Inside Early Talk

LENA®

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Why pay attention to early talk?

More than two decades ago, a novel idea began to form in the minds of scientists: Early talk and interaction are the construction crew that creates foundational brain architecture in children.

At the time, testing this hypothesis meant relying solely on observational data. But now, with LENA's one-of-a-kind "talk pedometer" technology, along with functional magnetic resonance imaging (fMRI), researchers can use the power of data to look inside children's talk environments and understand how early interactions shape the brain.

The results have been extraordinary — and a testament to our co-founder Terry Paul's genius and vision. We've seen how an automated measurement tool can unlock insights into children's early learning experiences that were unimaginable earlier in our lifetimes. We've learned that children who have more back-and-forth conversations in the first few years of life are smarter as teenagers. And beyond that, we've begun homing in on substantive solutions — answers to the question of where the greatest opportunities exist for adults to better nurture the growing brains of children in their care.

In this report, we're excited to share never-before-seen early talk data that we've collected from thousands of children, families, and teachers who have participated in LENA programs. These data show how important a tool LENA has become for policymakers, funders, and program implementers. They can see how supporting caregiver focus on early talk helps ensure the success and well-being of all children. These data should strengthen the case that immediate action is needed. LENA's program models comprise one effective approach, and a brief explanation of them is provided at the end of this report.

We will never again get this opportunity to set today's young children on a lifelong course that maximizes their learning potential. The first step in building a more equitable foundation is to understand children's earliest learning experiences from their perspective, inside early talk.
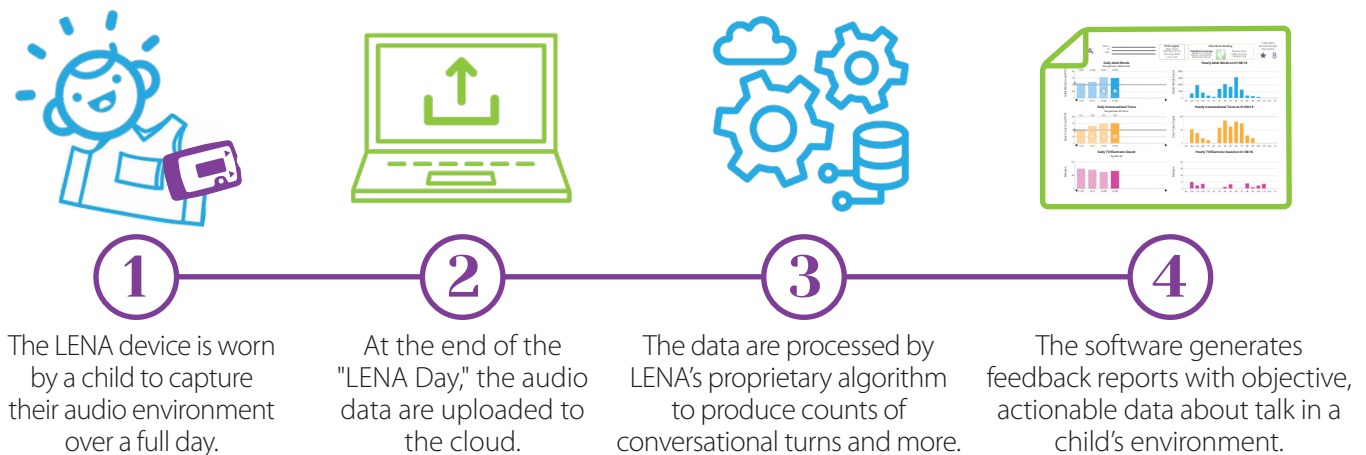
Best,

Dr. Jill Gilkerson
Chief Research and Evaluation Officer, LENA
March 2021

How does LENA measure talk?

