March 19, 2018

Capitol 3 Block 1

2:15 P.M. MT

Theory of Mind Development in Children who are Hard of Hearing: Understanding False Belief

>> I'd like to introduce myself. I'm Marcia. I'm the room monitor. If you need anything, let me know. I'm going to alcohols the door and not let too many more people in so it doesn't disturb us. Our speaker needs more no introduction. Mary Pat Moeller has been lecturing on this wonderful topic of the theory of mind for a long time. It's a great interest to everybody. So I'll pass it on to her.

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Mary Pat Moeller Mary Pat Moeller thank you Sox for coming out to hear what I find to be a fascinating topic. I started on this topic during my dissertation work and I'm delighted I got to revisit it in my next project. We at Boys Town have been doing a longitudinal project with children who are hard of hearing with mild and moderate levels of hearing aids. Why? The federal government realized we had very little information about these children. Their needs are often underestimated and now we're picking them up at birth and we needed to follow them prospectively. So I've carved out a little piece over time when we've looked at their theory of mind development and have pretty new data to slayer with you today. I hope you'll find that interesting. And this wonderful project is not all Boys Town. We're working in collaboration with the University of Iowa and the University of North Carolina at Chapel Hill.

So we're following a very large group of hard of hearing children who wear hearing aids. So let's definition in. But first before I get too far, I want to acknowledge my coauthors who weren't able to be here today. That's Beth walker from University of Iowa and Sophie Ambrose who works with me the Boys Town and also Jake own Olson who is our statistics whiz and helps us with everything mathematical. I also want to thank Dr. Peter deEVORS who is ale sl real school or in theory of mind and also Brenda shicker from here in Colorado who mentored my dissertation in this area. I also want to acknowledge our funding agency, the NIDCD.

So I'm assuming many of you in the room know what theory of mind is. But I always like to tell a story about my grandchildren as a way to illustrate it in case you don't. My grandkids love to play hide and seek in the upper floor and the oldest boy who was 5 at the time they want the interpreter to move over here. Is is that all right with everyone?

>> Yay, we're getting the thumbs up.

Great. Thank you. Thank you for helping us make sure access is strong because that's going to be a key point today. Strong access. Anyway, okay. So I've got these grandchildren playing hide and seek and the oldest one is 5. And he would run in the other room and hide under the covers on the bed in exactly the same place every single time.

And then his little sister would find him.

Every single time.

At which point he would accuse her of cheating and peeking and he was furious with her. And I had an opportunity for a wonderful theory of mind story and to teach him a little. "Gave inwhen you hide in exactly the same place every time, we will all know where you are every time. You need to find unique places to hide so that we don't know where you are."

And boy, he got that quickly. But it surprised me for a pretty verbal child he was missing that perspective of the other people that if we saw him there every time, we would know where he was.

So getting a theory of mind understanding a perspectives and thoughts and beliefs of others, really helps children navigate their social world.

And understand things like tricks and mistakes and whys and humor and sarco axe.

So where are we going today? First I want to give you a little background and theory on what my theory is. What do we know about it in children who are deaf and hard of hearing? Then I'll roll out a few research questions on what methods and materials we ice to test children's theory of mind. I'll share results with you. I have some cross sectional results.

On 5-year-olds and second graders. And I'll also share longitudinal results what happened at 3 and 5 and 6.

So it's a fun developmental story. I'll end with some implications for our work with babies and families.

So again what is a theory of mind? Some people call it mind reading that we understand how others are behaving because we take into account their thoughts and beliefs and how they usually behave.

But during late preschool children make a big discovery that other people have thoughts and feelings and beliefs.

And so do they themselves. Children as well as others have thoughts and beliefs and dreams.

And we call these mental states or internal states.

And our behavior is guided by those internal thoughts and beliefs.

So how we behave is guided by what we think and what we know.

And our growing understanding of others allows us to take their perspective and reason about why they're behaving the way they are. That's what's so important. It's even when we read a book, you pick up a book and you read a novel, you're taking into account the perspective of the characters of the author and what they want you to understand. A lot of it is underneath the words. Opportunity it? So referencing our mental states. Look at this picture that the norm Ann rock well foundation let me share, that's a picture. The little girl looks pretty disheveled doesn't she? What are you assuming? She's in trouble? She had a night and she's smiling. Why is she smiling? She had a fight. She won and maybe maybe it was a bully and maybe it was a boy bully. She's feeling really dissatisfied. Look at what all you filled in by what you know about people and there wasn't a single text word on that frame. So think about what you already knew about the situation that allowed to you put it together. Think about how you knew because you learned a lot about people and how they typically behave when sitting 0 you side the principle mall's office. That was not typical -- principal's office, which allows you to reason about why she made you happy. You got a lot from mind reading, didn't you. That's what the theory of mind is all about, yeah. Come on in. We've got room on the floorment

>> So Jerome Bruenner made this distinction. He talks about the landscape of action and the landscape of consciousness.

What does he mean by that?

Well, I shared a little wordless picture from a Mercer mayor frog story book and a child who doesn't have theory of mind yet might say something like this. A little boy is taking a frog out of the box. He is smiling. Talking about the blow by blow action.

Taking out a box he is smiling. A child with a theory of mind is going to talk about what's inside. Saying something like the boy got a new frog. His old frog is jealous. He thinks the boy won't love him any more. See that distinction? Blow by blow action. Talking about the inside consciousness. Landscape of consciousness. So children are on the route to understanding the landscape of consciousness. It helps them understand their social world. It helps them read and comprehend what they're reading.

So let's look at a few typical stages in development of theory of mind.

I did put a handout on line which has lots of references for you. But Roman and Loo came up with a way to study the progression of theory of mind. Some of the early steps. In preschool it has early beginnings in joint attention. Kids knew to look where their parents look. It also in pretend when a child begins to pretend, see that box there? The real thing is a plate but I'm making it into a steering wheel.

And that ability to hold two representations in mind is very fundamental to theory of mind and we'll revisit that concept. Around 2 to 3 years they start to understand that people can want different things (A that's called reverse desires. So they figure out that they might always want the French Fridays but oh, surprise mom picks broccoli instead. So they start to understand we can prefer different things and that helps them get an insight to the mind, may have different beliefs as well.

And then this is a fun age around 3 to 4 they start to understand deception a bit.

Like remember the penny hiding game when you were a kid and some adult would hold a penny in one of the hand and hold the hands out to you and you'd smack a hand and get a penny, it's really fun to watch a 2 1/2 or 3-year-old try this. Either the penny is sticking out or they bring it around and show it to you right way or they don't node to put in a different handage time. So it's a process of evolution to know how to deceive one. You will have to take somebody else's mind into account. To cleverly deceive them, don't you? And similarly knowledge ignorance. So they -- around that same age they start to realize that if you see it, you will know it.

