015). 24-month-old children with larger oral vocabularies display greater academic and behavioral functioning at kindergarten entry. *Child Development, 86*, 1351-1370.
- NICHD Early Child Care Research Network. (2005). Pathways to Reading: The Role of Oral Language in the Transition to Reading. *Developmental Psychology, 41*, 428-442.
- Ouellette, G. P. (2006). What's meaning got to do with it: The role of vocabulary in word reading and reading comprehension. *Journal of Educational Psychology, 98*, 554-566.
- Ramírez-Esparza, N., García-Sierra, A., & Kuhl, P. K. (2014). Look who's talking: speech style and social context in language input to infants are linked to concurrent and future speech development. *Developmental Science, 17*, 880-891.
- Rowe, M. L. (2008). Child-directed speech: relation to socioeconomic status, knowledge of child development and child vocabulary skill. *Journal of Child Language, 35*, 185-205.
- Suskind, D. L., Leffel, K. R., Graf, E., Hernandez, M. W., Gunderson, E. A., Sapolich, S. G., Suskind, E., Leininger, L., Goldin-Meadow, S., & Levine, S. C. (2016). A parent-directed

language intervention for children of low socioeconomic status: A randomized controlled pilot study. *Journal of Child Language*, 43, 366-406.

Weisleder, A., & Fernald, A. (2013). Talking to children matters early language experience strengthens processing and builds vocabulary. *Psychological Science*, 24, 2143-2152.

U.S. Department of Education. (2015). *What Works Clearinghouse: Procedures and Standards Handbook*. Washington, DC: Institute of Educational Sciences, U.S. Department of Education.

Appendix A: Technical Appendix

METHOD

Participants & Recruitment

Prior to the beginning of the workshop or session, parents and early childhood educators (ECEs) were invited to participate in the evaluation using a protocol approved by Institutional Review Boards of Johns Hopkins University and the New York City Department of Education. Of 125 parents who attended the workshops, 63 (50.4%) agreed to participate; of 136 ECEs who attended the professional development sessions, 119 (87.5%) agreed.

Of the 63 parents who agreed to participate in the research, 56 (88.9% of parents) completed the pre-survey, 57 (90.5%) completed the post-survey, and 50 parents (79.4%) completed both surveys. Although 37 parents agreed to be contacted for the follow-up survey, only seven parents (11.1%) completed it. Of the 119 participating educators, (87.4% of educators) completed the pre-survey, 118 (99.2%) completed the post-survey, and 103 educators (86.6%) completed both surveys. Sixty-two educators agreed to complete the follow-up survey, but only 13 (10.9%) did so.

Demographic data were drawn from the pre-survey, and therefore were only available for individuals who completed that survey. Percentages were calculated as the proportion of individuals who completed the pre-survey, and are presented in Table A1 below. Note that totals may not sum to 100% due to an individual choosing not to respond to a particular item.

Table A1. Distribution of Attendees by Gender and Race/Ethnicity

	Parents	Educators	Overall
Gender			
- Female	56 (100%)	98 (94.2%)	154 (96.3%)
- Male	0	4 (3.8%)	4 (2.5%)
Latino/Hispanic			
- Yes	38 (67.9%)	78 (75.0%)	116 (72.5%)
- No	17 (30.4%)	24 (23.1%)	41 (25.6%)
Survey Language			
- English	44 (69.8%)	71 (59.7%)	115 (63.2%)
- Spanish	19 (30.2%)	48 (40.3%)	67 (36.8%)

Measures

For both parents and educators, the pre- and post-program surveys asked parallel questions regarding attendees' knowledge of children's language and literacy development (10 items; see Figure 2 of the main text). Four of these items (numbered 1, 3, 4 and 10) were adapted from a measure developed by Suskind and her colleagues (Suskind et al., 2016). The remaining items were taken from a survey developed by Johns Hopkins University's Science of Learning Institute (Gagnier et al., In preparation). All items were asked on a 5-point scale ranging from 1 = Strongly disagree to 5 = Strongly agree. For six of the items, the correct response was agree, and therefore responses of "Agree" (4) and "Strongly agree" (5) were considered correct. For the remaining items, the correct response was disagree, and therefore responses of Strongly disagree (1) and Disagree (2) were considered correct. An overall index of knowledge was calculated as the proportion of correct responses for participants who responded to at least eight of the ten questions. The proportion of items correct was calculated out of ten for participants who answered either eight or nine questions, so as not to inflate the scores of participants who skipped items.

Parents and educators were also asked to rate the extent to which they believed they could promote their child or students' language development (5 items) using the same 5-point scale (see Figure 4 in the main text). Responses across these five items were averaged to yield a composite attitudes score for participants who answered all items. Internal consistency was marginal for the pre-program survey ($\alpha = .51$) and acceptable for the post-program survey ($\alpha = .65$).