Our technology

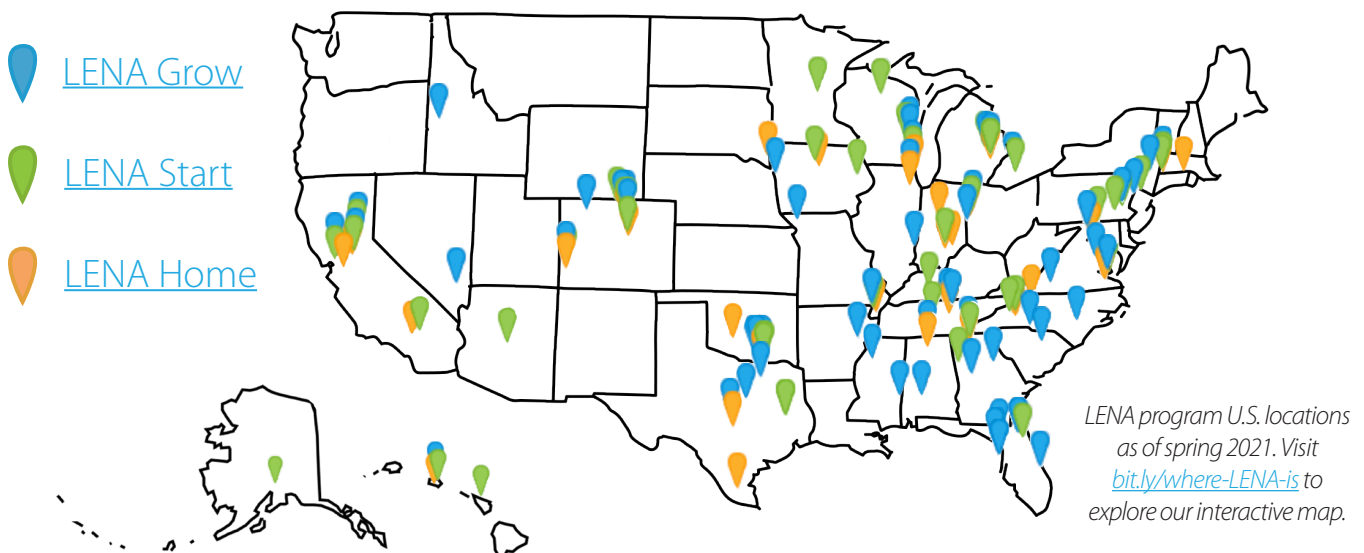LENA's one-of-a-kind "talk pedometer" technology measures a child's talk environment to provide objective data to caregivers on how much talk each child is experiencing. When we say "talk," we mean any speech-like, non-cry sound — from a baby's coo to a 3-year-old's story full of made-up words. Here's how it works:

1 The LENA device is worn by a child to capture their audio environment over a full day.

2 At the end of the "LENA Day," the audio data are uploaded to the cloud.

3 The data are processed by LENA's proprietary algorithm to produce counts of conversational turns and more.

4 The software generates feedback reports with objective, actionable data about talk in a child's environment.

Our sample

Through LENA's programs for families and early childhood teachers — LENA Grow, LENA Start, and LENA Home — the data are combined with strengths-based coaching that helps caregivers make measurable, sustainable increases in how much they talk with children.

To conduct the analyses presented in this report, we compared subsets of baseline data on the language environments of over **10,000 children across more than 120 LENA program sites nationwide:**

LENA Grow

LENA Start

LENA Home

LENA program U.S. locations as of spring 2021. Visit bit.ly/where-LENA-is to explore our interactive map.

Finding 1: 40 conversational turns per hour is a new benchmark for caregivers.

As an organization focused on measuring early talk, one of the questions LENA gets most often is how much talk is the "right" amount for optimal brain development. Is there a universal daily goal, the talk equivalent of 10,000 steps, that all caregivers should be trying to reach?

While our general guidance remains "more talk is better," a 10-year longitudinal study we published in 2018 has enabled us to dive more deeply into this question. The results of that study showed that children who engaged in more conversational turns between the ages of 18 and 24 months had higher IQ scores in adolescence.[1] **But how many conversational turns were needed to see a difference in IQ scores?**

What are conversational turns?

Conversational turns are simple, back-and-forth alternations between a child and an adult. They are LENA's proxy for "serve and return" interactions.

LENA technology is unique in that it can automatically count conversational turns experienced by a child across a whole day. Learn more at LENA.org/conversational-turns.

[1] Gilkerson, J., Richards, J. A., Warren, S. F., Oller, D. K., Russo, R., & Vohr, B. (2018). Language experience in the second year of life and language outcomes in late childhood. *Pediatrics*, 142 (4). doi: 10.1542/peds.2017-4276

Looking at the relationship between conversational turns and Full Scale IQ and Verbal IQ scores, we see that the potential benefit begins plateauing above 40 turns per hour:

Middle School Full Scale IQ by Hourly Turn Count at Age 18-24 months
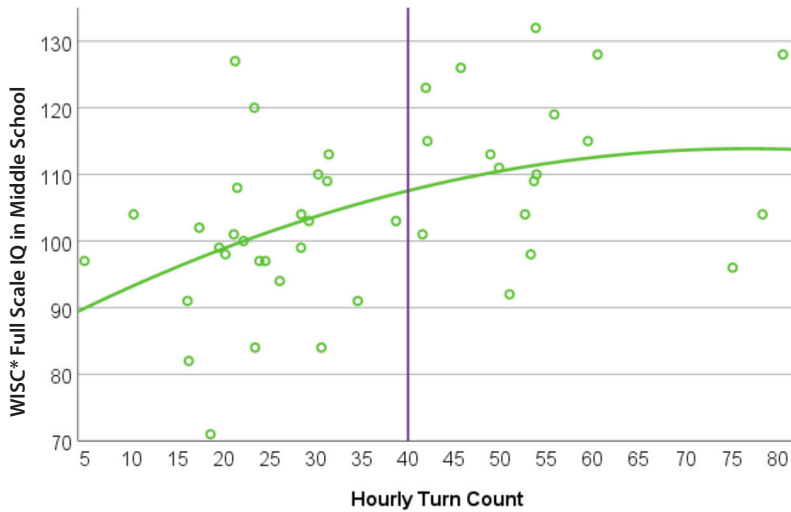
Up to 40 conversational turns per hour, each increase of two turns per hour is associated with a one-point increase in Full Scale IQ. Above 40, returns diminish and the same IQ increases require greater increases in turns.

Those children who engaged in at least 40 turns per hour had Full Scale IQ scores that were on average 31 percentile points (12.9 standard score points) higher and Verbal IQ scores that were 38 percentile points (16.6 standard score points) higher than those who engaged in fewer turns.

Middle School Verbal IQ by Hourly Turn Count at Age 18-24 months
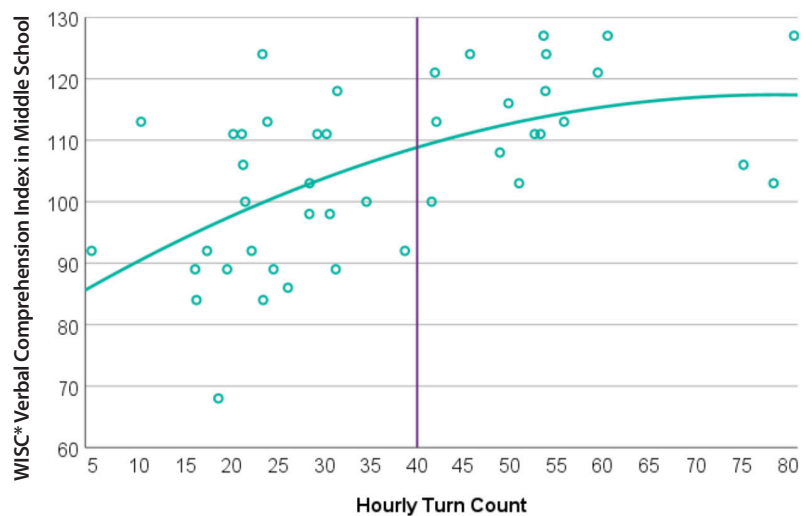
Conclusion: If your program is seeking to measurably improve school readiness and cognitive development, support caregivers in striving for 40 turns per hour per child. **On the journey to 40, remember that every increase of two turns has a statistically significant impact**. Potential benefits are indicated in the age range of 18–24 months. More broadly, we recommend this goal for all ages. Instilling quality interactive behaviors early establishes important habits.

WISC: Wechsler Intelligence Scale for Children

Finding 2: High-turn families demonstrate attainable patterns of talk.

Knowing that 40 turns per hour can seem like a formidable goal, we wanted to see how families achieved it. Looking at a representative sample of 195 of our high-turn families (at or above 40 turns per hour on average), we found some interesting results.

Read more about some of the people behind the data: bit.ly/LENA-Best-Memories.

#1

High-talk families aren't talking nonstop!

In a 12-hour day, they are only meeting or exceeding the 40-turn threshold for about eight of those hours.

*Hourly Turn Count* vs *Hour of Recording Day*
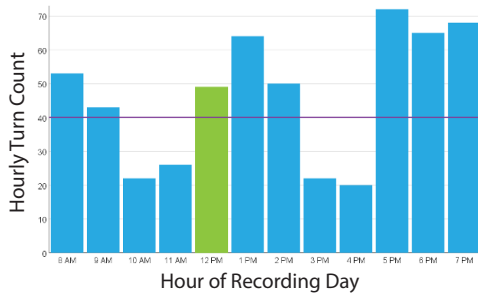
As an example, this graph shows that turns were relatively low for four of the 12 hours, while some hours were quite high. In practical terms, caregivers need breaks and children need quiet time for naps or independent play.

#2

They're not talking for the whole hour!

Looking at the eight hours that had 40+ turns, we found those turns were not evenly distributed. Instead, there were usually about 25 high-intensity minutes, with eight to 10 turns over a five-minute period.