And if you don't see it, you won't know. I was here in Colorado and a friend's daughter walked in the room with her face painted all up with her mother's makeup and her mother wasn't too thrilled with her and she denied that she got into her mother's makeup. No, I didn't. I wasn't in your makeup. But we can see it. It's obvious you were.

It's a work in progress. But false belief is what we're going to talk about today the it's called a watershed in development. Very important stage around 4 to 5 years of age when children can understand that a person can opt on what they know or think even when they're wrong. So let me give you the example. When I was just five years old I trek to this day, I went in the bathroom and there was this tube that looked like toothpaste. And I put it on my brush and I started brushing and I was disgusted. It was my father's hair cream called bril cream at the time. My siblings made great fun of me and I remember to this day it was a good example that I had a false belief and I was able to realize oh, there's also a true belief. I thought that was toothpaste but it's actually hair cream. Two representations being able to manipulate in mind. My belief my siblings belief. That's a rally important step in development that you can compare mental contents. Mine, theirs. Does that make sense? What's what we mean by false belief and then one more step I'm going mention is real apparent emotion and that's around 5 to 6 years of age that children get this ability, they realize this little boy, let's say he's smiling in spite of the fact that his peers just told a joke at his expense. He is masking his true feeling. So that's a little more sophisticated that kids learn people can mass whack they fuel believe by having a different facial expression. There's many more developments. You and I all know adults who aren't so good at this theory of mind thing. They don't always take the other person's perspective in account. But, if you want to persuade someone to take you to a really nice restaurant tonight you're going to use theory of mind and plan that out quite well. You're going to think about what are the arguments that get that significant other to go where you want them to go? And things like moral reasoning. Sarcasm, irony. Understanding ideomatic language. A lot of that involves theory of mind and unfolds later pavement of is this example I got from funniest home videos, somebody calls the grandmother and they say to her, you are a great grandma. And her answer was well, thanks. I try to be a good grandma. I try really hard at it.

But that's not what they meant. They were trying to tell her that her grandchild had a baby and she was a great grandmother. So her false belief -- they actually talk about two kinds of false leafs and I'm going to roll them out because we tested both kind. First oared, is just what that person thought.

So grandma thought that he were praising her. That's a first order false belief. They were not praising her. She thought they were. Second order, Julie realized grandmother was mistaken and thought she was being praised. So what Julie thought about grandmother's thought is second order. Does that make sense. So just thoughts about one person versus what somebody thought about another person's thought is second order belief. And. You know this book, miss Nelson is missing. That's a great false belief story where the kids are misbehaving so she dresses like a rich and comes back and they don't realize, they think their teach every is really gone which is their false belief and they start behaving better and voila. Miss Nelson shows up again. So it's really important for every day reasoning. I was driving to work one day and I saw a couple standing looking sadly at their garden. My mind star going maybe they just buried their pet or maybe they're upset that their challenging planting isn't yielding anything. All of us when we see something we can't understand we begin to reason by thinking about what's inside. What are factors that support theory of mind development. Lots of literature on this. We know language development is huge. You need stronger language in order to reason about events.

Grandmother was surprised because she didn't realize they were talking about her being a great grandmother.

So it takes a lot of language to articulate those connections of the dots. Believe it or not Judy Dunn has done great work that sibling complex help theory of mind. Why? Because people reason about what's happening when kids are in conflict. You quo hear mom now saying how would you feel if he treated you that way? What do you think you should do when you're in conflict like this? Sibling conflicts help children display theory of conflicts. Sharing is good for what kids are inventing from their imagination. Also huge is conversational access. Paul Harris, theory of mind researchers subjects that theory of mind grows from watching the shuttling back and forth of viewpoints among multiple talkers or signers.

So children need access to that human interaction among one person and another. Conversational access is huge. I think it may be the source -- one of the primary sources of deficits in theory of mind. And sharing the past is terrific. When you get out the phone and look at old photos or get out and old photo album and share perspectives on what happened, that's another case where people can share alternative viewpoints about your remember answers. Building an autobiographical memory helps theory of mind. We also know more educated mothers have children with more advanced theory of mind. All right. So let's look at just a very brief review of literature on children. First let as leek at deaf children who were late to acquire sign language. The literature says that the delays are quite pronounced and marked. We also know that children with autism are quite delayed in theory of mind. But the reasons for those delays are quite different. A social deficit in the case of autism, in the case of late signing children, its a conversational access or language access issue.

But nonetheless, people talk about very late acquisition of theory of mind and it's due to language delays and limited communication access. That theory is supported by the research on native signing deaf children. Whether they have access to ASL early in life, they achieve theory of mind right on schedule. We do not see delays in that group. That shows it's nothing inherent to deafness that is delaying theory of mind. It's an issue of communication access and language access.

What about children with cochlear implants? That's more recent information. What's interesting is the results are quite mixed so far.

In the red I've showed you the research studies that have concluded these children are similarly delayed to other deaf children with hearing parents.

In the green there are researchers including peters and Remmel and peters who claim these children with cochlear implants who have strong language are not delayed in theory of mind. And then there's one other study I found that suggested they're less delayed than children were in the past. So I will say it's a real mixed bag and we don't know about children with implants yet.

And so my charge was to look at children who are hard of hearing. And if you think about it, they're kind of interesting because let's say they have mild or moderate hearing loss and they're well amplified. They may have some conversational access, but it's not like they're hearing peers. It is also sometimes has barriers. And so we wanted to look at this group and there's only been one other research group in Sweden that looked at hard of hearing children and they were 3 to 5. They have language abilities comparable to their peers and they were still delayed in theory of mind. That's interesting. If language is age appropriate and theory of mind is delayed, that, to me, suggests there's something about conversation access. That is still causing some delay.

So we went about trying to fill this gap in the literature. And so the focus of the current work is fast belief at age 5. Then we'll look at a subgroup of children who failed at 5, the false belief measure. We tested them again at 6 to see if they caught up and then we tested another group on more advanced false belief at second grade.

I will also be exploring with you what are factors seem to explain development. What are the influential factors and we are going to look at how did parents talk to children at 3? About mental states? And did that influence their development at 5? So that's where we're headed E-5 or 6 years of agenda, how does hard of hearing children compare to their hearing peers in understanding those concepts at 5 and 6 and what factors were influential. So first, some methods we had 142 children who were hard of hearing. As I mentioned they had mostly mild and 0 moderate hearing levels and they were matched to 57 hearing children. This he were matched on age and maternal education, all of the children wore hearing aids. 76% of them were identified through newborn hearing screening. So it's mostly an early identified group. Also these children were reliant on spoken language and that was not a decision of ours or some preference for spoken language. That's who's in the study. My previous dissertation work was on signing children. Buted to we're going to look at hard of hearing children in spoken language. There were 50 of those 1142 who did not pass at 5 so we tested them again at 6 and there were just six hearing children who did not pass at 5 who were retested alt 6. So let's look first at the 5-year-olds and here you just see some of the basic data about them average hearing level at 46db, manage their mostly moderate the average child was moderate. Next says aided audibility. That's how well did they do with their hearing aids and if you had perfect access, your score would be one. Their ar Raj was .78. Which is pretty good audibility but not perfect. And then you see a few other variable about them.

