Transcript

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Karen Gordon

Hello and welcome to the award-winning Hear Here podcast. I'm Karen Gordon. I'm an audiologist and scientist at the Hospital for Sick Children in Toronto, Canada, and I'm delighted to introduce our season five. You'll be hearing episodes hosted by our Hear Here Podcast Team. They are an amazing group of individuals who have experience living with hearing loss themselves or with siblings who have hearing loss. So you'll be hearing from Maria Khan, Nimrat Chani, Sofia Olaizola, Annika Gasse, May Wang, and Maryam Othman. In season five, we recognize the contributions that many families have made to our research conducted at Archie's Cochlear Implant Laboratory here at the Hospital for Sick Children. We discuss the findings of studies that often take many, many years and represent so many hours that children and their caregivers and loved ones spend with us and we really appreciate them and all of this contribution they've made.

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Sofia Olaizola

Hi, everyone. Welcome back to another episode of Hear, Hear. Today, we are talking to Carly Anderson, who's talking to us from Lancaster, United Kingdom today. And we're going to be focusing on bilateral cochlear implants in children. We have Karen joining us also today to provide some insights. And we're excited to get into the conversation. So Carly, why don't you introduce yourself a little bit.

Carly Anderson

Yeah. Hi, Sophia. So I'm Carly Anderson, and I'm a lecturer in neuroscience at Lancaster University. I moved here recently, just last week. Before that, I was at University College London, in London in the UK, where I was leading my research program. I had a Wellcome Trust Fellowship, a Sir Henry Wellcome Postdoctoral Fellowship, that funded four years of my research. So I've just started to sort of wrap that up and, well, bring it over here to Lancaster University.

Sofia Olaizola

That's super exciting. Are you liking it in Lancaster so far?

Carly Anderson

So far so good. It's, you know, lots of things to figure out and lots of settling in today, but it's such a beautiful part of the country and the psychology department that I'm based in are really collegial and friendly. And yeah, I have no doubt that it's the right choice for my career right now.

Sofia Olaizola

That's amazing. The topic we're talking about today is of particular interest to me because I am a cochlear implant user. I was born bilaterally deaf and because it was the early 2000s, I received just the one cochlear implant. And then I did get the second one when I was 10 years old, but I didn't wear it beyond the first year, which I'm sure is a common thing. theme that you see in your research, but I'll let you speak more about that. First, you could maybe explain to the listeners what bilateral cochlear implantation is. And we can talk a little bit about how bilateral implantation users compare to unilateral users.

Carly Anderson

So when we talk about bilateral cochlear implants, what we're really talking about is for people, children or adults who are profoundly deaf. And when they have two implants, so one on each side or one in each ear. So for hearing individuals, their biological mechanism of hearing involves hair cells in the inner ear sending electrical signals to the brain that then our brain has to process and understand as sound. But in the case of profound sensorineural deafness, those cells are damaged. And so the cochlear implant replaces these and the implant sends electrical signals to the brain instead of those biological hair cells. So when someone has two implants, in the case of bilateral implantation, they're accessing sound through both ears rather than one, which we call unilateral implantation. And this can improve things such as sound localization, so understanding where sound comes from in the environment, understanding speech in noisy conditions, so being able to kind of pick out the talker better than you would do just with one implant. And just overall for children, more holistic auditory development in terms of their biological auditory system than compared to if they only had access to sound through one ear.

Karen Gordon

I'm going to jump in if you don't mind, Sophia. Just going to quickly introduce myself. I am Karen Gordon and I direct the research lab, Archie's Cochlear Implant Lab at Sick Kids Hospital in Toronto. And it is a pleasure to listen to this discussion about cochlear implants than bilateral cochlear implantation, because as you said, Sophia, when you were first given an implant, even though you had hearing loss in both ears, it was only to one side. And I just, I think it's important for our listeners to understand the context of that. At that time, cochlear implants were so new. I wonder like how many cochlear implants we had

done at that time when you received yours. It was probably, I don't know, I'm guessing like less than 100.

