

Season 2, Episode 3: Hannah Stewart and Carly Anderson Transcript

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Karen Gordon: So that brings us to episode 3 of our Hear Here podcast season 2, and I want to thank Dr. Carly Anderson and Dr. Hannah Stewart for being our guests on this episode, um, they are early career researchers. So, they're in an early stage of their careers, and they have lots of hopes and dreams for what they're going to be able to accomplish as they get into this work. They're both interested in hearing loss and in uhm to some degree in cochlear implantation and effects of different devices on people with hearing loss. They know each other because they started their PhDs at a similar time at Nottingham University. They're working in different areas now, and we have this nice chance for them to give us some um details of what they're doing.

Introductions to Hannah and Carly and their Research

Karen Gordon: So I am thrilled to welcome Dr. Hannah Stewart and Dr. Carly Anderson, who have agreed so nicely to join us as our guests today. I think it was in Banff, Alberta that we all met together, and I realized, Wow, these are two really up and coming important scientists that we really are going to have to keep an eye out uhm Hannah is a pediatric, cognitive auditory neuroscientist at Lancaster University and Carly, she is very impressive, Sir Henry Wellcome Postdoctoral Research fellow, she is doing this through the University College London.

Carly Anderson: So maybe, Karen, I'll start by just carrying on from your introduction. Thank you for that. So Yes, as you said, I'm a post-doctoral research fellow at UCL. But I'm actually um independent in the sense that I am hosted by a lab there. But I have external funding, which allows me to pursue my own research interests which is a lovely position to be in, and I'm very grateful for that.

As I said, my undergraduate was in psychology, so I had one year um working as an assistant psychologist in the middle of that study program. And so, I actually volunteered at a high security mental hospital, very famous one in the UK. So I had this love of of clinical and forensic psychology in terms of the topic. But when I was working with patients and applying these research methods to a real-life situation, that's when this love of research and kind of real-world impact really spoke to me. I think doing research through a Ph.D. for three, four years, and getting paid –poorly- but paid to do it just really sounded like the right thing for me at the time. In terms of actually getting into um deafness and auditory neuroscience for me that was more of a personal experience. Both of my grandparents on my mother's side were born congenitally deaf and were British sign language users very strong um members of the deaf community um, and my mom is a sign language interpreter. That's what she does for a profession. So I've been brought up um, you know, in the deaf culture

Hannah Stewart: So I've recently just moved to Lancaster University and got my first lectureship, what I've been doing in the past is looking at what happens in children's brains when you give them a hearing device.

So back when I was doing my Ai undergrad. I am as a poor student, I worked as a swimming teacher, and to fund my degree, and I absolutely loved working with children with developmental disorders. I knew I

wanted to work with these children, So then I went into psychology. I discover neuroimaging, which is quite number-heavy, so I got to use my AI skills. I knew after my master's thesis that I really wanted to do research, I actually so in very memorable day- I was actually flying to a conference in Canada, and I got two phone calls in a row as I was in the airport, saying, "Congratulations, You got this PhD" and the day before that I actually got on to a clinical psychology, Ph.D. So I really had to decide, not like between this career, power, back career path, and also in the second one, two different institutions, and I spent the whole flight back to Canada, freaking out. I'm writing, you know that classic like advantages and disadvantages columns for everything, and when I landed I knew what I wanted to do, and I wanted to do a research PhD. I chose a hearing one because of personal reasons as well. So, when I was a child I had hearing difficulties, especially in noisy environments, and I have had my hearing tested so so much. I know that environment so well. And eventually I was given a diagnosis of auditory processing disorder. There was no clear answer about what auditory processing disorder was, and so very kind of naively I was like, I'll go and get the answers, and off I went.

Karen Gordon: Why, don't you each tell us about what you think you've been able to accomplish in your scientific careers thus far,

Carly Anderson: My research has focused, on auditory science and auditory neuroscience, particularly in deaf adults who have then um gone on to receive a cochlear implant. They have become deaf later in life after they've already established spoken language. One of the significant contributions that I made in this field was that there was, and still it is, a long stand in theory that in order to be able to hear well with a cochlear implant after long periods of deafness, that um the auditory brain regions that are responsible for hearing, become responsive to some level, to vision when someone's deaf. So they will start to process visual language inputs like lip reading, for example, and the thought is that this is visual take over. But actually, my my research during my PhD. found the complete opposite. The impact of this was an initial piece of evidence to to show the positives of language input regardless of modality so regardless of the sense that you receive them, whether that's hearing or vision, and that we need to provide people with language.