Maternal education was about 15 years of education on average. So that's better than a typical U.S. cohort. But as I mentioned before, they were very well matched to the kids we're comparing them to. Is how do we test them? No? Okay. Procedures at 5 and 6 years. At 5 years, we did a comprehensive measure of hearing.

There are going to be four tasks that measure their theory of mind or false belief and then we tested language in a variety of ways. Grammar test, vocabularyy, and their verbal reasoning on a test called the play. At six years we tested hearing again. The same four false belief tasks and language this time we assessed grammar but we also looked at their pragmatic language abilities. We were interested in knowing if you're good at theory of mind at 5, does that impact you're pragmatic language ability a year later. We also looked at cognition and executive function. As you may know, executive function has to do with children's ability to plan and monitor their learning usually involves planning. And intuition. What are false belief tasks, these are start in the literature, we use two of this form. Called unexpected contents. You show the child a crayon box and say what do you think is in this box. And they typically answer crayons and then we open the box and say oh, look at that. Isn't this silly. There's a spoon in there and then we tuck the spoon back in the box and we both agree there's a spoon in there. And we ask what if we bring your brother Joey into the room and show him this kay on box. What will Joey think is in the box and kids who have a theory of mind are going to say he's going to think crayons but he's wrong. There's a spoon in there. Two representations in mind.

Every 3 year-old on the earth will tell you he's going to think it's a spoon even though he never looked in there. These are cartoon stories from Dr. Peter so in the left most frame Bobby's dad is going to give him a piece of cake but he wants to play base base bough ball. He pu it in the cupboard and waves to dads and the fourth the dad is thinking it gets pretty hot in that cupboard, I think I'll move the cake to the refrigerator so dad moves the cake and then we have a blank room and here comes Bobby back. And the question to the child is where will Bobby first look for the cake? A child with theory of mind will convincingly tell you he's going to look in the cupboard but he won't find it there. He doesn't know dad moved it but a child without ToM ToM will tell you it's in the refrigerator. So they can't prohibit that pree pond rant response. That's why executive function often relates to these. Here's the task there's a cartoon of girls playing. Mary walks over to her friends who are plying with Gauls calls. Mary wants to play. What does Mary say? They need to formulate a polite sentence to join the play. Let's start results on work question one. How did the groups compare? What you see is distribution of scores. I've plotted them by the percent of group that got steer 0, 1, 2, 3. Or 4 correct op theory of mind. We usually consider if you get three of the four tasks right, we call that passing, I'd like to point out we had 84% passing rate by the hearing children. 41 by our hard of hearing children that. Is a significant difference. So our hearing children were outperforming our hard of hearing children although 41% of them were doing great. Notably our hard of hearing children on ranch had lower language than hearing peers. In spite of getting intervention and being identified early, there was still lag and affect size were a half percent of deviation to 100% of deviation. It's possible language is culprit or again language access. There are some children in group who are better served by spoken language only. At age 6 I told you we retested some children, you see the figure, 0, 1, 2, or 3 or 4 correct. There's no significant difference between our hard of hearing children and our hearing children. It shows a pattern of catching up. The caveat is remember at 5 we didn't have as many passing but the caveat is that there's a concerning proportion of children who are still very much at risk in theory of mind. Proportion of children higher than in hearing children group. We've got children at risker and those are kids we want to look at if they aren't passing this at 6, maybe we should have been doing something earlier. What abouts results in terms of research question 2. We asked what are the influential factors. Let's start first at age 5. We found we could explain almost half of variation in children's theory of mind scores by three factors. They are very influential. Their language, both grammar and verbal reasoning. Both contributed so it's not enough to work on grammar, their verbal reasoning was an important contributor and also which group they were in. Whether hearing or in the hard of hearing group. So that was influential as well. On hearing children were five times more likely to pass this at 5 than the children who were hard of hearing.

It means we want to intervene early on this ability so children can get to 5 and be passing.

We also were interested in our hard of hearing group only. Were any of these unflew enshall. We separated them off and looked at children -- now we've got -- we looked at the children who had hearing loss. Who were hard of hearing only. Passersby versus nonpassersby of theory of mind. Now we've got two bins. They were significantly different in aided hearing. They're averages were the same. But the children with better aided hearing had better theory of mind and that suggested they need to be amplified well if they're trying to rely on spoken language. Had you they nooned theory of mooned language was the most influential. We really reasoned there's a path kind of thing happening here that if you have good access with hearing aids, that helps to bolster language and that bolsters false belief. Although there was not a direct and inflew -- a direct direct and independent influence of that aided hearing. Hope that makes sense. I'll briefly summarize what's happening here. The hearing children and -- separated them bypassers and not massers again.

And what's interesting here if you look at all the way over to the between group comparisons, hearing ts passers are way better than nonpassersby on executive function, on cognitive abilities and on their language abilities. The kids with cognition and weaker executive function and if you have the terrible triple it's going to compromise theory of mind learning.

So I found that rather interesting. The chirp were were delayed had false belief on average and were five times less likely to pass than their hearing peers. That's a little bit discouraging but it gets better at 6 and it's going to get better at second grade so I'm not going to leave you with a discouraging story, I promise. We saw the delays were resolving for children who were hard of hearing all those some remained at risk particularly those with no language, low language, cognitive skills. My summary would be language ability, and language access are the huge drivers underlying false belief understanding for our children. I go gak to 3 and we wanted to mention parent talk to their children at 3. And was that going to relate to children's theory of mind at 5? I mentioned I did this dissertation study, there I looked at mothers who were hearing but had learned sign language and were trying to do their best at signing to the deaf children. And what I found was the more signs they knew about mental talk, they use those in interaction with their children. Their children were much earlier to achieve theory of mind. Makes sense doesn't it? The mother's language about the mind made a difference for the children.

So hi one more little example for you, I play with a 3 yearly old boy Will. He's pretty verbal and we were playing with this little microwave oven is that the kid all love because it spins food around inside and beeps.

He couldn't get it to work. He said to me the batteries are dead. Every red word on there is a mental term I'm exposing him to. He says the batteries are dead. Right away I thick into theory of mind bootcamp. I wonder what happens if we push harder? Oh, look it worked. And Will said I thought, I thought it was the batteries. And I said yes, you thought the batteries died. But I thought we needed to push harder.