Sofia Olaizola

I think my parents were told that we were within a cohort of the first 100.

Karen Gordon

There you go. So that was a good guess. Yeah. At that time, we were really in new territory. We didn't know how well the implants were working. We really wanted to make sure. that we were doing everything safely and that there was going to be some good hearing that comes out of a cochlear implant. We wanted to make sure that everything had been tried and then we're going to only do it in one ear because we were just not sure this was going to be a lifetime of learning. And as we can see now, I am so privileged to have watched you and the others that, other recipients and their families grow up into these adults who could tell us what you heard and what your experiences were. I think it's just so important. But I think setting that scene is crucial because sometimes people ask me, we have two ears, why wouldn't you have put them in both ears? And I think at the time we just were just being so, careful that we wanted to do one side to see how it went.

Sofia Olaizola

I mean, not to mention at the time it was brain surgery on babies, right? So it makes complete sense that you would want to make sure before you touch both sides of the brain.

Karen Gordon

The surgery involves opening up the ear and, you know, there's bone in there and they have to get into very delicate parts of the ear and to the inner ear, the cochlea. Like this is really delicate surgery. So it feels like the brain, but it's not the brain, it's the ear, but the ear is attached to the brain. And that to me is a great segue for Carly, because she's really interested in what the implant hearing loss and perception does in the brain. I think.

Carly Anderson

That's a really important point that it isn't just the ear. Hearing It is about the brain and it's about the person at the end of that implant, right? I think as implantation has developed and as it's got more and more common and, you know, we know so much more in the surgical techniques, so much safer and less damaging to the residual hearing and all these sorts of advancements. we have to remember that it's not just about restoring a bottom-up signal, you know, sensory signal. It's about the person and everything they bring to how

they interpret that signal, what that experience is like for them. Sophia, you said you didn't wear your second implant in the first year. That is really common for many reasons. And I think really keeping focus on the fact that we should be thinking about these these surgical procedures as wider, the wider procedures with wider implications on the person and what their experience of that is like and how we can support cochlear implant users through that process.

Sofia Olaizola

So Carly, in your research, are you studying any like specific populations like early implantation versus late implantation? What are you looking at these days?

Carly Anderson

So I've got a few different, I suppose, areas of research. Probably what's most relevant today is my work that I did in my postdoc with Karen. So I'll just, I'll focus on that for now. So My research with children with cochlear implants, the group that I am currently looking at is actually a group like yourself, Sophia. So children who received their first implant early on in childhood, before the age of five, at that time when clinical guidelines and recommendations only allowed for one implant, even though they were deaf in both ears. So these children then developed through their childhood for about a decade until they were, in their early age of teenage years. They developed with access to sound through that implant in one ear, but were profoundly deaf in the other. And so these children then, when the guidelines changed, were able to receive a second implant if they wished. And that is the really interesting group that I'm currently looking at with some of my research.

Sofia Olaizola

And are there any early findings that you can share with the listeners or anything you're seeing come up?

Carly Anderson

We've got some good, well-established findings that we've published. And those findings have shown that when these children first listen with their new implant, that we get these really, really big, really dominant responses in the brain that we weren't expecting to see. You know, our thought as scientists really was, okay, these children have been listening for many years with their first implant. And that's a really familiar sound that they've developed with, that they've established all these, you know, understanding of sounds and all these representations in their brain of what sound sounds like. And so we think that will be the dominant response in the brain. But what we found was that it was actually a bigger response from the new implant. We thought that would be weaker because they hadn't

heard with it before and because those auditory pathways hadn't been stimulated and hadn't been used to listening through that implant. So it was really surprising to us to see this really big response. that really just, completely contradicted what we thought we would see. So that's a finding that's out there for people to have a look at and read about. More kind of recently, some, you know, hot of the press findings that I'm still working on at the moment and writing up. We've now moved beyond looking at this response, this kind of localized or focal response in the auditory brain regions and how strong that is. We're now going beyond that and saying, okay, well, we know that the brain is complex. It's organized chaos, right? And these areas don't work in isolation. So we're now running what we call a functional connectivity analysis to understand how these auditory brain regions that process sound, how they're communicating with other areas of the brain. And so we're hoping to understand more holistically how the brain is all these different areas are working together to help interpret this new sound input from this new implant.