5-Minute Turn Count vs *12:00 Hour: 5-Minute Periods*
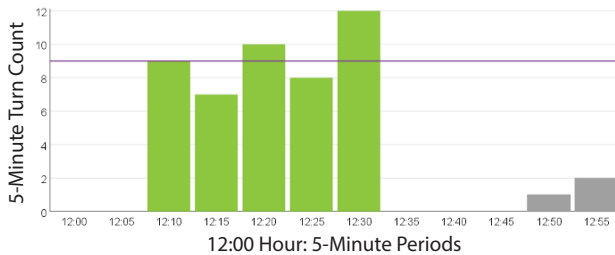
Zooming in on 12-1 p.m., this graph illustrates how parents were spending five five-minute "chunks" of time in more intensive back-and-forth activity – only 25 minutes of the hour.

#3

The message is simple: Double down!

It boils down to getting two turns per minute in those high-activity sessions. If parents and other caregivers can carve out some focused time with their little one, advise them to try to set aside 25 minutes. During that time, it's all about two quality turns per minute. Essentially, if they can get one turn, try to go for one more!

1-Minute Turn Count vs *12:10-12:35: High Activity Period*
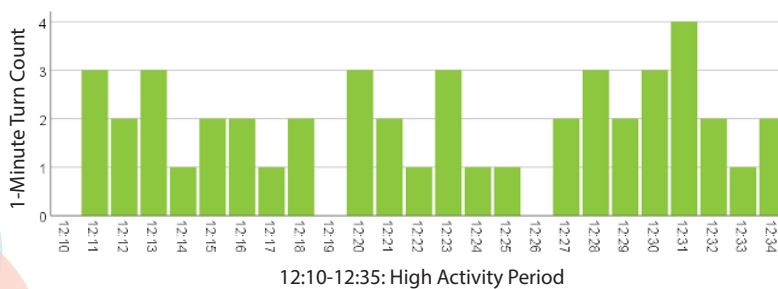
Zooming in on a 25-minute, high-activity turns session, we see that some minutes were quiet, while others had one to three turns. Again, high-talk caregivers aren't talking nonstop!

Putting research into practice: How do we translate these data into behavioral changes for individual caregivers?

Distilling the research into concrete behavioral goals can help parents and other caregivers incorporate it into their daily routines. Illustrating those goals in a simple graphic like the one below can make them more approachable.

Download a copy of this graphic to share with families at info.lena.org/more-talk.

Make time for talk

Try to find 25-minute blocks during the day when you can focus on talking with your child.

Talk about what you're doing and thinking. Turn daily routines and activities into opportunities for talk.

Avoid too much screen time when your child isn't interacting with anyone, or use TV time as an opportunity to talk about what's happening in the story they're watching.

Build more back-and-forth

Double down: each time you get one back-and-forth exchange with your child, try to make it two!
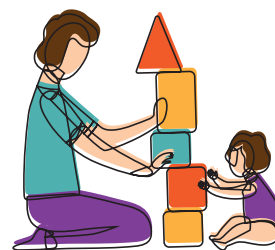
Tune in and respond to what they look at, do, and say. Notice what your child is interested in and engage with them on that topic.

Avoid interrupting or appearing disinterested when your child tries to talk back to you or get your attention.

Finding 3: Home settings are consistently higher in interactions than child care settings.

As we've hopefully made clear by now, **every** environment where children are interacting with adults matters and presents opportunities for rich engagements and relationships. LENA data make it undeniable, however, that children are generally experiencing vastly more turns at home. This finding is unsurprising since at home children are with familial caregivers, interactions with adults tend to be spread across fewer children, and there are often less frequent conversational interruptions throughout the day.

At home, children engage in

73% more

conversational turns, and

they hear

28% more

adult words than children in a traditional child care environment.

Here's a breakdown of how different caregiving environments compare in terms of early talk:

Hourly Conversational Turns by Age Group and Setting

Home   **Family child care**   **Center-based child care**

Average Hourly Conversational Turns During the Day

Age Group
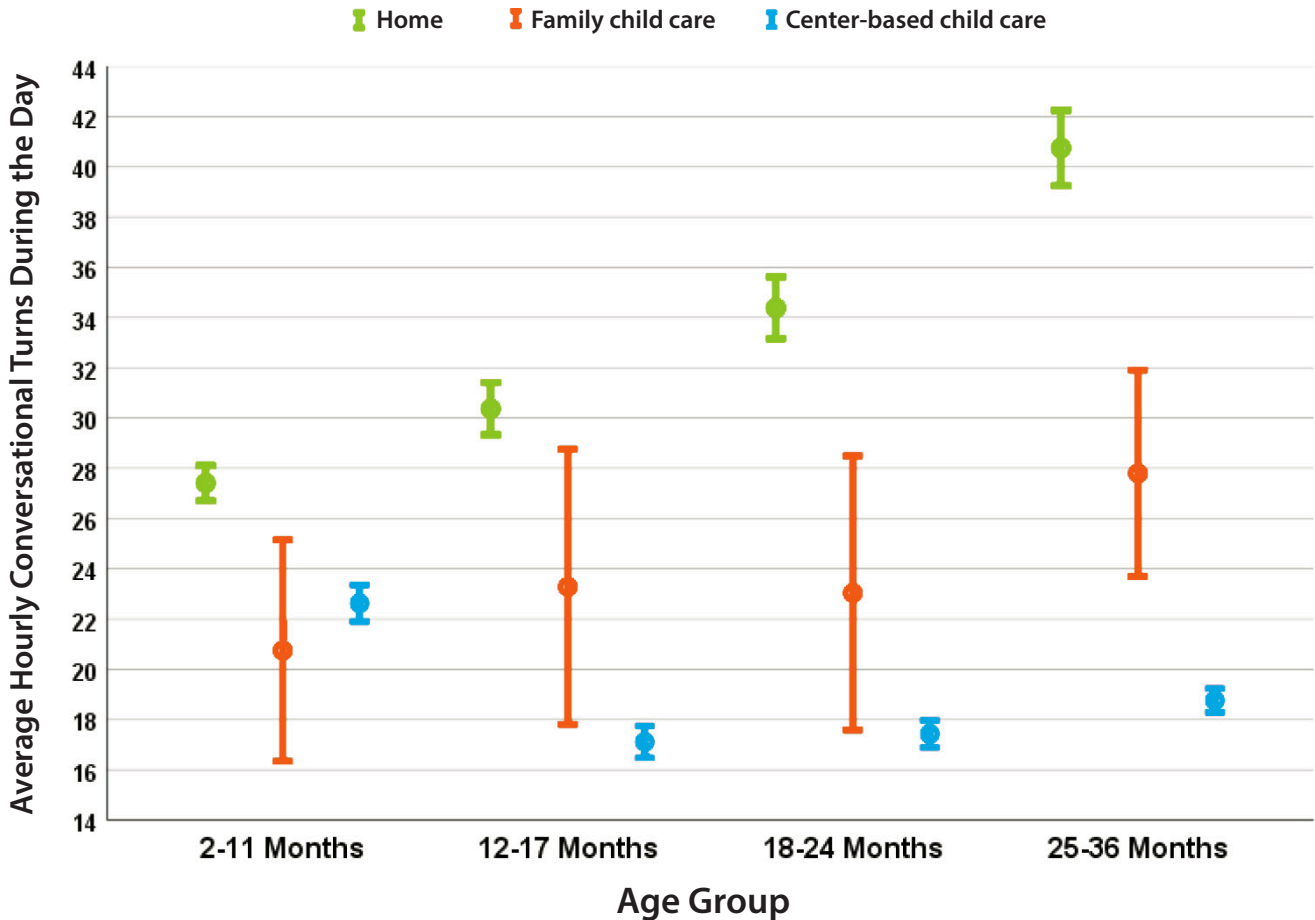
Although there are fewer children in the family child care (FCC) sample, our data show early indications that they fall in between home and child care settings for words and turns at 12 months of age. Interestingly, this first look at FCC data supports the idea that they are closer to approximating the home environment than child care centers, perhaps because there are fewer children and a quieter environment. We will continue to monitor how these environments compare as we gather data from a larger sample.

Read more about some of the people behind the data: bit.ly/Colorado-FCC and bit.ly/Georgia-FCC.

Inside child care: Our perspective

Early child care environments vary widely with respect to factors that influence quality, such as teacher training and credentialing, workforce salaries, and adult-to-child ratios. These are critical levers for improving the landscape of early care and education and increasing options for working families. However, they also constitute systemic challenges that have developed over decades and will take time to resolve through policy.

That is time that today's young children do not have. In addition to policy resolutions, we need more immediate interventions — actions that both improve quality for individual children and add up to statistically significant improvements for all. As you will see in the findings that follow, children are experiencing wide variability in language and interaction across early learning environments, which creates disparities that only widen as they enter school.

Early interactions are foundational to all the later learning and life successes that follow. Increasing the quality and quantity of interactions is an area where we can have an immediate, profound, and scalable impact that improves outcomes for children.

Finding 4: In child care, interactions are the lowest when they matter most.

LENA's 2018 longitudinal study found that children who engaged in more conversational turns as toddlers showed higher IQ scores, verbal comprehension, vocabulary, and other language skills in adolescence (read more at LENA.org/longitudinal-study).

Increased words & turns

Increased IQ & language skills

The period between 18 and 24 months turned out to be especially predictive and statistically significant, indicating a "key window" for adult-child engagement. Since developmentally this is also a period where children are becoming more verbal and able to express themselves, the hope would be that interaction with adults also naturally increases. Unfortunately, our data suggest that this is not necessarily the case in child care settings.