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Karen Gordon: she is asking about multi-sensory integration. She uses a lot of imaging techniques but one of her most interesting questions is whether crossmodal change during deafness is a good thing or a bad thing.

Sharon Cushing: Even when you learn about biology and physiology in high school, you learn about, people who lose a sense and their capacity to have heightened awareness with other senses, and I think, from an evolutionary standpoint there is lots of benefit to doing that. But what happens when we interfere, right? With a cochlear implant? Are we then having to undo these things? It's worth asking the question. And in children especially, it's not like they've lived their lives with hearing when they're born congenitally deaf. Um, You know what we do, and what we don't do is going to impact what happens in those developmental systems, and so it's probably good to a certain degree, but beyond that it's not - like most things in life- there's some good and bad to it.

Blake Papsin: I listen to music in colour and I remember parts by color. It's not so much with taste, but so it it fascinates me the concept.

[MUSIC]

Carly Anderson: Of course you know this isn't about being in one camp or another. It's not about whether you should use a visual approach or an auditory approach. If a child receives a hearing aid, or a cochlear implant. That is an auditory intervention, and of course, resource, time and effort is going to be put into trying to improve their auditory skills. However, you know, in the real world that child will use this together with visual information that will actually make it easier for them to understand what someone is saying. Don't assume um a maladaptive um part of vision in hearing restoration.

Karen Gordon: I just think that's so important that you come to this with a new way of thinking, and that if your research tells you to go in a different direction, you follow it. I know you're very interested in how the different modalities actually work together.

Carly Anderson: Yeah, exactly. And that's really been the springboard for my, now, my independent, my independent research interests. Um. And so now I am really interested in how our sensory experience, so, for example, deafness, but also our language experience. The demands of our language, environment, such as when someone is in a bilingual language, environment. How that shapes, how we process information from voices and faces. So how we use vision and sound together to help us communicate.

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Blake Papsin: How? How, how do humans do anything? And then, more importantly, how does a human with impaired and restored hearing do any of this? The question is, all of these children have done something that no human being had ever done before -- Ever until the late eighties -- which is to take a percept converted from acoustic to electric and make sense out of it at a central level. So I've always proposed: If you want to study cross-modality, which fascinates me as I said, then hook up the the processor, the cochlear implant processor to look at ultraviolet, or infrared or or something else, and let them explore the world and see how the brain develops. That would be cool to me. How are you perceiving this? Are you using the visual system primarily as it was intended? Differently? Are you? Are you developmentally becoming synesthetes? I don't know. I know what's going on in the primary auditory cortices but after that it's a big fat mystery

Karen Gordon: Here's where I think research is so important. It's to learn how to get that big question into something that's answerable. And my discussion with both Hannah and Carly made me realize that young investigators are really interested in the process and in being good scientists at this stage. So, for example, Hannah was talking about her work, where she was asking about whether directional microphones on hearing aids are a good or bad thing for children. It's something that we've asked all the time, we think about children in playgrounds. Why would they want a directional microphone when they need to hear what's going on all the way around them? Why would they want to hear only what's coming from in front of them? It may make sense from an adult perspective, because we like to stand around and talk to each other. We're more interested in who's in front of us than maybe from behind. But in children does that work?

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Karen Gordon: Okay, Hannah, I want to hear about what you're doing and what you think you want people to know about the most important parts of your work.

Hannah Stewart: There's been so much work looking at auditory training. But if you think about it when you give a child or an adult a hearing device, whether it's a hearing aid or a remote microphone, you're changing the sound that's entering their brain. So I'm wanting to see how that changes the brain, or if it changes it at all. So during one of my previous postdocs out at Cincinnati Children's Hospital with Dave Moore, we were the first people to do MRI scans on children with hearing loss. It was a randomized control trial and um the children were each given identical hearing aids, so that one group received one algorithm which was an omni-directional algorithm and then the other group received an algorithm that was adaptive. It had directionality and it also had noise reduction in it. And then, after thirteen months, we brought them back again, and we scanned them again to see if anything had changed. We actually found that the children who were using the omnidirectional algorithm, they were showing a stronger connection between their auditory cortex and the auditory learning areas of the brain. So really cool finding. And we're trying to figure out what this means, and dive into this a bit deeper.