The post-program survey also included ten questions that asked attendees to rate how often they engaged in behaviors known to promote children's language and literacy development on a four-point scale ranging from 0 = Less than once a month to 3 = Almost every day. A composite score was calculated as the mean of responses across these items for participants who answered at least six items. These same questions were asked on the follow-up survey, along with four additional items assessing how often attendees used the activities presented at the workshop as part of these behaviors. For the questions about behaviors, internal consistency was acceptable for the pre-program survey ($\alpha = .73$), but was low for the follow-up survey ($\alpha = .23$). For the four additional items, internal consistency was acceptable ($\alpha = .65$). The behavior and satisfaction items from the parent survey are listed in Table A2 below. The items in the educators' survey addressed the same content, but referenced educators' students.

The post-program survey included four items assessing attendees' satisfaction with the session using the same 5-point scale employed for the knowledge and attitudes items (see Figure 5 of the main text). A composite satisfaction score was calculated as the mean of the four items. Internal consistency for this measure was good ($\alpha = .87$).

Data Management

Following data collection, all survey data were de-identified and scanned. Data were entered and a random selection of 20% of the surveys were compared against the scanned measures to ensure accuracy of entry prior to analysis. All de-identified data were contained in single file stored on WolfBrown's server.

Table A2. Items Regarding Behaviors and Use of Materials

Items Regarding Behaviors
How often do you talk to your child about the sounds that letters make?
How often do you talk to your child about the shapes of letters (such as "straight", "curvy")?
How often do you have your child practice writing letters?
How often do you correct your child when he or she says "me like bananas" instead of "I like bananas"?
When your baby makes babbling noises (like "babababa"), how often do you make silly noises back?
How often do you talk to your child about what they're doing, like "Oh, you're putting the baby to bed?" or "You're getting fussy because you're hungry."
How often do you point to things and label them to help your child learn new words?
How often do you ask your child questions when you read?
When you are reading to your child, how often do you let your child interrupt the story to ask questions?
When you read, how often do you ask your child to point out different letters or numbers that are printed in the book?
Items Regarding Use of Materials
In the last 6 to 8 weeks, how often did you use the materials or activities you learned at the workshop when doing any of the behaviors listed above?
In the last 6 to 8 weeks, how often did you and your child use the worksheet that you received at the workshop?
In the last 6 to 8 weeks, how often did you spend time singing to your child since attending the workshop?
In the last 6 to 8 weeks, how often did you and your child do some of the activities featured in the workshop, such as making a family photo album?

Data Analysis

Data analysis proceeded in three steps.

In Step 1 we conducted preliminary analyses to investigate whether post-program or follow-up measures of knowledge, attitudes, or behaviors were related to the respondents' role (parent or educator), their race/ethnicity, or the language in which the survey was administered, and to assess whether missingness post-program scores was related to these factors and/or pre-program scores. We also examined descriptive statistics (means and standard errors) for each measure for the sample as a whole and within the parent and ECE sub-samples.

In Step 2 we examined pre-program, post-program, and follow-up scores for the subset of participants who provided data on pairs of measures (e.g., pre- and post-program). We conducted a series of paired-samples *t*-tests to examine whether mean differences in pre- and post-program or pre-program and follow-up scores were statistically significant prior to adjusting for relevant covariates or the nested structure of the data. Given that post-program knowledge and attitudes scores were correlated ($r(163) = .34, p < .001$), the level of α was subject to a Bonferroni adjustment for multiple (in this case, two) tests, and therefore adjusted $\alpha = .05/2 = .025$.

In Step 3 a series of multi-level linear models were conducted using the MIXED procedure in SAS to examine whether results obtained thus far were robust to the inclusion of covariates and corrections for the nested data structure. The data file was restructured so that time (pre-program and post-program/follow-up collection) was nested within participants, who were in turn nested within particular occurrences of workshops or sessions. Levels of each measure that was administered in a repeated fashion (knowledge, attitudes, and behavior) at the j^{th} point in time for the j^{th} individual attending the k^{th} workshop or session were estimated according to the following equation:

$$measure_{ijk} = intercept + time_i + role_{ij} + error_{ijk}$$

Note that the participants' role (parent or educator) is included in the model as a covariate while race/ethnicity and the language in which the survey was administered are not (see results of preliminary analyses below). Unlike the paired samples *t*-tests, models used all available data under full information maximum likelihood. As series of random effects models indicated that a substantial portion of the variance in knowledge (22.1%, $p = .029$), attitudes (5.7%, $p = .124$), and behaviors (17.8%, $p = .058$) was attributable to the particular workshop or session participants attended.