We discovered the batteries are working. Look at that comparison of dual thoughts. We thought differently about it.

We made Ascofer I. That's the kind of talk we want our parents using with their little ones.

We looked at how much is that happening? We had the subgroup of 46 children who were hard of hearing and 19 peers who were hearing children.

We happened to have interactive services on them on page 3 that we established in different work and we also had false belief measures at 5:00 so we went back to those language samples and coded them for all the mental talk the pain was using and they were brief examples, ToM, you can tell me five minutes or so, brief examples. We also gave language measures. It's an interesting story. First of all, at -- for this little group of children, they were matched on language ability. So think of they didn't differ from their basic concepts or pragmatic judgment at age 3 and in spite of that comparable language ability. The children who war hard of hearing used half as many mental terms as the mother addressing hearing children. Wow, I see some of you nodding. Doesn't that send up a red flag that we need to support them more? And what is that about? I thought hours and hours about if their languages are similar, why -- interest are a number of hypotheses we can think of. It turns aut memory tests arement supportive to differentses, the hearing children may have had more knowledge. It may be that parents are making some kind of assumptions about if they're child is ready to have this complex language yet. That's something malleable. I think we can change that 4 or parents. It may be that our parents are not talking to our churn if they perceive them not to be in earshot. A patient came out from Vanderbilt where they put remote mics on parents and voila, the languaging came up. Therery anumber of hypotheses we can make but it sent up an alarm for me that wow, we can get busy and help them change this and help them understand I've done lots of workshops with parents around theory of mind. I have lots of practice activities I could share that help them understand how to talk about this and how to increase the diet around theory of mind concepts. So our conclusion, the parents addressing children who were hard of hearing, there's significantly fewer mental terms and that wasn't fully explained by the children's language ability.

We also looked at predictors again and they were the same. Predicted theory of mind at 5. How much language the moms used was not an independent predictor but again we believe it was a predictor through language. So, if they were using a lot of mental terms, the child had better language and that influenced theory of mind. Complicate the. Meres one pick fury want to share to get us to the does it matter. Does it influence their social language use later. What we found here was quite encouraging that the children's large ability at 5 made direct contributions foe are to their social pragmatic communication knowledge at 6. But theory of mind made an industry contribution for theory of language. We need theory of mind and good language ability in order for children to have good social language skills. I think a lot of that makes sense. So take home messages, what are longitudinal insights. Input matters. I should have it on my grave. Input matters. We want to help encourage families even with little tiny ones to encourage talk about thoughts and feelings and I always tell them take the inside out. If you think about it, say it out loud. Even if you're in a long line of traffic. Instead of there being silence, you're probably wondering I hope there wasn't an accident. I hope no one got hurt you can be taking the inside out. -- coming he's, students and I was sharing a story where my deaf nephew was with his hearing parents and they -- though went forward in the back seat and bonked his head and no one in the family shared with him they stopped suddenly because a deer crossed the road. Road.

Logical conclusion.

Information he was not given. So helping families know that's a really vital piece of information to share to allow that wonderful brain and learner to connect those dots.

So we also want to consider why the input might be limited for some parents. Are they setting the bar too low. Do they have a belief about what their child's ready to learn? That we need to help them alter? Also help families know why learning is helpful and getting the photos out and sharing old photos which we know kids love to do is such a rich opportunity for theory of mind learning. Even giving access to conflict. Brothers misbehaving. That's fascinating to a kid. So just putting them in timeout without explanation, question miss an opportunity for theory of mind development. Sharing all of family communication. As hard as that will be. I say that with such ease, I know that's hard to navigate but really important for parents to do. I think it's worth our effort because false belief does contribute to children's pragmatic language skills. Those score skills they're going to go into various schools with. So it's worth working on.

So now we've arrived at second grade. And so that's our last set of research questions and I'm going to give you a peek into the future and a few implications. The fourth research question had to do with how these children compare to their peers at second grade on more advanced theory of mind tasks. And what factors are influential. You can kind of see I'm following a pattern here. So here's the children at second grade. We had 80. Again they were mostly on average in the moderate range of hearing level. With fairly good but not perfect aided audibility and we compared them to 43 hearing children matched on age and maternal education.

The procedure at second grade was a little more complicated it was a steery retold the children and then asked them questions about the story. And there were actually 16 points you could accrue but four of those items had to do with knowledge versus ignorance and honestly those were soy easy for the kids and we had eight items that were first order false belief and four items that were second order false belief.

On the right you see measures we gave again, hearing, language, including grammar and vocabularyy and we also tested their working memory. Okay. Here's the task and I hope you can see it well enough. And I'll share with you how it goes. In picture number one, here's the story.

You're really have to kind of pay attention I'm sorry because there's a lot to track here. You'll see why this is hard for the chirp. Sam and Maria are playing together. They look outside to see that the school is having a bake sale. Maria tells Sam "I'm going to buy chocolate chip cookies there and she walks away.

Frame 2, mom comes home, tells a.m. that she just drove past the baning sale and Sam asks her are they selling chocolate chip cookies and mom says no, I only sell pumpkin pie. Sam says ah, then Maria the get pumpkin pie at the bake sale. Frame 3, now Maria arrived at the bake sail and asks for chocolate chin cookies, remember that's what she originally wanted. The lady says all we have left are brownies because Maria likes brownies, she decides to get some.

Now I've got the test itself in picture 4 on the way back Maria meets the mailman. I got brownies and I'm going to share them with my brother Sam. Irrelevant assay surprise. The mailman says that's nice of you and then he asks what does Sam you are buying at the bake sale. Are you all tracked all this detail? Hard, isn't it? What does Maria tell him? What does Sam think they are selling at the bake sale. He his it's pie because that's what mom told him. Complicated isn't it? But that's what we're testing and some of those are first order and some are second order false belief so how did the children do? What I plotted here are the three different kinds of tasks. Knowledge, ignorance is on the left and hearing children and hard of hearing children were at ceiling. Basically. We're ignoring it. In the middle first order of false belief. Those two dots that show the meme, not any different. The kid were really similar in their understanding of first order. Then we go to the right to second order. That is not a significant difference. Although hearing children did a little better, it's not a significant difference. Our conclusion was there are no significant differences between these groups. On their advanced false belief at second grade. Yes.