Karen Gordon: And I really liked Hannah's approach because she was thinking about doing randomized control trials. I mean that's tricky thing to do to ask a question, you know, trying to give some kids this technology and other kids not and in a randomized way. I mean It's hard to do, but it's an important scientific tool.

This is absolutely wonderful, because we don't have enough randomized control trials in our work. I think, as researchers, we have to be courageous and not adhere to these ideas that were there before, and try to think about things in a new way. So this is such a good example. This directional microphone? Is it actually a good thing? It sounds from an engineering point of view to be great. But is it for a child's brain? Are you sure that we need to point the the direction of the microphones for children in a forward position when they actually are listening to sounds in all different positions: beside them, behind them.

Hannah Stewart: There is research looking at adults, but obviously adults and children communicate very differently.

Karen Gordon: If an audiologist is listening to this right now, you would tell them, give it a go, turn off the directional microphone and turn on the omni-directional microphone. Is that correct?

Hannah Stewart: I would say, fit whatever you think would best fit the child's personal situation. We've just shown that it doesn't have to be the latest fanciest.

Carly Anderson: I think it speaks to individual differences right, and remembering that there is a very complex person at the end of this device.

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Blake Papsin: So here: Has anyone ever said, this is what the implanted deaf child does. Let me apply it to normal hearing children. No we continually take the normal thing and try to restore it with a prosthetic, and I wish we'd stop. So tell me, what does the profoundly deaf child with 2 implants, what

do they do in the playground? Has anyone applied the cochlear implant percept to normal people? because maybe they do something better than normal, but we don't look at it that way. It's always. Why are we falling short of normal and so like from the people or the rest of the people in the world like me, who aren't normal, I say, "wait a sec- represent me. I'm doing the best I can. Don't you want to know how I do it?"

Sharon Cushing: And I think it speaks to the trickiness right? We will take down these, you know 3 dimensional multi-sensory environments, and we compact them into something we can study and that's that's important. And it's important to ask a question you can answer, you know. But but you're right. How do children communicate on the playground when they're running around, and they may or may not have balanced difficulties, you know, if we just sat there and watch them, what would we learn about how they use where they put their bodies to communicate? But it's really tricky to find. You know, we started this these sessions talking about gaps right? This is a gap right? How do we get from the lab to the playground and back again?

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Carly Anderson: As an early career researcher, I think it. It became evident to me, perhaps during my PhD that you know, during your PhD. You specialize in really one thing and one technique, maybe two, but it really is apparent that's that probably won't serve you very well for a career. So you do have to expand and learn new methods and find what you love working with as well. And what you think the pros and cons of each method are, Yeah they don't always correlate, I think, in a way that's the beauty of it, because they each maybe give us some unique information that we can't just necessarily get from one technique. So I think the power where is combining them and using them together to understand our research questions.

Hannah Stewart: I definitely think there's power in combining them. So in some of the work that I do, we look at the functional connectivity between different cortical areas. So this is kind of the temporal correlations between different brain areas. And having a stronger connection doesn't necessarily mean that there's a better connection.

Karen Gordon: Yeah. I'm in the same position with with the the two of you. I have um a very big interest in in what the actual system is doing, and how that uh comes across in terms of function. I also think there's a beauty in the imaging for children where we don't really know what to ask them, and they don't necessarily have the language to respond. What are the real outcomes that we're trying to get to here?

Hannah Stewart: I often think we are looking at the kind of correct outcome measures, maybe not necessarily in the correct way with children. When when we do testing, it's normally a child in a room by themselves, And it's a very alien environment for a child. So how is their performance in that going to resemble the performance in real life. That I'm not so sure about.