After estimating the models according to the equation above, two subsequent models were run. The first added an interaction between *time* and *role* to examine whether the association between program participation and change in knowledge, attitudes, or behavior may vary as a function of whether the participant was a parent or educator. The second added an interaction between *time* and *language*; this allowed us to assess whether change varied as a function of the language in which the survey was administered.

When the parameter estimate for *time* was significant, the size of the main effect was calculated by dividing the difference in the model-implied estimates for pre-program and post-program or follow-up scores by the observed standard deviation of the pre-program scores.

FINDINGS

Preliminary Analyses (Data Analysis, Step 1)

Identification of Covariates. Educators reported significantly higher levels of knowledge ($t(170) = 4.43, p < .001$) and more positive attitudes ($t(164) = 2.79, p < .001$) on the post-program surveys than parents, and reported more frequent engagement in behaviors thought to promote children's language and literacy behaviors on the follow-up survey at the trend level ($p = .155$). This indicated that the participant's role (parent or educator) should be included as a covariate in subsequent analyses. No differences in these measures were observed as a function of respondents' race/ethnicity or the language in which the survey was administered.

Post-program knowledge scores were missing for 10 participants (5.5% of the sample). Post-program attitude scores were missing for 16 participants (8.8%), while follow-up behavior scores were missing 162 participants (89%). Parents were significantly more likely to be missing post-program knowledge ($Wald(1) = 4.56, p = .033$) and attitude ($Wald(1) = 4.56, p = .033$) scores than educators.

Race/ethnicity, the language in which the survey was administered, and pre-program scores were not related to the missingness of post-program or follow-up data.

Descriptive Statistics. Table A3 presents descriptives for each measure for the sample as a whole and within the parent and ECE sub-samples using all available data.

Table A3. Descriptive Statistics for Each Measure

	Parents			Educators			Overall		
	N	M	SE	N	M	SE	N	M	SE
Knowledge (scale: 0 – 1)									
- Pre-program	52	.58	.02	100	.64	.02	152	.62	.01
- Post-program	56	.64	.02	116	.73	.01	172	.70	.01
Attitudes (scale: 0 – 4)									
- Pre-program	46	2.31	.06	104	2.50	.05	150	2.44	.04
- Post-program	49	2.47	.05	117	2.67	.04	166	2.61	.03
Behavior (scale: 0 – 3)									
- Pre-program	52	2.25	.08	98	2.43	.04	150	2.61	.03
- Follow-up	7	2.26	.24	13	2.55	.06	20	2.45	.10
Use of materials									
- Follow-up (only)	7	1.69	.35	12	2.17	.21	19	1.99	.19
Satisfaction (scale: 0 – 4)									
- Post-program (only)	55	3.58	.06	117	3.69	.04	172	3.66	.03

While the differences in mean levels of knowledge and attitudes from pre- to post-program are suggestive of increasing levels of these constructs within participants, it may also be the case that these differences are attributable, at least in part, to the shifting composition of the sub-samples for which data were available at each time point. Assessing this possibility requires a more thorough examination change over time within participants.

Examining Change Over Time (Data Analysis, Steps 2 & 3)

To examine change over time within participants we ran paired sample *t*-tests using only the sub-sample for which data were available at both time points. The results are summarized in Table A4 below.

Table A4. Summary of Paired-Samples *t*-Tests

	Parents			Educators			Overall		
Knowledge (scale: 0 – 1)	<i>N</i>	<i>M</i>	<i>SE</i>	<i>N</i>	<i>M</i>	<i>SE</i>	<i>N</i>	<i>M</i>	<i>SE</i>
- Pre-program	46	.57	.02	97	.64	.02	143	.62	.01
- Post-program	46	.63	.02	97	.73	.01	143	.70	.01
	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>
- Difference	.06	2.42 (45)	.020	.09	5.51 (96)	< .001	.08	-5.90 (142)	< .001
Attitudes (scale: 0 – 4)	<i>N</i>	<i>M</i>	<i>SE</i>	<i>N</i>	<i>M</i>	<i>SE</i>	<i>N</i>	<i>M</i>	<i>SE</i>
- Pre-program	39	2.29	.06	101	2.52	.05	140	2.45	.04
- Post-program	39	2.45	.06	101	2.67	.04	140	2.61	.03
	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>
- Difference	.17	2.97 (38)	.005	.16	3.23 (100)	.002	.16	4.18 (139)	< .001
Behavior (scale: 0 – 3)	<i>N</i>	<i>M</i>	<i>SE</i>	<i>N</i>	<i>M</i>	<i>SE</i>	<i>N</i>	<i>M</i>	<i>SE</i>
- Pre-program	7	2.63	.15	13	2.51	.07	20	2.55	.07
- Follow-up	7	2.26	.24	13	2.55	.07	20	2.45	.10
	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>	<i>M_{diff}</i>	<i>t</i> (df)	<i>p</i>
- Difference	-.37	1.36 (6)	.223	.05	0.52 (12)	.612	-.10	0.86 (19)	.400