At least we see what we think may be some much catching up and why is that important? The literature is so discourage discouraging. If inter not tell the adults did they catch up. All our efforts to give early language and good stimulation and good academic development. I didn't want to believe that discouraging story. Here it is in a different form. The form we did before again on the groups on 0, 1, 2 he 3, and 4. If I animate in 3 out of 4. Now we have 60.5% of the children who are hearing pass theory of mind and less than half of our children are who are deaf and harped of hearing are passing. That's not significantly different. It still means there's kids not passing, there's more theory of mind but I think you'll agree that was a pretty darn hard task for these churn and it's encouraging that a lot of them are passing this complicated task. There were small differences in their language abilities but they were minimal. We also see that hard of hearing children are catching up in language by this grade. Here we see the full story one last time. Behind at 5. Catching up at 6 and similar to their hearing peers when they get to second grade. So what factors were influential? We tested a number of factors again and the winner of the prize was language development.

So that's been a consistent story throughout. Strong language development gives you conversational access particularly if you have good enough audibility. So what is our summary for second grade? The children who are hard of hearing performed like they're hearing peers. Language was the primary predictor. Does this mean they have to carve out belief at 6 or 8? Yeah, I'd like to think so. That is one concretion we could make. Possibly they are -- conclusion we could make. Possibly they are getting greater access to conversation. We don't flow if the groups will go on the floor master. We also wonder might false belief be too narrow a lens. Might we need to look at other theory of mind skills in order to be fair and honest researchers? So I'm going to give you one peek at one step further that we've taken. We've also looked at chirp's understanding of sarcasm. Don't you love Lynn from big bang theory. I'm sure he was coaching his peers on that. We used Peter's work again, nine pictures supported stories and they were presented -- we made movies so they were presented in a standard format across all of our sites in spoken language but the kids had every advantage they're going to get aril lick tour story and they're going to get queues and -- picture story and facial expression and sarcastic intonation but believe it or not kids at 8 don't use then Rossty to understand sarcasm. I read lots of -- prosity. It's understood later that prosity is a cue. Prosity is sort of off the table.

Nonetheless, we were interested in looking at could they reason about sarcastic stories. I'm going to play you an example of one our stories. Do you see the picture support there? An errand then -- to that we ask the child what did the big brother mean when he explained that. We get them to explain what they think that sarcastic intention was and then they have a multiple choice answer. Did the brother think his little brother was a bad hitter or good hitter. So that tests their comprehension of the over all SAR sarcastic intend. I'll show you a peak aut our preliminary data. We did have a main effect of hearing category. So what you're saying here is we have our hearing children. You see the arrow, hearing, mild, moderate, med rat severe. The dots have showing you the dots are the mean. If I animate in we're going to notice that our children with mild hearing levels are performing almost identically to moderate severe. That's counter intuitive, isn't it? Why are the mild chirp struggling so much. Why do we have so much variance, look at our moderate kids. Moderate hearing levels are performing exactly alike their hearing peers and tomorrow's tom is grinning because we know on our team we're starting to refer to this as the sweet spot. What when he mean is for some reason our children with moderate hearing levels are doing better than children with mild hearing levels and we think part of that might be that when we talk about kids who are hard of hearing being underestimated think about those mild kids. Can people don't think that's a big deal. Why cow need to leave a hearing aid on or wear it in the first mace. They hear fine. We think some might not be using their amplification and that mutes their access. So it might be that the mild children are being underestimated in some way. The children in the moderate group have hearing levels that get people's attention. Perhaps they've gotten more regular service and perhaps the children in the moderate severe group need additional supports because their hearing levels are significant enough that they are continuing to struggle. All of that is sort of speculation by our team. But I got to tell you we're seeing the sweet spot in a lot of areas of our data including language and academic development. So we're going to be sur sewn that further and trying to understand what we're -- pursuing that and trying it understand what we're calling the sweet shot. When are contributors, language earlier theory of mind if you had good theory of mind at 12 you're going to do well on this at second grade and also language ability was a predict tore. So that brings me to any r my final -- I think why I'm excited is I think the over all pattern of these results are encouraging.

That it's not taking until adolescence for these children to understand these problem concepts. And we want them to have good social language understanding. As they work on their ak Dexic development.

And there are many malleable factors. What I mean is changeable factor. So our efforts to support and promote strong language development early in life, that's going to get us there. That's critically important what you're doing, helping parents understand complexes as annoying as they are a wonderful opportunity to develop theory of mind. In gaming the children in pretend play. I can't tell you how many of my life it was transformed into castles and swords and all of that is good for children's linguistic development and theory of mind. But critically important is the family conversational access. Helping families understand that if it's something that is out of earshot, how do we give children access tho that information? Information conveyed on the phone even turning down a pesky salesman in a pole light way. What an important theory of mind lesson that is to know how to do that with elegance and yet get off the phone with the pesky salesmen. Also that encramminging for example, Liz to engage -- encouraging families to engage in the sharing of old memories can be so perfect ductive for that dual representation of ideas and sharing viewpoints on what happened in the past.

And I think I'll end every talk with communication access is the key to all of this. So there's lots we can do with young families by helping them understand the concept of theory of mind. And why it's so critically important that they take their inside out and they're their model with the children whether that be in spoken language or sign or both. So I hope I've shared something encouraging and interesting and this entire presentation we have published recently in the journal of speech language hearing research. So you can find the original research there. And I thank my teammates on this project at Iowa, Boys Town and at the University of North Carolina Chapel Hill. Thanks for having me.

(Applause).

>> Marcia: We do have five minutes for questions if anybody has a question.

>> Before I take your question, if you mind we have audiologists in the group that can help researchers there's a flyer in the back and she's wanting to do an intervention study to help families that can't keep laids on their babies. She wants to do it through telehealth so, if you might help her access families through telehelp. Please sign up at the back. Okay. Ra thanks for letting me do that advertisement.

>> My question is kids who were not passersby even at age 6 did we look at presence of additional disabilities because one third of kids with hearing loss have additional disabilities but obviously one third don't.

>> That's a great question and that is a control we l in this study. We excluded churn with multiple disabilities so we've got kids who should be progressing and they're not. We need to figure out why.

>> AUDIENCE MEMBER: I do you see materials being developed out of this research even social media pests to share with families directly through that medium.

>> I would love to see that happening and my agent brain isn't going remember the name. But there is a researcher on the east coast who is developing some lovely materials.

Does anybody know her name? I'm retiring in August but that would be a fun after indication for retirement. We need practical materials, they're loving. We make all these comparisons about interesting food and who's got what preferences and there are lots of ways to visualize that but the kids get the take home message. So I would be eager to do that and if you want to email me, I can find that person for you who is in the process of developing curriculum. Peter himself has developed curriculum for developing theory of mind at Smith college.

>> Thank you so much. In the last study you did looking at the older kids, I'm just curious did you look at the language, was it similar results of those kids with mild hearing loss compared to the moderately is he, did you find the same results looking at their language skills as well? Mary Pat Moeller on certain language measures, yes. When our team meets we do language blitz where we sherry merging data that comes out and we keep seeing this repeated pat everyone which means on some of the language measures and some academic measures we see that sweet spot, meaning we have to pay attention to these kids called suddenly mild who need access to more resources perhaps pavement.