> **"**
>
> *The early environment influences every aspect of child development; in addition to effects on cognitive and language outcomes, recent work has also shown that parent–child verbal interactions also have effects on social–emotional development. This speaks to the importance of early language exposure in every domain of early learning and also to the agency with which children elicit stimulation from their caregivers and their environment.*
>
> — Alan L. Mendelsohn and Perri Klass in *Pediatrics*[2]
>
> **"**

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[2] Mendelsohn, A., & Klass, P (2018). Early language exposure and middle school language and IQ. *Pediatrics*, 142 (4). doi: 0.1542/peds.2018-2234

LENA's longitudinal research showed that conversational turns experienced by children 18-24 months of age were most predictive of verbal skills and IQ in middle school, suggesting this is a "key window" for the positive effects of early interaction.

Early Childhood Turn Correlation with Verbal Skills in Middle School
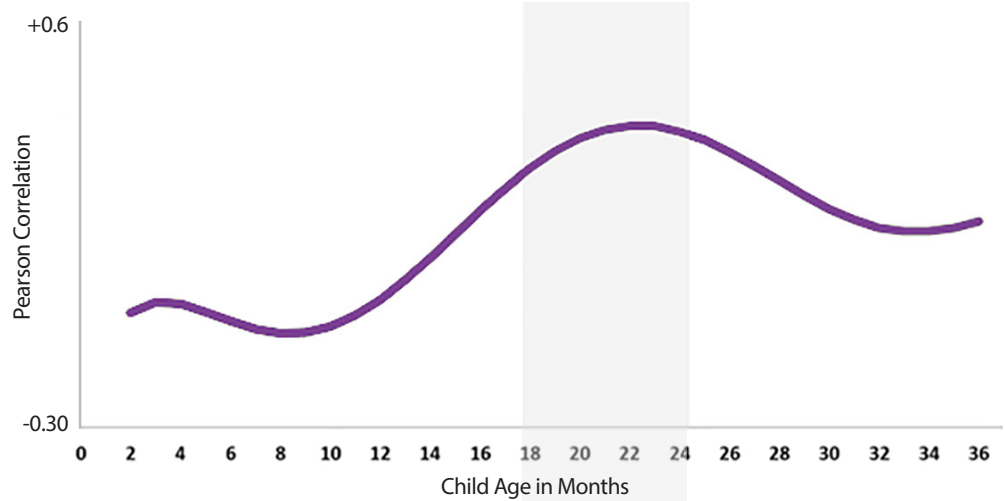
Alarmingly, our analysis of the experience of more than 6,000 children in a child care setting reveals that they are experiencing the least amount of interaction during this exact age window. Only 4% of children in the age range of 18-24 months average 40 or more turns per hour at baseline, compared to 34% of children in a home setting.

Mean Hourly Conversational Turns in Child Care by Age
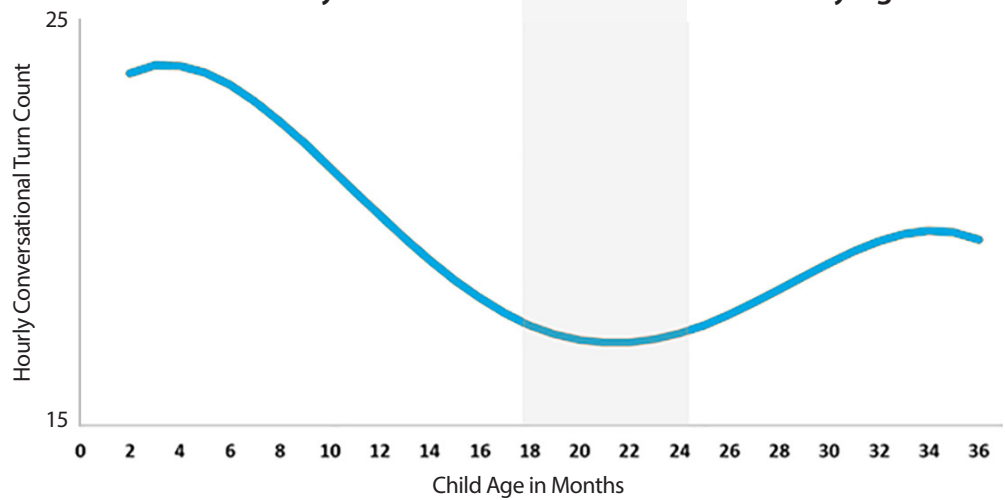
Curve fit based on same data used for figure on Page 9.

Finding 5: There are large disparities in the language environments children are experiencing in child care.

