All right, we're going to get started. I want to first thank the program committee for giving us the opportunity to talk about this work. I'm Gerry and this is Elodie. She's a development pediatrician at Cincinnati Children's as well.

And I'm going to slow down because I realize there's a lot of letters in my name. I'm going to turn it over to Dr. Potansis [phonetic].

>> Hi, so, we don't have any financial disclosures and the funding for this research study was through the CDC. To begin, we know that birth to 3 is a critical development period and we know the importance of the 1, 3, 6 guidelines, so, screening children for hearing impairment by one month, diagnosing by three months and intervening by six months, so that the early enrollment in early intervention enhances their language development and we all know it has an impact on that language development.

Not only achieving that 1, 3, 6 is associated to the emergent literacy, it's also associated to kindergarten readiness. The EI program intensity may be a critical factor for improving long-term outcomes in these children, such as school readiness.

These two graphs are shown to highlight the impact of early enrollment in early intervention, not only in language, as we know, but also, in kindergarten readiness and in literacy. And what we can see here is that children who were enrolled before six months are showing, demonstrating kindergarten readiness and also on track for their literacy and it's, their values are comparable to all Ohio students and are very similar.

We don't know much about the characterization of what deaf and hard of hearing specialized services look like, but we know what the components of early intervention are for the deaf and hard of hearing. They look like home-based family supports, parent to parent supports, opportunities to interact with the capital D Deaf Community, guidance and communication, language development. Planning for transition to pre-school.

But we wanted to characterize what the intensity looked like as well.

So, in a previous study, we characterized that intensity in minutes per month and we also looked at cumulative exposure that was deemed in hours throughout the exposure in EI and we found -- sorry, in the first year of EI, the median intensity for those receiving specialized deaf and hard of hearing services was 59 minutes per month. It was around 121 minutes per month. 50% of the children who were deaf and hard of hearing and received less than 20 hours cumulative, meaning total, throughout their EI life, of exposure to specialized deaf and hard of hearing services and 30% of the children never even received these services.

So, here we can see factors that are associated with the intensity of the deaf and hard of hearing services, that were received within the first year of EI, and what we can see is that greater intensity or more minutes per month was provided to children who had bilateral hearing loss, severe to profound hearing loss, and were enrolled in early intervention at a later time.

As a way to kind of catch up to that time. The objectives of our current work, since we know that early intervention -- sorry, early -- being enrolled early in early intervention, sorry, has an impact on language. And on literacy and we know what the characterization kind of looks like between the minutes per month and what the consume fantastic hours look like, we wanted to evaluate the relationship between the EI intensity for children who are deaf and hard of hearing and their kindergarten readiness by age 5.

So, we looked at that intensity within that first tier of being enrolled and we took a specific focus on specialized deaf and hard of hearing services.

We do this through leveraging information from the Ohio EHDI data linkage project and we had 1252 deaf and hard of hearing infants who were born from 2008 to 2014 and enrolled in early intervention.

We focused on EI intensity, minutes per month for specialized D/HH EI services within the first year of enrollment. Analysis included data on 385 kindergartners who are deaf and hard of hearing, 58% of those were enrolled in EI by the age of six months and we assessed kindergarten readiness using the kindergarten readiness assessment at the beginning of kindergarten.

As for the EI service definitions, I'm not going to go into too much detail, because we kind of all already have an idea, but this is classified within the IFSD and what's important is that each service includes a start and stop date. There's many different categories and intervals in which the services can be given, how-frequently and the duration of the encounters as well.

We also classified (?) so, if they had any or no services at all, within that first year, the minutes per month and then the cumulative hours as well.

As for the outcome measures for kindergarten readiness, we have the KRA, the kindergarten readiness assessment that is given to children at the beginning of the school year. And it looks at language and literacy, mathematics, social foundations, physical well-being and motor development and depending on the score that the child gets, they'll be labelled as having demonstrating approaching or emerging skills.

And the language and literacy area measures skills in early reading, the letter recognition and using words in conversations.

This table is to show the basic demographics, characteristics of the deaf and hard of hearing children that we had enrolled in EI. We can see the contrast between the overall population versus kindergarten nurse, whoo, sorry, and this is just to show and highlight where there might be some differences, there were less-severe to profound hearing loss and there were more documented disabilities in EI.

But overall, it was the pretty good sample that represented a sample.

So, to start with the results, the majority of the children, 79 % received deaf and hard of hearing services at some point during EI and 68% received them within the first year of enrollment in EI.

That means, also, that the rest of them have to wait a whole year before they get the actual services, specialized services and the medium cumulative hours of service were around 13.3 hours, with the intensity received around 49 minutes per month. Which is less than an hour per month.

28% of children demonstrated kindergarten readiness.

>> I'm going to start walking us through results of this. I didn't take captioning into account when I made my X axis, so, we have to be very sort of mentally visual as I walk you through what the X axes are. One point I want to bring up, we're focusing on the line item and IFSP that is for deaf and hard of hearing specialized services. That is that sort of conglomerate of services that Dr. Patensis [phonetic] showed us earlier.