Thank you. You've been so patient.

>> So with the speech path kids to tag on to that, was this looked at because I know a lot of kids who were under fit ear blocking with med school and I wondered whether that was looked at in the study. I don't know that answer. That's really a good question.

Tom, can you help me? I can't recall. I'm sorry. But I suspect our mild kids had pretty good audibility over all. Because that was carefully looked athe over years in the project. We're in year 10 so that's something that's been carefully Monday are monitored so our suspicion is probably not using their devices consistently.

So yeah. Audibility in the end is maybe the issue.

>> We have time for one more. I'm curious about something. You talked about the language that is the hard of hearing kids and the hearing kids.

And the discrepancy.

And I'm wondering if the hard of hearing kids who had exposure to the every day language like on the radio and TV and just different ambient now's are you considering that in your study, number one. And just the exposure to the language of the world whether it's TV, radio, walking around the mall, that kind of thing

>> That's such an important question. Because we so often test these children in quiet. And that does not show how they deal with our noisy and complex world. We have a spin I don't have grant that is being contract ducted by Dr. Ryan McYearry.Ry. He's not here at this meeting but the whole grant is about how children cope with complex listening environments. And those papers are starting to roll out. But that was a really important spin off to this project. Because everything I've told you has been in a quiet ideal environment. And so I mentioned I think when language looks equivalent that there's a theory of mind delay, it's suggesting it's conferenceal access that's the problem and that implies noise and multiple talkers and not being able to follow multiple talkers quickly enough when there's noise.

The concepts of how kids joke with each other or tease each other, they they don't have the opportunity sometimes but that type of lapping -- but hearing kids do and whether that helped with the other sarcasm and that kind of thing. And so just wondering -- you know, hard of hearing kids miss that opportunity. Often to have that kind of equivalence with their peers. When you think about it, when you're in a crowd, hearing people have such subtle and quick interaction. That makes total sense to me that they're missing out on that subtle very important social layer.

Which can lead to isolation, not feeling connected. There's a plot mope we need to learn. And Ryan's being very lever. He's looking at linguistic and working memory and do those resources help kids cope with noisy environments. I'm remembering I had a student who was outstanding with his implant but he walked into a comedy club with his friends and as soon as the punchline happened, everyone laughed and 0 blight rated his opportunity to hear the punchline.

So he would tell me about I can't catch the human here. So I think -- yeah. I think that's what we're saying and I'm still encouraged that they went scored as well as the children who are hard of hearing -- or the hearing children that. Doesn't plane we're done yet. There's a lot more we need to know.

>> Marcia: Thank you, Mary Pat, I'm sorry about the crowd.

Mary Pat Moeller I was delighted to have the crowd.

(Applause).

For those who are not going to fill out your yellow forms if you'll leave them on your chairs because there's lots of people who need them and I don't have enough. Okay?

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>> If those of you in the back want to come sit up front, if you can't see, that's fine. And we'll have to close the doors and not let people in.

And I think we'll go ahead and get started. My name is Marcia Taber and I'm a room monitor here. I love to accommodate everybody and get plenty forms for you. Our speakers today are going to be Karen Carpenter and I'll let them take it way.

So thank you all for joining us today.

We will try to move things along rapidly enough so that after lunch and cookie break you don't just want will all want to fall asleep within the first two minutes. I said something yesterday I've been doing afternoon presentations that -- you know, there are a lot of cultures that believe in the concept of a siesta.

And I think there are days when I would really like that concept. So like I said, we'll try to move it along. I'm Dinah Beams. I'm the program coordinator for the Colorado Home Intervention Program.

I don't want to bore anyone but I also don't want to make assumptions.

So just to let you know in Colorado we have a statewide family centered in-home early intervention program. In the outreach Department of Colorado School for the Deaf and blind. So I'm the program coordinator for that program.

In our state. Some of may know it from the acronym CHIP and some research that's come out by various people including (saying name) over many, many years with the CHIP program. I'm going to let my colleague introduce herself and take it away. You'll need a mic.

>> KAREN CARPENTER: Karen Carpenter I'm Karen Carpenter and I'm the unilateral hearing loss coordinator for Colorado. That's all.

>> DINAH BEAMS: So how many of are you from states where unilateral hearing loss is an established condition or the kiddos are categorically eligible for services? This is an area where we in Colorado ep I have you. You're going to find out what I mean by that statement as we move along.

So our learning objectives today we're hoping that you will gain from the information we share a little bit about the monitoring program that we have come up with in our state.

We're monitoring children with unilateral hearing loss. Want to digress just for a moment. I know in this field terminology changes often. It changes from one region to another. So we're going to be using the term "unilateral hearing loss" occasionally we may say something about single sided deafness so I know there are multiple terms but just to be clear we'll probably just stick with that term. I want you to be able to identify the key players in your state. You probably know who those people are. But you may not.

And then appropriate assessments for monitoring the progress in the areas of language and communication for these little ones.

So I feel like again just in this ability to give us all a little bit of context, these are our statistics from 2016 in the state of Colorado all the data from 2017 has not been crunched yet. As you know firm data takes a little while to pull all those numbers together. But we've held pretty steady 65, 66,000 births for quite a while in our state.

So right in there. You can see our screening rate is very good as other states have very successful newborn hearing programs and we have about 106 -- there were about 160 children we confirmed with permanent hearing loss either bilateral or unilateral in 2016 by two months of age

Okay.? So that's kind of here we are. I always laugh a little bit when I do presentations and as some state will say but you don't understand we're really a rural state.

You know, every state in this country virtually has those families that are not in a place where they can readily receive services. In our state, it's over the mountains and so, if we could go by helicopter, or if God had given me wings we could see these families very easily. But when you have to go over the mountain passes that close in the winter or due to rock slides as one of them did yesterday, that's a different story. But when I lived in North Carolina it was drive across this island, get on a ferry, drive across the next island, get on a ferry. So everybody has their rural challenges. We're kind of all in that together.

So in our Colorado system, as I said, children birth to 3 are referred typically into early intervention and that generally means into the Colorado Home Intervention Program. To one of the area coordinators.

I've already said that we're a statewide program through the outreach Department of School for the Deaf and blind. And we have this system a statewide regional coordinators, there are 8 of us who offer basically technical assistance to families. So we meet the families, get them started, so on and so forth.

A number of years ago we realized that we were all under water in terms of capacity with eight of us around the state trying to do all of this. And that's when any friend Karen stepped up to the plate and graciously agreed to partner with all of us and to become our coordinator for the children with unilateral hearing loss. And we are ever so grateful. So in Colorado, a number of years ago children with unilateral hearing loss were categorically eligible, were on our list of children with established conditions.

