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CONSUMER: CASEY JUDD

EHDI

NARITA A/B – VOCABULARY ACQUISITION AND PREDICTORS OF ACCELERATED VOCABULARY GROWTH IN CHILDREN WHO ARE DEAF OR HARD OF HEARING

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>> I'm Allyson I work at the University of Colorado boulder and also for the Colorado School for the Deaf and the Blind and I'll be presenting today about vocabulary growth in children who are deaf and hard of hearing and looking at predictors or more successful outcomes and what places children at risk this presentation was done with Dr. Christine who is up here at the front. Dr. Craig Mason. All of them up in the front if you have questions afterwards and you don't catch me catch one of them. I will be presenting on our behalf today. So this presentation is up on the EHDI website as a PowerPoint handout so if you don't feel like taking notes or you want the details of our contact information or anything like that, feel free to just go on the website, click on our presentation you'll be able to download this PowerPoint I'm going to show today. So what I'll be talking about today is a very brief description of a project called kneecap which is where all the data from this presentation came from and I'm excited to see people in this room who contributed. A big data to all of you who contributed data because without you, this presentation would not exist. I'll summarize the sample characteristics which because this is multistate study that involved 15 different states will give a good idea of sort of averages across the country. What we're seeing in terms of age of identification, gender distribution, that sort of thing. I'll be talking about vocabulary growth over time because this was a longitudinal study where children were tested on multiple occasions over time and I'll be identifying outcomes.

And also briefly I would like to do a comparison of children with unilateral hearing loss and bilateral hearing loss which when I saw, this morning's plenary session would be ‑‑ I thought would be a nice addition to throw in there to follow up on what we heard about this morning.

If you were there which was quite interesting. So all of the participants in this study came from a project called NECAP and it's a project supported by the CDC, the Centers for Disease Control and the main objective to look at language outcomes in very young deaf and hard of hearing children across the United States. And these are all of the states that have data in this particular project. I see people here from Wyoming and Idaho and Texas and Wisconsin. So ‑‑ and probably there are others that maybe I'm not seeing exactly in the room but, again, thank you for coming and thank you to all the states, families, interventionists that all participated in this project. So the project did involve children with both unilateral and bilateral hearing loss. It did also involve children who had other significant disabilities but the majority of the data I'll be presenting today is on the children who had bilateral loss but it could be to any degree from mild hearing loss to profound hearing loss. We did have children who used Spanish in the home in the project but today's data is going to reflect those children in which English was the written language of the a home in most cases also the spoken language but in some cases both parents were deaf and ASL was the day‑to‑day communication language although they read and wrote in English. And also I'm parsing out those children who were believed to not have any other disabilities in addition to their hearing loss. So that resulted in 837 children that met those criteria and those children were tested. The study was longitudinal with most states testing the children every six months but some states choosing to do it annually and other states choosing to do it at two specific points in time at two specific age levels so about half of the children in this dataset were assessed only one. And the other half were assessed two or more times. Two, three, four, sometimes even five occasions. And that resulted in one short of 1500 assessments which was really annoying that I couldn't say 1500. So 1,499 assessments. I was like really compelled to go out and get one more child that met the criteria just to round it out. So the children ranged in age from nine month to 36 months and again, the study encompassed a wider age range both a little younger and a little older but we're looking at expressive vocabulary development and the vast majority of children would not start to produce words whether speech or sign until they were nine months of age or older so I just restricted it to the age range when children would be starting to develop their expressive vocabulary and the mean was about two years of age. Study was divided more or less equally between boys and girl. A little more boys but pretty close. I think of interest to people in EHDI. This was across fifteen states with no biases to get a certain type of child or children whose families might be more aggressive about getting hearing testing, those who might be a little more relaxed about it. We can take a look across the country in terms of meeting EHDI guidelines.