The quality improvement landscape in early childhood education is largely focused on feedback from human observation, utilizing both rating scales completed by outside observers and video recordings that allow teachers to watch and reflect on their own practice.

While these observations can help us draw summary conclusions about the overall quality of the environment, they do not allow us to see inside the individual experience of each child throughout the day. On the one hand, LENA data show a correlation between increased conversational turns and increased CLASS® scores. On the other hand, though, **LENA data indicate that even in classrooms and environments that are highly interactive, some children spend large portions of the day in relative silence.**

> Read more about the correlation between conversational turns and CLASS® scores: bit.ly/LENA-CLASS.

The spectrum of early talk in child care

Looking at the average conversational turns per hour that children experience, we can begin to place quality of early talk environments along the spectrum below:

Language Isolation	*Average hourly interactions in center-based child care*	*Average hourly interactions in family child care*	*Optimal early talk environment*

0 turns/hour　　**5 turns/hour**　　　**15 turns/hour**　　　**25 turns/hour**　　　**40 turns/hour**

20% of children are in language isolation, experiencing fewer than five turns per hour for the vast majority of their day. This was the case even in classrooms that were otherwise high talk.

Most children experience 40% of their interactions within a single hour of the day. **Beyond that single hour, more than 2/3 of children experience fewer than 15 conversational turns per hour, on average.**

Our early sample of family child care environments suggests that talk is consistently higher than traditional center-based environments. **Children in family child care experience an average of 25 turns per hour at baseline.**

Only 6% of children experience an average of 40 or more conversational turns per hour at baseline.

40+

Even in settings that are considered high quality overall, we can't make assumptions about each individual child's experience or about equity of access to interaction and learning opportunities.

Read more about some of our partners who are working to understand and address inequities in early talk and to increase conversational turns with each individual child in their care: bit.ly/LENA-Porter-Leath and bit.ly/LENA-Bright-Beginnings.

Finding 6: The effects of COVID-19 reveal reduced turn-taking in child care.

Our data also allow us to look at changes experienced by children in LENA Grow classrooms before and after the COVID-19 shutdowns in the spring of 2020.

Based on survey data and feedback from our partners, a number of factors reduced the focus on interactions. Among these factors were mask protocols, concerns about exposure to COVID, and general stress and uncertainty.

These data are from a sampling of child care centers in our network that had the same rooms operating before and after a four-month shutdown. The x-axis shows the percentage change in room enrollment after COVID, while the y-axis shows the increase or decrease in the number of conversational turns.

Mean Hourly Change in Turns by Percent Change in Classroom Enrollment

R^2 Linear = 0.585
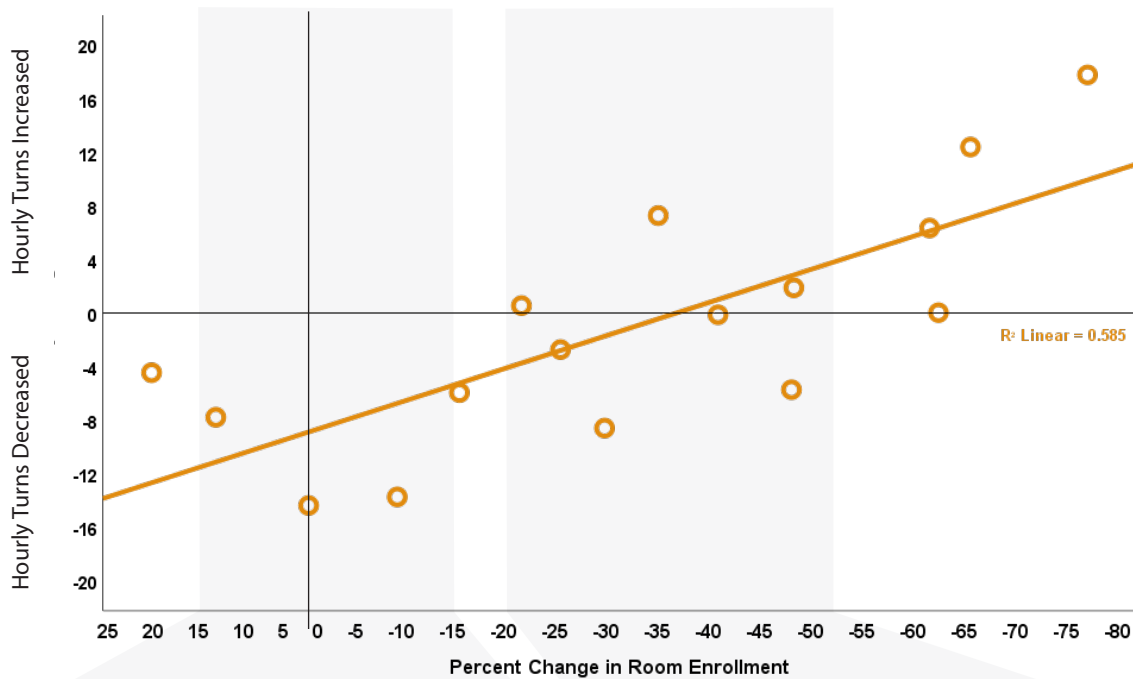
The left-hand shaded cluster shows classrooms where enrollment stayed about the same upon reopening, but turns dropped by about eight per hour, a nearly 40% reduction from before the pandemic.