Deaf and hard of hearing services are provided irrespective of what else is happening with the child. These are preventive services that early intervention at the time was providing. All children who were identified as deaf or hard of hearing.

The other services are often overlaid when there's an identified delay or an additional need of the child. These are services we wanted to focus on, these are really, really preventive services that we're trying to provide to support appropriate development of children who are deaf or hard of hearing.

All right, so, after controlling for enrollment age, we know the age of enrollment is extremely important. Children who received any deaf and hard of hearing services in that first year of early intervention, irrespective of how much, any versus none in that first year, were twice as likely to be kindergarten ready compared to those who received none.

There's a relationship with service intensity in the first early intervention year. Here, we're seeing an increased likelihood with the first red dot on the left being for every 45 minutes per month of service. A child received, they were just a little under two times as likely to be kindergarten ready.

The dot next to that is what would happen if they received 60 minutes of service, compared to -- you know, for every 60 additional minutes of service they received. You'll see, there's not a great big additional help or benefit by receiving those extra 50 minutes.

This last -- these are the cumulative hours. So, the total amount of hours that they may have received in services.

What we also see is that we get very little bump for cumulative hours. This is because -- and I can't even see what that X axis means, so, I'm really sorry. Those are cumulative hours. What we're seeing here is that the age of early intervention matters and it probably matters more than the cumulative hours of service because those two are extremely tied.

You're going to get more hours of service if you're in early. The intensity per month is not tied to the age at which they got in, necessarily.

So, getting more intense deaf and hard of hearing services, the more intense services didn't necessarily make they more kindergarten-ready. Getting any services seemed to be where they got their biggest bang for their buck.

Now we'll take a look more deeply at how intensity may be associated with that probability of being kindergarten-ready. We identified in our work that this is not a linear relationship.

Probability here, is illustrated on the Y axis with differing intensities of deaf and hard of hearing intervention services quantified on the X axis and those are in minutes per month we can see that on the X axis.

The solid line here, shows the relationship between intensity and kindergarten-readiness for children enrolled by six months of age.

You can see there's a slight increase, the more intense services for this subgroup, the better or more-likely they are to be kindergarten ready.

However, if we go to the dashed line, these are kids who got into early intervention late. And if you remember, in a couple slides earlier, we saw that kids who got into early intervention late received a lot more intense services.

They had higher minutes per month when they got in. However, that intensity is not helping them at this stage and this is because we hypothesize that it's about getting in early and getting exposed, as opposed to getting tons of service the minute they get in.

They're already delayed at this stage. So, we're playing a lot of catch-up. We also wanted to look at the cumulative exposure to deaf and hard of hearing specialized services.

So, these are those special services that are given irrespective of any delay. These are the only services we've been talking about. Here, we see also, the probability being kindergarten-ready on the Y axis and we see -- you don't see -- on the X axis, the increasing exposure cumulatively in hours.

And over time. This is cumulative, this is during their entire stay. This top line here, is going to represent children. A child. Who had private insurance, who has no disability diagnosis while they were in early intervention and has a higher, you know, family education history.

Now, we'll see the impact of having a disability on this. Everything else stays the same. If a child has one of the diagnosed disabilities while they were in early intervention, we see a significant drop in that probability.

Sadly, we also see that significant drop if we're just looking at that family educational status. And it doesn't impact them differently than if their child had a disability. This is important because we're talking about social determinants of outcomes and thinking differently about how we may need to support families.

This bottom line let's us see that a constellation of possible social determinants may play a significant role in the outcomes of kindergartners. We believe that this graph, in general, is emphasizing for us, a need to understand the social determinants, so we can better-help families at their -- in their lives with their different needs.

And if we can do that, then perhaps we can move this bottom line up, which is sort of what our overall goal should be. In closing that gap. This is retrospective -- this is a study of data that was collected as part of a large public health and state agency initiative. Therefore, it's fraught with a number of limitations, first off, the service types weren't standardized, meaning we didn't define how service -- how people needed to be defining the service types. How they delivered services and what they said was needed wasn't standardized from one child to the next.

We quantified what was in the IFSP, not what a child actually received. We know there's a discrepancy that's not a one-on-one relationship.

We don't have the cognitive and language levels of children in this particular study. We do have, whether they were delays. We do have information about their sort of educational labels.

So, we know what the education system has decided in terms of needs and we have the IEPs of these children as well that we can dig into.

We also don't have great data on the social determinants of health and I think this is vastly important. We do need to better-support families by understanding what this data are.

And this may, in fact, provide us -- this awareness would help us better-understand how to support children and their families.

So, to finish off, independent of enrollment of age, intensity of the deaf and hard of hearing services in the first year of EI was associated with an increased likelihood of kindergarten readiness. That being said, age of enrollment is still one of the most-critical factors.

Understanding the impact of service intensity for specific DHH services on outcomes may have implications on part CEI practice and policies.