If you look below the table the table tells you the median, the average age that were identified when they got amplification and when they entered early intervention. From an average standpoint those averages are within the EHDI guidelines so we can see that from the median that at least half of the children are meeting the guidelines. But if we look below the table you can see more specifically that there's almost 70% of the children nationwide that are being identified by three months of age. About 65% who are in intervention by six months of age. The other part of the guideline and a little less than that that actually meet both of the criteria. So the 57% meeting EHDI 1‑3‑6 was a little lower. A little over half are meeting the guidelines. So, you know, good but we still have work to do obviously.

As we all know. As far as the mother's level of education we had a nice spread on that with half of the mothers either having a high school degree or not having completed high school and a little more than half having some schooling after high school up to graduate level degrees and then the first communication mode goes there was no restrictions in the study for that so families could, you know, we included families using any sort of communication mode. So across the country and this was very similar across all of the states. About three quarters of the families are choosing to use spoken language. Some of that I broke down to families that say we only use spoken language. That was about 30% and then the other 40% said, yeah, every once in awhile we throw a sign in here and there so primarily relying on spoken language but maybe bath time or in certain situations they might throw a sign in here and there but very occasional and then the other 25 or so percent were trying to sign as much as they could so the amount of that obviously varied a lot of these children were young and the families were starting to use sign language but about 25% were committed to trying to sign within their ability as much as possible. With 5% signing only and that was primarily parents who were deaf themselves so the instrument we use and I'm going to be looking at is the communicative inventories which you are probably familiar with. It's a common language assessment that looks at vocabulary and that's the piece I'm going to look at today. It does in young children look at vocabulary comprehension and expression of vocabulary but in the older children, or children producing more language, it only looks at expressive vocabulary. If I wanted to measure that encompassed the entire birth to three age range I'm just looking at expressive vocabulary. Vocabulary use. So if you're not familiar with the MacArthur it is a parent report instrument so generally the intervention is to some extent work through it with the family and certainly they're available to provide instructions and answer questions and we encouraged all the interventionists to look it over after the family filled it out and if they felt there were discrepancies they were to reconcile that with the family. Or to let us know they didn't feel it was valid and then we, in very rare cases might not include it if the interventionist and parent could not reconcile the child's language skills so parents basically just check off the words that their child can say or sign and there's 680 words on the instrument. So although children might say or sign some words that aren't on the instrument, it's a pretty comprehensive list of words that are typically used by children in the first couple of years to two and a half years of life. And it did include both words the child said or words they signed and so there was no benefit in terms of the age score of doing one or the other or both. You know for any given word they got a point.

Whether it was produced in sign language, spoken language or both sign and spoken language. Again it's a longitudinal analysis and as far as that piece goes we used hierarchical lineal analysis. If you have technical questions go to Craig Mason. But essentially what we're looking at is their vocabulary age relative to their actual chronological age over time. So that is what I'll be sharing in terms of results. What I'll be doing is showing you some various graphs. I'll talk a little bit about them and then I'm going to show you the graph again so that you can, you know, sort of see what I was just saying. When I summarized what the outcomes are. So most of the graphs are going to be set up like this. So I just want to orient you to it. We've got the chronological age across the bottom so how old the child actually is when they take the assessment and the language age score they got on the test along the vertical axis here. And there'll always be a dotted line that would show you what we would hope for or accept. So in other words, if you follow the dotted line you can see at chronological age of 15 months we would hope that the language age would also be 15 months. At chronological age of 24 months we hope the vocabulary age is 24 months. That is what we hope they're achieving and then the other lines that you'll be seeing are lines from this sample of 834 kids. So we can see that the dotted line, again, age expectations, the blue line is the entire sample of children over time. You see they're not meeting age expectations and I'll talk about a few summary pieces of information and then we'll look at that graph again. So one thing you'll notice is that it's a very early age. So when the children are just starting to produce words they are pretty much on track so the children as a whole are typically saying their first ten words basically on schedule at the same time that a hearing child would be doing that. But as the children who are deaf and hard of hearing get older and older. As their chronological age increases they start deviating more and more from that expected line. So the gap is widening over time and it's pretty dramatically widening over time. And we can see this in look at how much delay the children are exhibiting. At the various chronological age levels and again, remember these are average numbers, there are children who at age expectations. There are children who exceed age expectations and children who are doing more poorly as well.