Sharon Cushing: There's a ton of focus very importantly on speech and language, skills right? And and we know that that kid on the playground is so much more than their speech and language skills and so you know. Perhaps you know, with Carly and Hannah's work we're able to figure out some of these

building blocks so that we can not only help them with their speech and language, but help them with the social nuances and navigating the world, and so that helps them with their overall being

[MUSIC]

Karen Gordon: Well, am I right, Hannah? You You come from a psychology background?

Hannah Stewart: I actually started doing artificial intelligence and maths. Many years ago I decided I did not want to spend my life programming and then I went and did psychology and then ended up doing auditory work.

Carly Anderson: so. It's funny, because I've actually taken the complete opposite route to Hannah there. So I started in psychology and training in psychology as my undergrad and I'm now, currently, I've just come round to start in to do AI and programing I think some of the research questions that I'm asking, for example, about do modeling people who are monolingual and bilingual. Do they process faces differently from each other, and the measures that we currently have maybe aren't, sensitive to these nuanced differences between people. AI, is potentially a way forward as an analysis method to really help us observe these these subtle pattern differences

You can then hypothesize from Okay. So what does this mean? Right? The machine has told us this is this meaningful and let's go and test this.

Karen Gordon: What you're both communicating is the excitement that research can have .You're both speaking so passionately about what you're doing. You believe in in the work that you're doing.

Carly Anderson: Um, it's it's hard because you have this enthusiasm. And, as you say, Karen, I think all of us have these questions that maybe seem basic, but they question, maybe something fundamental that we think, "Is that right?" As an early career researcher, it's a big risk to research that it's very difficult to get that balance between researching what you want and what you love and making sure that you have some solid, safe outputs.

Pre-registration of Research Studies

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Karen Gordon: I made a reference that they're both very focused on the scientific process, and they brought something to me that I really didn't know much about, and this was pre-registration of protocols, and even an idea that you have in research. I guess we're giving them all out freely in this podcast, whereas they would say, "Well wait a second. Why, don't you pre-register it as your idea that you're going to be studying later?"

Carly Anderson: I think that there does seem to be a change in the scientific community at the moment. Um, which is great, which is towards, you know, more reproducible research and registering or pre-registering your research studies, You could hypothesize a null finding and again, maybe that's just as useful. By pre-registering your project, you take away that that stress and anxiety of what am I going to

find? Know It's really already. Well, this is what we're going to do. This is what we hypothesize, and the results will be the results.

Hannah Stewart: I completely agree. And also in these these developmental studies you get so much data. The temptation to go and just kind of look at this, that and the other when actually that wasn't the aim. I think it's really wonderful that people are now doing a lot of pre-registrations So that people are data mining or just finding a positive result.

Karen Gordon: So are you saying that the pre-registration is sort of giving you a stamp on. "This is what I'm doing, everybody. Look out here I come. This is what I'm doing." I actually don't know about this. Is there a possibility in those pre-registered studies that you can go in and modify as you go through?

Carly Anderson: Yeah, there are different um types of pre-registration. You could say, for example, "We've already collected data. We have it, and we want to look at this." You could go. you know completely the other way, and pre-register something before you've collected the data, which is essentially what we do internally in our lab meetings. Right like, we always discuss the design, the analysis plans, how many people we need. Worst thing is you've written up the manuscript, and your peer review comes back saying, well, did you collect this? Did you do this? And it's too late. So there is that option to actually go through a formal peer-review process before you've even collected your results.

Hannah Stewart: So I've done a kind of a middle ground of those two options where I pre-registered, saying I was going to collect all this data. These were my hypotheses. These were the analyses I was going to do. But it wasn't peer-reviewed. It was just kind of shoving it out on the Internet And saying, this is my record.

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Karen Gordon: Honestly, I feel a little bit old, because this is not something I've had experience with, and in some ways i'm not sure I believe,that. That you can put a stamp on an idea, we all need to share and see how far we can get. What's your thought on these?

Sharon Cushing: I think it's like our kids, you know. There's consequences to what to what we do and what we don't do., You know I I love our freedom to communicate and you know me, Karen, I'm like, I'm an open book. I'm going to tell you what I think. I'm going to tell you what's going on in my head, like the not not intent, but rather just. you know what limits that my place and and certainly, you know, we experience talking to other scientists who don't have, who don't feel that same freedom and safety right, and perhaps feel vulnerable about, you know, maintaining their ownership of ideas and those are different conversations. But again, I think the magic happens when you know you just have a conversation.