Our part C agency as they were reevaluating, who should be in that list of children with established conditions, and who should not, children with unilateral hearing loss were removed from that list. So those of us who had been operating with -- you know we can provide the service, direct services to all these families where all of a sudden what do we do now? We're really concerned about these kiddos how are we going to monitor them? We've always operated from this premise that the children would receive direct services just like the children with bilateral hearing loss oh, no. What do we do now. We were really concerned that children would fall through the cracks, now, the exception to that is if the child has another established condition, then if the child has Down's syndrome, we can definitely -- unilateral hearing loss, we can definitely get in there and serve that child and be put on that IF SP, but, if they don't have another established condition they cannot receive direct services in our state until there is a documented delay. Okay?

Well as we all know this documented delays typically don't show up until the child is quite a bit older than that two months of age when we were starting. When this change happened we kind of all did this -- they've done what? What has happened to our list? What do we do now? So we faced with a number of problems. How do we identify which of these children with unilateral hearing loss needs support and services and -- meaning direct services and which of them may be don't or are doing just fine. How do we establish a coordinated system of care and what does that system of care look like in light of this change and how do we avoid these children falling through the cracks. So with that in mind we came up with this collaborative monitoring program. We developed a statewide system for monitoring infants and toddlers with unilateral hearing loss. We developed it in 2010. So a number of years ago. Before we did this, we started off with a pilot program to really begin to look at a pilot study to try to get some data in our state when children were identified through newborn hearing screening with a unilateral hearing loss, what percentage of those children were demonstrating a delay at what point in time, what are the variable that were a part of that? You know, were were looking at if it was the right ear that was impacted, was that more significant than if it was left ear, did it depend on the degree of hearing loss? What exactly were we looking at to try to wrap our mind around it as we moved into this monitoring system that we established.

So we completed that pilot. We established Karen as our designated coordinator for this population. She's not going to brag about herself so I'm going to do it for her. Embarrass her before she comes up.

But like I said, Karen has been so helpful to all of us, she is an audiologist by training. So she brings that wreath of knowledge to that position and she's just been fabulous at answering families question, getting them hooked up to services. Really helping us to move this whole system along.

We share specific information and she's going to talk about what with share with these families part of it is the results of the pilot we did so families know there is a study behind what we're doing. With do assessments at established intervals. So there's absolutely, you know, it's not just operating from our gut but what do these assessment packets look like. She's going to talk about what those assessments look like as well.

We connect the families to hands and voices to the unilateral guy by your side in Colorado so that they have that kind of parent to parent connection. Which again has proved IP valuable to these families and we do tracking and data collection. That's an overview of what the system looks like and Karen is going to go into some of the specifics because I think sometimes the specifics are aware we can -- things are go awry. That can be really helpful to us.

>> KAREN CARPENTER: Karen Carpenter as the unilateral hearing loss coordinator, I received my referrals mostly from audiologists. Using the diagnosing audiologist or the managing audiologist. Sometimes one and the same and sometimes from cohears when they get the first referral and then refer down to me.

I contact the family usually by email and I explain our program to them and ask if they would like to enroll at no charge, no cost to our families in Colorado. And I talked to them about the aspects of the program. We provide home visits if a family asks to be contacted in person.

If they have specific questions and often times I ought to refer that visit out to the cohear because the cohears are the ones with the real information about resources and what's available to the families.

We also have done home visits for families whose native language is other than English. Most were Spanish but I've also done home visits for Arabic, Nurada, a family who spoke that which is an Aztec derivative in Mexico.

And they had some basic Spanish as well.

And we found that when we made that personal contact. There's a bigger buy-in from the families. They're much more willing to participate in the program because they had a chance to ask the questions and understand what it's really about. As part of the program I send out assessments at intervals from six months to 33 months. So there's five assessments total. Six months to almost three years.

Now the reason it's -- okay. we'll just two to that side and then I'll come back. The reason we have those intervals is because they're in accord with state standards.

For early intervention and when they perform their evaluation. So, if a referral comes from us to child find, which is what we have in Colorado, then we're on the same schedule for what's already been evaluated and what may need to be evaluated.

The assessments then are returned to the University of Colorado in boulder. They're scored and a summary is sent to the family.

And to me.

And to the regional cohear.

So, if we start to see a delay, one of us will make a decision to make a phone call and I'll call the family or cohear and then she may go alead an contact the family to see if they need to move forward. An evaluation to qualify for services.

Also, as part of the initial conversation, and then what's included in the information they get flexibility, the -- we talk about the hand and voices. So they have a chance to become involved with those resources. Including the newsletter and the parent to parent connections.

Also that -- my job gets easier all the time because the pediatric audiologists are so good at introducing our program to the families either at the initial diagnostic visit or follow-up visits and they say that if the family would like, I'll make a call and tell them more about the program.

So that by the time I call the family they're receptive.

And sometimes I get tips from the cohear as well. They'll say something like this family is eager to participate and they would welcome a call from you. Or there's a hesitation here they said they could call but they're not sure they want to participate at this point. Sometimes a namely will say not right now because we have other issues and challenges going on.

Call me back in six months.

And in thinking about this, over the years, over the 7 and a half years we've had this program, I would say that I've had an outright refusal about once a year. That's all. They just said no thanks, don't want to do it. Now that doesn't mean that they complete all of the assessments and return them. But they are a part of the program.

Child find of course which is the evaluation process that we go to them when we see a delay.

During the contact with the families and they say yes I'd like to participate, they say I'll send them information about unilateral hearing loss. And I have the packets. I had two sample packets up here, one in English and one in Spanish if you would like to come up and kind of rifle through it and see what we've got in there after the talk. A consent form for them to agree to the program and allure them that there's confidentiality and they can withdraw at any point and it doesn't commit them to anything. Tips for parents about unilateral hearing loss. Distance hearing, hearing and background noise.

Developmental milestones for auditory skills and for speech and language development.

There's also an article about middle ear infections.

The cause, the concerns. What to do about them.

As Dinah spoke about the unilateral hearing loss study that was conducted from CU in 2000 to 2002, there's the child find contact information.

So that if opportunity they want to make a direct contact, they can of course.

They could ask me about it. They could ask a regional cohear about it too to try to facilitate a visit. The cohear coordinator contact list so that has their information on the region in the state of Colorado and the pressures about hands and voices and more information about unilateral hearing loss and cohears.

We already did this one. Do you remember. I'm going to quiz you.

And the protocols we have -- it's an abbreviated assessment relative 20 what children with bilateral hearing loss get.

At the intervals. They can't inventory of skills. Are you familiar with these, some of you, all of you? Okay.

So those are -- that's a general development.