Our multilevel models yielded results that were consistent with the pattern of descriptives reported in Table A4:

There was a significant effect of *time* on knowledge scores ($t(142) = 6.03, p < .0001$), such that post-program scores were higher ($Est. = .68, SE = .02$) than pre-program scores ($Est. = .60, SE = .02$) after controlling for the role (parent versus educator) of the participant. Dividing difference in the model-implied pre- and post-program scores (.08) by the observed standard deviation for the pre-program scores ($SD = .16$) yielded an effect estimate of $d = 0.50$.

The interaction between *time* and *role* was not significant ($p = .277$), indicating that the association between program participation and increased knowledge did not vary for parents and educators. The interaction between *time* and *language* was also not significant ($p = .867$), indicating that the language in which the survey was administered was not associated with variable increases in knowledge.

There was also a significant of *time* on attitudes ($t(139) = 4.27, p < .0001$): post-program scores ($Est. = 2.56, SE = 0.04$) exceeded pre-program scores ($Est. = 2.40, SE = 0.04$). The size of the effect was $d = 0.35 ((2.56-2.40)/0.46)$. Neither the interactions between *time* and *role* ($p = .682$) or *time* and *language* ($p = .760$) was significant.

While follow-up levels of behavior exceeded initial levels at the trend level, there was no effect of *time* on behavior ($p = .695$), nor was there a significant interaction between *time* and *role* ($p = .328$) or *time* and *language* ($p = .095$).

Appendix B: Comments and Testimonials by Participants

Here we present comments and testimonials offered by parents and educators who participated in a workshop, family festival, or professional development session, or (in two cases) from an administrator at a childcare center that hosted a family workshop.

While our quantitative analyses could not include the family festivals, the testimonials provided by participating families suggest that parents also found these events valuable.

Comments from Educators and Administrators

“The ATWTK content will be easy and fun to use with daily activities in my classroom. Before the program I only thought of building literacy skills through reading, but now I see how it is part of talking about math and other classroom activities. I like the poster and am going to hang it in my classroom as a reminder.”

- ACS Childcare Provider, South Bronx

“Very dynamic! PD’s usually put me to sleep.”

- Educator, Cardinal McCloskey

“I learned a lot. I’m planning on using what I learned with my students. I’m going to practice these activities at home. The session was very active and a lot of fun.”

- Educator, Cardinal McCloskey

“This was great, what are you guys doing next?”

- Site coordinator, Children’s Center

“Parents are always asking, ‘Are they coming back next week?’”

- Site Coordinator, Cardinal McCloskey

Comments from Parents Attending a Workshop

“My mother is a Spanish speaker and has not only been using the All the Way to K activities daily with my 16-month old son (she hung the poster on the refrigerator), but she now feels confident speaking in her native language to him more often. I have seen an increase in his ability to speak and recognize more words in Spanish.”

“It’s a fantastic activity and I think everyone should do it.”

“I learned a lot and I hope to do the activities at home with my kid.”

Comments from Parents Attending a Family Festival

"The workshop was very informative and educational and so fun. The kids really enjoyed it. The people in charge are so warm and friendly."

"During the workshop, I enjoyed storytelling. It was interactive and increased student literacy skills."

"An idea I will take home with me, is how children can have fun with simple things."

"Something I learned today, was that kids learn through play."

"I enjoyed the different workshops and different activities for the kids to do. I even enjoyed it for myself!"

"The workshop was very hands-on."

"The workshop gave me a chance to spend time with my daughter. I learned different things to do with my child. She loves arts & crafts!"

"The workshop was very entertaining, and kept kids engaged."

"I enjoyed hands-on puppet making during the workshop, along with the interaction in the reading and movement."

"I really enjoyed the story time portion of the workshop. It was very animated."

"I enjoyed the workshop's art activity and the incorporation of song and dance into the story time."

"I enjoyed the educator's energy and interaction with the project, and enjoyed making the puppet with my kid. I think I'll make puppets at home with my child now."

"I really enjoyed all of the family activities in today's workshop."

"The workshop included interactive activities for all ages. I learned how children work well with parents in arts and crafts. The sensory bags are very therapeutic, I want to make them for my child's next birthday party!"

"Staff has a great interaction with the kids. I've learned a new arts and crafts project for my daughter."

"Through this workshop, I learned that my child is very creative. At home I plan to let her be more hands-on with her arts & crafts."