The right-hand shaded cluster shows classrooms where reduced enrollment led to lower child-to-teacher ratios. On average, these classrooms were able to maintain the levels of interaction they were at before the shutdown.

These results point to an even more critical need to reduce child-to-teacher ratios, especially when teachers are facing new challenges or additional responsibilities.

A center that mitigated challenges: In Cañon City, Colorado, our partners (not included in the sample above) continued collecting LENA data throughout COVID. When they began wearing masks about 75% of the way through completing the LENA Grow program, they noted that their data reflected a dip in interactions. After teachers saw the numbers, they implemented intentional strategies such as getting down on the children's level, facing children when interacting, and speaking more slowly to mitigate the impact of masks. The next week their turns were back to the levels they were before they began wearing masks.

Early talk is our point of greatest leverage for improving children's futures.

Improving early language development is widely agreed to be the most impactful — and cost-effective — way to address a wide range of societal challenges. Research since 1995 has established a direct link between early talk and children's educational achievement. Success in school, career opportunities, lifetime income levels, mental health, physical health, and even behavioral issues like incarceration, drug use, and child abuse all hinge to a greater or lesser extent on the talk environment in the very first years of life. A recent synthesis of the latest research about the most important factors contributing to school readiness puts it this way: "Language…may be the strongest predictor of future success."[3]

And caregivers *want* to learn to talk more with children. As communication increases, they immediately begin seeing benefits in their relationship with the child and in the child's development.

We must continue to deepen our understanding of the factors that drive differences between children's early learning experiences, while simultaneously working to improve those experiences.

Going forward, we encourage those in the early childhood field, from program implementers to policy makers, to pursue:

- Greater collaboration and aggregation of early childhood data to understand the factors that drive differences in early language experiences.
- The use of LENA data to inform policy decisions that increase equitable access to talk. Zip code, setting, funding source, race and ethnicity, and home language should NOT predict children's access to early talk. We believe LENA data can be used in service of a more just society.
- Large-scale partnerships between organizations that are in the position to create a tipping point of impact.

[3] Leger, M., Roberts, C., & Sharp, S. (2020). *The road to readiness: the precursors and practices that predict school readiness and later school success*. New York, NY: Overdeck Family Foundation.

LENA's interventions: Programs to increase early talk

Join us in our goal to reach 100,000 children annually in 2024. Early talk is our most scalable and cost-effective point of leverage for improving children's futures.

We know where we are now. Most child care and home environments are substantially below our benchmark of 40 conversational turns per hour. That doesn't mean they have to stay there. Forty turns is a high bar, but we see attainable patterns that make it possible to close the gap and clear that bar. Those patterns come to light most clearly when we look at outcomes from LENA's programs, including LENA Start and LENA Grow.

Family engagement with an early talk focus

LENA Start is a group model for parents and primary caregivers that integrates LENA technology with practical tips for increasing talk with very young children. An independent evaluation of LENA Start has shown that participating families provided increasingly rich home language environments for their children, expanding how much they talked to and with them over the duration of the 10-week class.[4]

Analysis of thousands of LENA Start participants indicates that families who talk the least at the beginning of the program tend to increase their interactions the most by the end of the program. 98% of parents who had never read books with their children began reading with them daily, and 95% of families who complete the program believe ALL parents should participate in LENA Start.

Job-embedded professional development for early childhood teachers

LENA Grow is a practice-based professional development program for infant, toddler, and pre-k teachers. While the baseline data we have shared in this report indicate a need to increase the focus on interactions in child care, there is also cause for celebration.

Children in language isolation have experienced a 170% increase in interaction after their teachers completed LENA Grow. We have also found that 94% of teachers reported increased job satisfaction and confidence in their teaching abilities after completing LENA Grow.

Learn more about evaluations of our programs at **LENA.org/effectiveness**

[4] Beecher, C. C., & Van Pay, C. K. (2020). Investigation of the effectiveness of a community-based parent education program to engage families in increasing language interactions with their children. *Early Childhood Research Quarterly*, 53, 453-463. doi: https://doi.org/10.1016/j.ecresq.2020.04.001