And we use that as a baseline for the next assessment which comes at 15 months. And from 15 months through 33 months, they will get one or the other inventories Minnesota child development inventory. You'll notice at 21 months they get both. And we have a note in there base asking the child to choose based on the inventory they're different for boys and girls. For boys it's above or below 50 uttered words and for girls above or below 70.

I think this is you, Dinah.

So as Karen has already said, the assessments are scored at CU, the summary of the results are sent and are shared with the coordinator with the families.

If the results show a delay in language and communication based on those assessments she just went over, then we are going to as a program, we're going to make a contact with family.

We are going assist the family on getting scheduled with a child find evaluation in their local community.

The cohear coordinator will then attend the child find evaluation with the family.

And if the child is determined to be eligible for services by the child find team, then at that point in time, an IFSP is written and CHIP directs services are begun.

It's kind of the whole protocol on how we work through that.

So, if the child is showing a delay, Karen then, since she's doing the monitoring refers the family back to the cohear coordinator for the region. And we then take up this whole process with the child find team, with the IFSP team. Ashed moving toward direct services. So this is just our experience, okay?

In our experience, these delays and communication, speech, language, are typically showing up between 21 and 27 months of age. Shouldn't come as very much of a surprise because before we had newborn hearing screening, how old were those children with bilateral hearing loss typically being diagnosed? It was when they had a delay that was evident to the parent, to the physicians and people started digging deeper.

So this really shouldn't be a surprise. Prior to that there's a lot of your child may be a late talker, don't worry, it's going to come around. It agency boys, got two older sisters, that wars the case with my brother. So there are a lot of reasons given but then as that child gets right around two years of age, it's like ugh, not so much. In case you were wondering how many different children do we have in a typical month in Colorado. So a typical month CHIP is 33 Four-piece children in this slide. I just ran our stats for the month of March. It was 350. So somewhere around ha mark and at the time I ran these stats a couple months ago, 101 children unilateral hearing loss that we were monitoring or that we were following. 80 consult and 21 is direct service.

The other thing I will say to you since we started this monitoring program is that we have seen the referrals to the program go way way up. So when Karen started, we really did not have a lot of children with unilateral hearing loss being referred to us. And we have seen those numbers steadily grow to the point they are now which statistically, seems about right. What that says to me, our larger community, our other community partners be they in the medical arena or with part C are feeling like this monitoring program is working so they're pulling us into this discussion.

So of the cult in that instance would be a little -- would be this monitoring that children has done. We -- she has a system set up where she is in contact with those families on a fairly regular basis. Checking in with them, how's it going? Do you need additional help? Do you have additional questions? Do you need help with the assessment packet we just sent out. Those things. There are times she will contact one of the cohears and say this family really has a lot of questions about this. Can you go out and meet with them? So then it may change. Had there are times when the part C agency even though the child hasn't been deemed eligible for another reason, maybe the family is not ready for direct services from CHIP but the part C agency will pull us in as a cult for several visits to kind of talk through with them. About that.

We have our integrated data system. I know everyone has their data system they're working with.

And so Karen is unilateral coordinator inputs this data specific to the assessments.

What those outcomes look like on the assessments. Already contact dat with those families. That is all logged in our database as well. And then the cohears put in that information with children with bilateral hearing loss. For those of you who were administrators in the room, we can never get away without talking about money.

So the funding for this project is really a collaborative ep defer. The Colorado School for the Deaf and blind puts money toward it as does our HERSA universal newborn hearing screening and intervention grant. In our state, there is very little that we do that is not what I finally refer to as a patchwork quilt of funding.

Because it's like this person -- this agency we can put this much and this agency we can put this am and somehow we get there. It may not be the most streamlined process but we make it. And then we went ahead and put the references in the Power Point. For those assessments in case those are assessments that you're wanting to look at, these are the same aesments we use with our children in the program who have bilateral hearing loss. So I just thought some of you might want to know about those assessments.

We just have a couple of minutes. Are there any questions that we did not cover in this very rapid fire approach? Yes.

The question was how are we defining delay. These assessments are assessments that are normed on typically developing kiddos.

So, if the child -- when we do these communication assessments, if the child is showing up with a delay on those assessments, we then have that discussion with the family and it would be a significant delay.

So we would then have the discussion with the family that do you want to pursue an evaluation with your child find agency to see if your child actually is delayed enough to qualify for services

Okay.? For direct services. Yes.

>> AUDIENCE MEMBER: I I'm not familiar with these assessments. I'm in the audiology realm and my PIP providers would be probably the ones that are doing these now. But are these all parent report or how are they administered to the namely? Are these questionnaires, these inventories -- how are they administered to the family? (off mic).

>> DINAH BEAMS: So in case you didn't hear Karen, what she said is there are parent checklists so the parents do respond but we have normative data on them. They're available in English and Spanish and the MacArthurism has been normed on both populations.

>> I just always worry about underreport especially in unilateral cases, I feel like sometimes we -- not everybody but some of our parents that we work with kind of under-- it's just sometimes I feel like they're not reporting as accurately as what we would like. Has that been an issue or do you feel like that's not really a concern at all?

>> DINAH BEAMS: You know, we really haven't experienced that as an issue. But I do appreciate that caution.

And like I said, our stats pretty much flow with what you would expect in terms of the number of children that are being identified. So yes. Thank you.

>> AUDIENCE MEMBER: I just a question. What percentage of your unilateral kids end up showing a delay? Because it sounds like your system works so well that part C is not going to pick up these kids again because you found a way to fund your monitoring program. And they're not showing a delay until almost transition time.

>> DINAH BEAMS: Right. When we go back to that when the children are in direct service out of that 100 children, so we've got about 20% of them that are receiving direct service because they have demonstrated a delay. Again, some of those children have other issues. So your question is very true and you always -- I feel like in this field, we're always balancing things between how do we plug this hole to make it work so we don't have a gap and how do we let the chips fall a little bit so that someone else will realize there's a need here. It's a tricky one.

I think we've got one more question and then probably our time is up.

>> AUDIENCE MEMBER: I you mentioned that the assessments the questionnaires are certainty out based on age.

And the five groups.

What standards are they based on? Are they from the state? Are they national standards or what?

>> DINAH BEAMS: So the assessments that we're using are all -- they all have reliability and validity data. They're norms on typically developing children. So the Spanish MacArthur is normed on typically developing children in Mexico.

Because their vow cashly words, their eary words are not quite the same as children in the U.S.

So they are -- vocabularyy. The normative data is really solid but they're national and even internationally recognized assessments.

>> All right, we don't have time for any more questions but I'm sure Dinah and Karen will stay around and there's packets up here if you want to look at them. Thank you very much.

>> DINAH BEAMS: Thank you, everyone.

(Applause)

(Applause)(ca.ecl)