And as for our current directions, we're looking into a couple things. We're looking at the impact of early intervention on third grade reading and also, on the impact of the COVID pandemic on early academic outcomes.

>> That's it.

>> Thank you very much.

[applause]

>> And we have time for questions, if you have them. Yes?

>> [Too far from mic].

>> We picked a couple and put them up there. I looked at this before, state aid, there's an impact with state aid, which is probably a better social determinants of health, absolutely.

>> We want to hear your beautiful voice.

>> Are you going to take the study further and look at quality of early intervention service, not just quantity?

>> I love that idea. I'd love to do that. That's definitely a prospective type of work that I hadn't really thought about, but I really should, thank you for bringing that up.

>> Did you look at if any of these families were receiving D/HH services outside of early intervention? If they were doing private AVT or things like that.

>> I think that's great. No, at the time these data were collected, they didn't collect that information. They do a better job at capturing that now, but we didn't have that at the time.

>> Did, when you were looking at the numbers for the amount of services, did you, I know you said you took it directly from the IFSP, were you guys able to account for absences? Like the number -- the number of sessions that parents were able to attend like missed sessions?

>> One of the major limitations, this is what a family was supposed to get. They'd tell us how many times per week, how many times per month. Whether a family was available for those sessions, whether they weren't there. We didn't know what a child actually received. Yes?

>> My question is for the Kindergarten Readiness Assessment. I'm right here. The Kindergarten Readiness Assessment, did that evaluate specifically for deaf and hard of hearing kids? Visual skills?

>> The Kindergarten Readiness Assessment is the Ohio State Education Agency assessment. It accounts for ASL, visual learning, it's been used to do that.

So, in fact, the partner that I have it, the Ohio Department of Education is extremely motivated to partner and evaluate children who are deaf or hard of hearing. She used to work for the group that was associated, so, she's very -- with deaf and hard of hearing kids, she's very motivated.

>> Hi, you mentioned that you're going to be looking at the affect of COVID on kindergarten readiness.

So, I received my family, my child received early intervention services, basically from the very beginning of March 2020 through, you know, now he's in pre-school.

The bulk of our -- I'd say the majority of our early intervention services was completely remote, on Zoom.

It'd be interesting to look at the effects of remote early intervention services versus in-person, we had a positive experience, all things considered. It wasn't something that we would necessarily go back and choose, if we could have a choice, but we still were able to access those services.

So, it'd be interesting to see if long-term, whether rural communities who really could benefit from remote services, if that has an impact on what you're looking at.

>> I absolutely, 100% agree with you. I think that's an important and necessary question that we need to be asking. A lot of places went teletherapy, telehealth, tele-intervention. We shouldn't go back to that. Thank you.

>> There was a study looking at Teleintervention before COVID. I was wondering what kinds of deaf and hard of hearing services are available through the IFSPs. I'm from Colorado, we have CHIP, which is different. I don't know if it involved things through Children's or not in Ohio, if that's separate and how that works.

>> Great question, the deaf and hard of hearing services that the specialized services is actually, was at the time, a line item that, one of the intervention services, early intervention services, part CH services that was provided for deaf and hard of hearing children. Every child who was deaf and hard of hearing had the, could be exposed to these. It was one line item that included all of these at once.

>> Hello.

>> My name is Gina, I work at Nationwide Children's in Ohio. I -- I've followed your work for awhile. You've presented lots of really good data. My question is, I think your endpoint, currently is 2014. And I know for those not from Ohio, our state has changed a little bit. And I was curious if you would be continuing that after that change so we can just see if there's anything that impacted the children's readiness after that.

>> Yes, absolutely. The birth cohort to 2014, all of the children in this cohort received -- had the opportunity to receive these services and we have had a shift in Ohio where early intervention is provided by an agency. One of the reasons for me looking at this is because this is providing an evidence-based model for the deaf and hard of hearing services that children need.

So, we can at least put some evidence that say, "this works and this is important" and I think evidence is important for driving policy.

The second bit is, we have already been working with Ohio Department of Health and Department of Developmental Disabilities to get updated birth data. Hopefully we'll be able to add an additional birth cohort of children who were born after the move over to the agency.

So, we'll be able to see if that makes a difference. Thank you for bringing that up. You have phenomenal questions, I really appreciate it.

>> Thank you. Nina Molaski [phonetic], early intervention in North Carolina. I'm so fascinated by this research, but my question to you is, in Ohio, is there a specific protocol for how often services are recommended? Is that -- like, in North Carolina, that is very much family-based? We can recommend, but then, they decide what they'd like to do?

I know in other places, it's more regimented. I was curious to see how those services, service delivery frequency was determined.

>> I think that's a great question. I'm going to say that at the time this data -- at the time of these kids exposure to early intervention, it was very likely the same family sort of driven, family-led type of intervention services.

So, family plays such a huge role in what they get and how they get it. It was -- much of it was family-led. There are needs of the child, of course, that will play a role as well.

Well, I want to thank you all for staying until you're starving for lunch and I hope you have a great day.