Karen Gordon: So that was my intention for this podcast. I mean, it came out of the pandemic because we, we weren't interacting out with other people, and I thought people might want to hear from other researchers, I realize now that one of the greatest benefits is just having a chance to talk together and hash out some of these ideas. it's new for us to put this out there in such a public way. I mean, I don't know about you guys, but social media for me is not something that I engage with easily.

Blake Papsin: I try and spend a lot more of my time trying to explain to people how they've been fooled by stuff they see on the Internet. It would be much easier just to fool them myself. It's just it's exhausting, and I don't really know how it interfaces with scientific advancement. I really don't. I mean it's good for awareness.

Research Communication

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Karen Gordon: Ah, you know you guys come from a different generation. This is part of a new way of looking at research from the beginning. But also your way of communicating is a bit different. Hannah, I noticed you have a website, for example.

Hannah Stewart: So I've made a website from my lab, the Pelican Lab. It's standing for a pediatric listening cognition and neuroscience lab

Hannah Stewart: It's there to advertise what we're doing to parents for children that we look to be able to recruit for research studies, to help disseminate what we're actually up to to show that we're active.

I really like being able to go into the stats of the website and see who in the world has been on my website.

Carly Anderson: Such a researcher

Hannah Stewart: I know I can never stop I certainly think it helps with the networking, so that people know what you're about, and what you're doing, so that when they read your program applications there's kind of that a little bit of understanding before they read further,

Carly Anderson: I think they are definitely recognizing that you can have impact in different ways other than publications.

Karen Gordon: So let's talk about impact, research is really trying to make things better for individuals with hearing loss. That's what we want. I agree with you that writing everything up properly, and having it peer-reviewed and putting it into a journal, is an important part of our process. But sometimes it feels very non-impactful right? Because how many people are actually going to get at that journal article when they're you know it's one amongst hundreds that have come out.

Carly Anderson: And retaining scientific language.

Karen Gordon: Right, I think that this podcast was meant to try to get around that a little bit to explore what people are doing in their own words and in a less formal setting. Tell me what you think is important about the formality versus the less formal kinds of ways these social media websites, podcasts, are for communication of science.

Hannah Stewart: So I think in the past it very much used to be, your research was kind of kept in the world of research, unless a journalist found you whether it was through a pet project or an assignment that they had, and then your work might be more widely distributed. However, with the age of the Internet and people Googling, your work is found a lot more easily. And so, if you personally can be in charge of how you break that down, and how it can be disseminated, I think that's really powerful.

Carly Anderson: I really love these opportunities for science, communication, right, and engagement with the with the public. It's hard to have the time to do both. So you're trying to deliver your scientific aims and do the research and report to your funders and make these scientific impacts that are measured in the traditional way. I think it is shifting, I think I think the system, the academic institution that we work within is getting better at that, but I think it will take a long time for that, for a genuine shift.

Karen Gordon: Mhm so as you go forward, and you think about your own careers, what do you think you'd like to accomplish in the communication of your own work in the next five years? How do you think it's going to look different than it looks now?

Hannah Stewart: I'm very hopeful that it'll be more of a conversation between the people who are doing the research and the people who we're trying to help.

We were talking to the audiologists at the hospital, and there was a lot of: "My goodness, we've always wondered about the difference between algorithms, wondering if they should be on the latest and you've just shown that actually it's not a bad thing for the children to be on a more simple algorithm".

Personal Connections in Academia

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Karen Gordon: In this last part of my discussion with Carly and Hannah, they talk about the importance of peer support and tell us about their new podcast.

Carly Anderson: It's really nice that we informally just tap into each other and just support each other. It's so reassuring to know that you have a supportive peer network that you can go to. And someone like Hannah has certainly been key for me, and I mean, we've come together even more strongly recently.

Hannah Stewart: We sure have.

Carly Anderson: Because we are actually um putting together a podcast about ah early career researchers and the journeys that we have taken, and and the the challenges that people face.

Karen Gordon: Great, because it comes to what we're trying to do here, and trying to make an impact and really reach out to people.