At 15 months they're usually on track but by 29 months they're 8 months delayed and by 3 years old, now they're a whole year off of where they should be. So, again, this is just another example of how the gap is getting bigger and bigger over time so their growth is not keeping up at the ‑‑ it's not just as though they start lower and they keep growing at a normal rate. But they stay lower because they started lower. They start more or less at the right spot but their rate of growth is not as quick as a typical hearing child's is and so they start falling more and more behind over time. So the growth rate from one to three years old rather than being one month for every month of time is just a little over half a month for every month of time. So their growth rate is 56% of what it should be over that one to three‑year‑old period. And unfortunately there is a statistically significant quadratic effect which means the curve is like, I'll make it more dramatic so you can see it. Going like this. It's not dramatic but subtly the growth rate is getting less as they get older. So rather than kind of picking up speed and maybe starting to try to catch up they're actually kind of slowing down in terms of how much gain they're making every single month.

Although that is a very small effect. So it's fairly consistent over time. So, again, this is the same graph we just looked at but you can look at it relative to who we were just seeing. You see that widening of the gap over time.

Where when you start looking at at 30‑36 months you're seeing basically a 12 month delay in expressive vocabulary relative to where the children should be. Looking at it a slightly different way this is the number of words that the child produced so rather than their age score on the vertical axis now I have the number of words that the typical hearing child produces at the different ages.

That's the green and then the number of words that the typical deaf or hard of hearing child is producing at those same ages. It's a different way of looking at the same thing. We basically see the same effect, but in terms of amount of words behind the child are, I think this really hits a home about what we're up against I would say. So at 15 months they're very close to where they should be, just five words behind but a 15 month old doesn't say a lot of words. Even typical hearing child. By the time they're 30 months of age they are 306 words behind where they should be and so you see each, you know, six, three to six month increment of time they're more and more words behind. Their vocabulary size is further and further behind where they should be for their chronologic age. Why does this happen because after 18 months a child has gained 37 new words a month.

So typical development is more than one new productive word every single day. The deaf and hard of hearing children, again, because they're at about half speed of that are gaining an average of 18 words every month. So about half of what they should be getting every single month. And this is the same slide again. This one's a little more rocky because it's the actual average number of words at each given age level and so each age group maybe has 40‑50 kids in it and so you're going to see some little ‑‑ it's not going to be a perfect smooth curve the way the previous one was that has statistical treatment in it that smooths the curve out. So we want to look at the risk and what are the more protective factors people are doing better. We looked at a variety of variables that we thought might contribute to higher vocabulary scores. And in the final model we did control for all the various variables that were in the model. So one area we thought there would be differences was between boys and girls. They were doing the same in terms of vocabulary growth over time and their overall vocabulary scores over time. But one of the variables where we did see a difference where whether the children met the EHDI 1‑3‑6 guidelines or not. So we're not going to just show you the expected growth which is the diagonal dotted line but also the comparison of two groups. Sometimes more than two groups the blue line is children who are meeting the 1‑3‑6 guidelines. The dashed red line are children who are not.