Karen Gordon

Yeah, this is such a huge shift in our thinking. And Carly, really brought such a beautiful skill set to allow us to do this. Because we, I'm an audiologist. I'm interested in, you know, sound going into the ear and up to the brain. And we focus a lot on measures that look at barriers to entry. Let's talk about it that way. You know, we talk about, well, is there a problem? in front of the eardrum, as simple as a wax in the ear. We talk about fluid in the middle ear or some problem that happens behind the eardrum. We then talk about, okay, well, if that's all clear, maybe there's a problem right in the inner ear. And we're learning so much more about all the things that can happen in all of these three parts of the ear. But in audiology, we really focus a lot on defining the ear and where the problem is in the ear. But we are learning so much more about the connections to the brain. And even those connections, we use those a lot for things like measuring hearing in babies, for example, right?

Can we get responses from the auditory nerve and from the auditory pathways? Even all the way up to the brain, we look at, can we get any kind of sense that there's any kind of sense, any kind of measure, something that we can look at, quantify, put a value to that would tell us, yeah, everything's going from the outer ear all the way up to the brain. And that's just the first part of it in terms of, is there a sound there? Is it detectable? Does the child, does the person hear it? The more, when we look just at that, we get some really good feelings about what the implant is doing, right? Like we can see that the whole system actually gets. better over time. It pushes information up to the brain more quickly, through the brainstem, up to the cortex. It gets clearer in what we see.

We also see like, well, wait a minute, the first implanted ear. actually is doing the job of both. It sort of takes over that, it's going to send sound up to both areas of the brain that deal just with hearing. And that's what Carly was talking about, is that when you just look at the hearing parts of the brain in the temporal lobes, the auditory cortices, they tell you a lot. But when they tell you something you didn't expect, like what Carly was talking about, like why would you get a huge response from an ear that hasn't worked in decades, like at least a decade.

And all through those pathways, through those nerves that we thought were not being used at all, it just, it was like a light bulb in the sense of, well, that auditory brain is not just a receiver of input from the ear. It's a receiver of lots of things in other parts of the brain too. And other parts of the brain have been developing and changing and moving as children just live and grow. and learn. And that is the fascinating thing. The thing is that our traditional tools in audiology, and I know, Sophia, you're going to be focused in on this because now you're doing your degree in audiology. You're going to be an audiologist and you're going to be very focused in all of these specific barriers to entry for this first sound. And that's really, really important. But I think our discussion about what will the person do as they process the sound is something that's unbelievably fascinating and trying to capture that in a measurement is really phenomenal. So, I mean, Carly, I don't know if you can tell us like about how do you how do you do that?

Carly Anderson

Yeah, well, I was just thinking as you were saying all of that, Karen, that this is why for me, the area of cochlear implantation is just so interesting and fascinating because it does require all these different sets of skills and experiences from so many different people. It's like at the intersection of so many things. So of course, all this incredible work in audiology, of course, you know, it's an auditory prosthetic. We have to understand if it is delivering an auditory signal to the auditory cortex, that is its point. But then, and everyone has established some incredible work in that area. And it's only from that you can then, as scientists, build, right? And this is just a natural progression of science and techniques that have become available to us as well, these different ways of looking at data. I think as we work together more cross-disciplinary as well, then we get these different ideas from each other. And this is where the neuroscience comes in. And when I talk to cognitive neuroscientists, you know, colleagues in my area about these findings, their first reaction is, well, of course the brain did that because it's, it's surprised, right?