Karen Gordon: First of all, you have to tell us about the name of the podcast, and also the challenges you think you would like to discuss in that podcast,

Hannah Stewart: Our new podcast is called Unscientific, the journeys of early career researchers and you can find us on Twitter @UnscientificECR.

Karen Gordon: Beautiful, so what do you think you'd like to talk about most?

Hannah Stewart: I'm really hoping that through talking to other early career researchers around the world we can start hearing what the processes in the different countries are.

Carly Anderson: And I think for me one of the things that I'm really interested in is um is the different um The different career avenues as an early career researcher. So take in traditional postdoc roles, creating opportunities for yourself by applying for external funding and taking faculty or academic positions, working outside of research like I did, I went to work for a deafness charity, but was still very much in research. People who have developed their own startups, for example. You know, there's there's so many different choices out there that people have made that, I think will be really interesting to discuss.

Karen Gordon: This is a really important part of life as well. When you're just starting up your career as a researcher, so the flexibility that is asked of you is quite extensive.

Carly Anderson: it's very impactful on your personal life.

Hannah Stewart: So a big one for me was that when I was doing my post-doc at Cincinnati Children's Hospital, and I became pregnant with my daughter, and with essentially the restrictions on my husband's VISA and me wanting to have what in my eyes is a normal maternity leave, which over in the UK is up to a year off work, and we had to leave the country, and and we came back to the UK to have my daughter. I loved what I was doing. So, it was very, very hard to make that decision.

Carly Anderson: Yeah, and for me, I trained in the UK. And then I came to Toronto to work with you, Karen, for two years, and I had a two-year visa and I'm a UK citizen. So I had to set up my next job, you know it's either find a Post-doc opportunity, and there were none in Canada at that time, so I had to try to create my own opportunity, so I'm very fortunate with the funding and the the fellowship that I did get from the Wellcome Trust that they support networking and developing your skills. And so, I applied to work for one year in Vancouver, at the University of British Columbia, so that I could um continue to stay in Canada. But now, I am required to go back and complete my fellowship in the UK. And that is also very difficult when you've moved somewhere, set roots down, and really made a new life for yourself.

Karen Gordon: These are very unique challenges to this stage of life and career and those challenges are real, and have to be acknowledged, and particularly as women, as Hannah, you said, they might be different for people all over the world depending on where they are. So, what I hope is that we can all support each other um, and and learn how to do things maybe a little bit easier for the generation to come. Personally, I'm so thrilled that you are the next generation, because it looks very bright with really

exceptional work, and really just bright, energetic people and minds and ideas that you have. This has been a wonderful conversation, and I'm very inspired by you both.

Carly Anderson: Thank you, Karen I do think that um, as early career researchers, mentorship is hugely important, you know, to have mentors who understand these challenges, and who, you know, really are successful and secure enough in their careers to support you in allowing you to take those risks .We certainly couldn't do that without um senior scientists like yourself.

Karen Gordon: Thank you both so much for just helping us understand what you've been doing, where you're at, and thanks for being on here, and lots of luck for the podcast. I hope this becomes a new medium for how we all communicate.

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Karen Gordon: My idea for the podcast was that people could explain their own research in ways that might be more accessible than our communications through papers, and even through formal presentations, where you have 8 min, 15 min to get your idea across.

Blake Papsin: We hope people listen to this and trust us. But when did it become a trusted source of entertainment or a trusted source of science? And if it's entertainment, that's good that people are entertained by this, and I like that.

Karen Gordon: Thank you. Thank you for doing this, and for just bringing it out of the page into people's consciousness for whatever value that is, whether it's entertainment, education or anything else. See you later.

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Karen Gordon: You can catch other episodes of the Hear Here podcast. There's a link on our website, search Archie's Cochlear Implant SickKids Research Institute or wherever you get your podcasts. The Hear Here podcast is put together by me, Dr. Karen Gordon, with my colleagues at the hospital for Sick Children in Toronto, Canada, Drs Blake Papsin and Sharon Cushing with a tremendous production and advisory team, Sofia Olaizola, Rachel Bedder, and Maria Khan. The wonderful music was composed and performed by Dr. Blake Papsin.

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