We are definitely seeing a language advantage. The blue line hasn't brought us up to having exactly expected development but it does definitely give the children a significant advantage. Looking at this a little differently, we wanted to see like, well, is it just being IDed at three months is that enough or if you get them at intervention by six months is that enough or do you have to meet the whole shebang, it turns out you get a little advantage so the dotted red line is children who didn't meet either. So that group is doing the poorest in terms of vocabulary development. And then the two middle lines that kind of lay on top of each other are if they just met identification by three months but not in intervention by six or vice versa. They didn't get IDed by three months but did get into intervention by six months that gives children a little advantage and it is significant but if they meet both of the criteria, that's the solid blue line and that's even better. Than just meeting one or the other. So we shouldn't be satisfied with just meeting one‑half of EHDI. We ‑‑ children actually will do better typically if they meet both parts of it. So that just summarizes this. The children who only met one of the guidelines are doing better than children who met neither. But children who met both pieces of the guideline are doing better than children who just met one part or the other. And children identified by three months actually had higher growth rates so each month they were growing a little bit more than children who weren't identified at three months of age. This is looking at differences between children with moderate to profound loss. More significant losses compared to children who are mild‑to‑moderate and you see a difference between those groups as well. Where the mild‑to‑moderate have higher vocabulary levels than children who have more significant hearing losses. Then looking at maternal education we see it breaks down to mothers who have less than a high school diploma so did not complete high school. Their children have the lowest vocabulary scores. Then we have the middle line where parents completed high school or got a vocational degree. After high school they did better than those who didn't complete high school but not as well as the top group which were the children of parents who had at least an associate's degree. Another variable where children did better was if there was at least one deaf parent in the home. And this included deaf parents that used sign language and also included deaf parents who used spoken language to communicate that. Group was inclusive of those who signed and those who didn't but either way it gave them an advantage. So a quick look at the unilateral loss. We had 228 children with unilateral loss who also were assessed on 1‑5 occasions and that brought our total number of assessments for children with unilateral loss to 409. This speak to what Ann Marie was talking about this morning. The blue line are the children with unilateral loss. They are doing better as a group than children with bilateral loss, but you can see they're not performing at age expectations as a group so supporting what she said this morning as early as the birth to three period, before children are in a school setting we are already seeing delays in their expressive vocabulary development. So just to summarize children with unilateral loss did have higher vocabulary scores than those with bilateral loss. And the growth rates were higher. They gained more than the .56 months for every one month so they were growing at a faster rate and the bilateral and unilateral groups were pretty much the same in the early stages around 16 months but then they start to deviate and by 36 months the unilateral group has a four month advantage over the bilateral group however they are still significantly delayed relative to age expectations and so this is a group to pay attention to to at least be monitoring and we've noticed and you can see it in the graph the delays get bigger over time so if you monitor a child with a unilateral loss typically they look pretty good. Pretty much on track. Maybe a couple months behind. But maybe not that you'd feel concerned about but it's important to keep monitoring these children and to make sure that at say 30 months of age they have another speech and language assessment because that's where you can really see, you know, they look pretty good down here. On the blue line and the gray line but by the time of 30 months they're delayed 7‑8 months where at 15 months they were one or two months behind and probably nothing that would raise a red flag so consistent monitoring is important. Especially if they're not receiving regular intervention. So overall, to conclude as the language demands are increasing over time the gap between chronological age and vocabulary age and the children who have hearing loss is getting bigger and bigger. By 30 months of age the average child with a hearing loss is nine months behind where should be and the rate of growth over time is about 56% of where we want it to be. The factors we found with higher vocabulary scores were meeting EHDI 1‑3‑6 guidelines, less degrees of hearing loss, higher levels of maternal education and having at least one deaf parent in the home regardless of whether they use sign or spoken language. The groups that actually grew more over time, more than that .56 months who were those who less degrees of hearing loss, higher levels of maternal education or just hearing loss in one ear. So thinking about this clinically, I think it's really important that families and interventionists are always aware, always keeping in mind what the n ‑‑ normal growth rate is that a kid will gain new words every single month and so if the child with hearing loss is only gaining 18 words, one has to keep in mind that that's not enough to stay on track for where they should be.

So it's important to keep those benchmarks in mind. I don't know if anyone attended Betsy's talk yesterday. She talked about teaching specific vocabulary and the importance of doing that. Explicit teaching of single word vocabulary that the children are behind and concentrated efforts have to be made.

Some of the risk factors to deemed the children might be more significantly delayed and might warrant more intensity of service as if the level of education of the mother is on the lower end of the spectrum. If the child has more significant degrees of hearing loss and if they're late identified or late to get into intervention and another piece from the study that I think we can learn is the drawing on the skills and knowledge of deaf adults and their parenting styles and in their language facilitation techniques could be fruitful because their children are doing somewhat better than children where there's not a deaf adult in the home. So I believe my time is up but if anybody has questions I think ‑‑ do we have time for questions? No, I will go out and so if you have a question and you want to come out and ask I'll be out there and you can ask.
>> (Applause).
>> Thank you.