It's almost detecting an error. It's something it's not expecting, like a prediction error. So you've got these established sounds, these established systems from your first implant, and then in comes this new novel, you know, unexpected sensation. And your brain

networks and the frameworks that child has developed is having to suddenly reconcile the two and integrate the two together. And it doesn't know how to do that. So for some, this is an obvious finding, which I find fascinating in itself. You know, from an audiology point of view, you wouldn't predict this.

Maybe from a cognitive neuroscience point of view, you would have. And I think what's really interesting and probably what you might be able to speak to, Sophia, is then the link between brain and behavior and brain and human experience. So we're seeing these responses in the brain and that the auditory cortex is communicating fiercely with lots of different areas all over different parts of the brain that we weren't expecting. And how does that manifest? Does it manifest as experiences of discomfort, frustration, withdrawal, you know, not wanting to use your implant? I think the whole thing is just so amazingly complex.

Sofia Olaizola

Just to provide context, Carly, I did my first degree in cognitive science. And through taking some of those courses, I started to realize a lot of things about myself. And so that finding that you and Karen have both spoken about with the unused ear somehow, you know, generating such a strong response, even though it'd been dormant for so many years, completely resonates with me because when I got that second implant, that sound was so much stronger than my right implant, which is why I didn't want to wear it because I, obviously, because I was young too, I didn't see the long-term benefit, but I just couldn't reconcile the fact that this awful noise was so much stronger than what I believed to be hearing for the first, you know, 10, 11 years of my life. And so that finding doesn't surprise me actually, and it makes a lot of sense. I think it's so great that audiology research is moving towards this interdisciplinary work because I think so many different fields can bring such important insights. But I just wanted to make sure I asked you this question before we wrapped up, if you have any insights about how the two sides of the brain or the two ears are communicating with each other in bilateral cochlear implantation. Because obviously with typical hearing, you have the two ears communicating with each other about sound localization and other important things. but how does that look in users with two cochlear implants?

Karen Gordon

When you were speaking about the new ear and all of these, like the surprisal, it's almost like the new side is fighting with the old one. And I think what you're getting at is this idea of the actual working of the two ears together. The job of creating integration between the two ears. We haven't done such a great job on that, to be honest. So the first thing is this idea of

having this preference for the first side that's been hearing for much longer than the other side. So that oral preference is one major issue where we now have like a competition between the two sides that really make, and it's hard because you talk about this loudness thing. It's like a, it's a self-fulfilling prophecy, right?

So you want to turn it it down because it's interfering. It's like, wait, I don't want to hear that. So that creates this back and forth with the programming, with the audiologist to turn it down. So then the benefits may be reduced. And so then you don't want to wear it as much because it's not going to be an equal partner to the other ear. And so we get this problem going on all the time, which, truthfully, one of the best successes of doing cochlear implants at the same time, same surgery in each year for children, so simultaneously, is we don't have that fight all the time. So everything... is programmed together, the therapy goes together, everything kind of goes together. And still, the two devices work completely independently. So we're still not doing a great job of getting integration between the two sides, because that does take coordination actually from the brain stem right away. It has to match perfectly. It's amazing what the auditory system does with the two ears. It puts it together perfectly, but it needs a little help So when we give different input between two sides, the auditory system is fighting that. So when we get up to the brain and we get up to, can the brain actually make sense of the input between two ears? So we can see in behavior that, children are getting better at sound localization, but what they're doing is comparing between two sides, right? They're saying, I hear a sound that's kind of on this side versus that side. So the left versus the right, for example. And that's helpful, super helpful, better than having nothing on one side at all. But it is still an effort. And we talked about this a lot is how much do you have to make a cognitive or a brain effort to resolve that? So that's where now we've talked about the beginning parts of cochlear implants and that's surprisal. But as you go down the line using these devices over time, maybe Carly can talk about that, like what happens with these responses, what we see, and also with, you know, your experiences with effort, fatigue, et cetera.

Carly Anderson

You've just highlighted a really big point in the field of cochlear implantation, which is variability in how children and adults affair with their implants, right? So some children will absolutely thrive with two and others will thrive with just one. And the variation can be huge. And probably a lot of that is to do with exactly what you've just said is learning how to use these inputs together and the impact of that on them, how effortful it is. If it's too much, then it becomes non-use. But I think that there's an aspect here of the rehabilitation, right? And the, can we, if the brain is doing everything it kind of should be to integrate these ears and it's still not happening. then what else can we do to support these

children to get the success that they want? And what is that success for every child? Is it language development? Is it more social interaction with their peers? And I think we need to also, you know, remember that we use everything available to us.

So if there is this limitation with the implants and with the sound and that it's not quite fit in properly, just from a pure sound perspective, let's remember that we also have other senses, right? We have vision and children will use their vision, their touch, their smell to understand where things are coming from in their environment as well. And one of the things that we found in our research looking at how the brain communicates, how the hearing parts of the brain communicate with other areas of the brain when it's trying to learn this new sound and trying to integrate it, is that it kind of piggybacks on visual areas. So these visual brain areas that are traditionally used for visual processing, for understanding where in your environment something visual is happening, that same network is then being used to try to understand where sound is coming from in your environment. So what's really important is having strong, you know, brain health, brain networks through development that can kind of switch between the different modalities to help in these instances when some children might be struggling to hear with the two inputs.

Karen Gordon

Yeah, I learned that from you. This, think about, think about the other senses, think about other senses. And also from you, Sophia, the idea that, there's a lot of effort that goes into listening. We just didn't appreciate that part of it. And it's just such a common theme. So we are moving in our research into that, into the idea of providing support. What we would love to do is get better implants, make them work together from the beginning. But using what we have right now, how can we support that whole feeling of where sound is, what it is, the two together with the whole person, as we talked about from the beginning. And vision is really a big part of it.

So we are combining auditory visual training, for example, and sound localization. It's like a simple thing. Like, you know, often in therapy, so if you probably remember this, like we... taxed you. We made a tax on vision. We took away all the visual input. We made you listen, listen, right? And that's, there's a role for that. You're trying to like, you know, exercise one sense and get rid of it. But ultimately, you're going to need both. You're going to need everything, every piece of information to get around in the world. And so I think putting it back in and understanding how to put it back in and how to foster integration. You know, we've done summer camps where we've tried to like just do practice exercise. We've, you know, whether it's balance or visual spatial navigation, remembering like where you are in a maze and trying to get back there. And, you know, doing listening tests and doing the

sound localization is just a very clear one. The sound can only be in certain places. So if I show you a light, to tell you that's where the sound was. Now you can get a sense of the room. Like, is it a big room, a small room? Is it like, where's the possibilities? And now I have, now you have a better idea of that pairing. And this idea of how the brain actually, and children can learn and do that pairing even within an hour session is remarkable. So there's potential there.

Sofia Olaizola

I think from what you both have said, brought up a couple of really important points for me. The first one that, we keep talking about what could be better with the technology that we have right now. But I think it's also super important to highlight the evolution of what it is from what it was just 20 years ago. And I think, you know, there is a lot that we can do with the technology that we have now because it's so incredible. I mean, we're talking about giving, hearing, To people who had none to begin with, and generating neuronal connections from scratch that didn't exist before, and the other point is we were talking about variability in children, and... input that they're receiving, all kinds of auditory input. And that brings, I just want to, speak to parents here about the importance of parental support, because that is everything and outcomes of cochlear implantation are directly. linked to the support that the child has. And, I think there's still so much stigma around wearing hearing technologies and, wanting to wait until the kid is a little bit older or exhausting all options, et cetera. But there's such an importance in acceptance and acknowledging that, you know, in this time that we're in right now with technology and with science that it's really okay. I mean, being born deaf is not, it's not a death sentence and it's absolutely. You can be 100% functioning in society. You can hear, you can swim, you can listen to music, you can do anything. And so having that parental support to just give so much auditory input from such a young age is super important. I'm sure you can both speak on that from a scientific perspective. But you know, listening to different languages, hearing different accents, hearing everything and anything is just going to lead to so much more success with the implant.

Carly Anderson

Yeah, and what's going to ensure success is early access to language inputs. So regardless of if that's spoken language through a hearing aid and a cochlear implant, through those sound-based representations, or if it's through sign language, so visual inputs, as well as speech reading, so visual speech inputs, you know, if a child is deaf and they do not have access to a language, regardless of if that is through their eyes or their ears, then that child is, we're failing them, we're failing them. And it can be extremely overwhelming and complex for parents, especially given that 90% of deaf children are born to hearing

parents. So parents, hearing parents who have, you know, no prior knowledge of deafness, of deaf identity, of deaf gains, of the positive aspects of being part of the deaf community and being a proficient sign language user, it must be so overwhelming for them. And when we live in a world where we can't give parents access to sign language classes and real hard evidence about the benefits of sign language on their children's future outcomes, they can be really scared and feel torn between the two that they have to pick spoken or sign language and it's not the case. And the risk there is that the child gets nothing because they don't have access to sound at that point. So the parental interaction, just being a parent to their deaf child, the eye contact, the joint attention, the affection, talking to them, making gestures, everything is so important for their development.

Karen Gordon

Yeah, I think, just to highlight that is so crucial is that day one, that baby needs language and connection to the world. We've talked about this so many times. Infant hearing, screening, it to me is just so, crucial. It's something that we know how to do and we're getting even better at how we look at it. So we are able able to test baby's hearing day one. And we can look at genes that we know are associated with hearing loss. And we know that certain viruses, cytomegalovirus, for example, at birth, have a high, high risk for hearing loss to come, whether it's there from day one or it's coming in the months or years later. It just tells us who we should keep close to us in terms of the hearing and hearing community and to start education and to really foster the language, because that's really what makes us humans, is our connection to each other and our ability to communicate all together. And that's really what we're looking for. And we, as you say, Sophia, we have such great technology now. We are providing new ways, I hope, to better support that whole developmental process. And I just want parents to feel connected at maybe through information. That's what we're trying to do here. But to just listen to all the people who are in their corner trying to make it, you know, make it a great experience for every single family, every single child.

Sofia Olaizola

Yeah, that's amazing. And, you know, Carly, also to your point, I really want to make sure that the listeners understand that sign language and spoken language can coexist. And I think sign language is such an amazing thing. Even typical hearing babies are using sign language and it's just only going to help with that connection and language. So that's an important point as well. I just wanted to wrap things up and ask you, know, what are the next steps in your research and what are you up to now?

Carly Anderson

So I'm looking at bilingualism in sign and spoken language. So of course, many deaf children and adults are bilingual, are bicultural. And really, you know, we have a lot of campaigns in the UK from the likes of the British Deaf Association that are advocating for the rights of deaf children to have access to both sign and spoken language and to be able to be fluent in both. And so I'm looking at the impact of being bilingual on the brain, on whether that can help with cognitive effort and whether that can help with using the senses together, auditory and visual inputs, you know, helping and enhancing each other and enhancing speech perception and emotion perception. So I'm very interested in just human communication really and kind of what makes a successful communication experience for individuals who are deaf and/or who have cochlear implants.

Sofia Olaizola

Yeah, that's incredible. I love that. I'm looking forward to reading that down the line. Is there anything else, Karen, that we wanted to touch on that we didn't get a chance to?

Karen Gordon

I think we should think about group therapy. That's my only little thought for innovation going forward is that we've been trying to do this recently at the Hospital for Sick Children in Toronto is the connection we've talked about with parents and children, of course. I mean, that's like a given. There's also a peer-to-peer connection that's important. And while we have been, at least in Canada and around Toronto, we really do have supported this idea of mainstreaming. So putting children with lots of different, abilities together in a classroom, which we call mainstream. So everybody together. I think it's also nice for people to find peers that they can connect to. And I think the group therapy sessions try and, the camp that we supported and all of these things give children with cochlear implants, for example, a chance to get together and meet each other where they wouldn't have normally. And within a listening situation, it's helpful because they're sharing similar challenges. And by doing that, you get naturally the ability to use vision and moving around and there's noise and it's just a little more realistic within a therapy session. Once there's, you know, a foundation of language there, I think that might be a nice way to move forward.

Carly Anderson

Yeah, it hits on all aspects, doesn't it? It's practicing those communication skills, it's socializing, it's, yeah, just being exposed and experiencing. all these different things in an engaging environment that the child wants to be in, hopefully.

Sofia Olaizola

I couldn't agree more. In my current audiology program, there are two other girls that also have hearing loss, and I just naturally... gravitated towards them and we were just having the best time relating to each other on so many things. So I couldn't agree more for the impact of peer support and just speaking with people who just get it. And it doesn't even matter, cochlear implant, hearing aid, unilateral, bilateral, we've all got the same challenges, which has been the most interesting part for me. You know, one girl has normal hearing in one ear and hearing loss in another and we have the exact same challenges. So that's been super interesting for me to hear as well. And I think that peer support is really important because as you said, Karen, when I, in Canada, we mainstream most children with hearing devices. And so I was mainstreamed. And the first time that I really got to know anyone else who had a cochlear implant was through this experience with Archie's cochlear implant lab. So I was 20 by the time I met someone. with a cochlear implant. And so I think it's super important to have that from a young age. It can help people feel more confident about their devices, less insecure and alone. So I think that's really important.

Carly Anderson

It could help to really create that strong sense of identity as well, right? Because that's a big thing, which is actually linked to having a strong language. So if you have a strong proficiency and strong preference for sign language or a strong preference and a strong proficiency in spoken language, that is really tied to having a strong identity, which can be a real protective factor with these things because you find yourself, like you just said, Sophia, kind of affiliating with your peers more and having that support and developing self-confidence and all those things that come with that feeling of connectedness.

Karen Gordon

You guys as clinicians are going to be such an asset to the professional community of audiology. We hope so. You 100% will to be able to give. support and coming from all that personal experience, that is going to be huge, not only for the families and the patients that you're going to work with, but for your colleagues like me and Carly, that we are just thrilled to have that.

Carly Anderson

Yeah, your lived experience is invaluable. You are the expert.

Sofia Olaizola

Thank you. It's been fun. It's been fun to be, you know, taking these introduction to audiology classes and looking at each other like, I don't think so, but okay.

Karen Gordon

Challenge them. Teach them like you taught us.

Sofia Olaizola

Yeah, it's been great and I'm excited to get working and I'm excited. It's been nice to be in an environment with other people who are interested in such a niche profession. So And I'm glad that it's becoming more interdisciplinary and psychologists and neuropsychologists and physicists and neuroscientists, they're all working together too, because like you said so many times throughout this talk, Carly, that the brain is working together in all facets and in all parts and we have to look at it holistically. And so I'm so glad that that's where the field is moving towards. And I'm excited for what's to come in the next 5, 10 years with the research and especially at the speed that everything has been coming out. I'm looking forward to it. So thank you so much, Carly, for talking to us today. It's been so interesting to hear about your work, especially what you're doing right now with bilingualism in spoken and sign language. And thank you, Karen, for joining as well and providing us some more detail.

Karen Gordon

Thank you, Sophia.

Carly Anderson

Thank you for having me. It's been a pleasure.

[MUSIC]

Karen Gordon

Thank you for listening to our award-winning Hear Hear Podcast. Thank you again to children and their families who have spent their time and energy with us in Archie's Cochlear Implant Laboratory. Thank you also to our Hear, Hear podcast team and a special shout out to Dr. Blake Papsin who composed and performed our Hear, Hear podcast theme music.

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