Anusha: Hi, and welcome to DigiHealth Talks, a podcast created and hosted by the Brown-Lifespan Center for Digital Health in Providence, Rhode Island. I'm your host, Anusha Rahman. Join us as we meet some of the masterminds behind the field of digital health, leveraging the innovative technology around us to help the public improve their well-being. Today, we are interviewing Dr. Erica Walker, an Assistant Professor of Epidemiology here at Brown. She's an expert on noise pollution and understanding the vast health impacts of unequal sound distribution in urban areas. Yeah, so if you can start us off, can you tell us a little bit about your background and how you got into studying noise pollution and sound distribution?

Dr. Walker: Yes, this is going to be like a totally weird story, but I before I got into this world of public health, I was an artist working in my studio, which was my apartment, which was a basement apartment, and up until this point, up until the point of no return, it was a very quiet space ,and I was able to work, like do my artwork. So I made furniture, and I also was a bookbinder. But one day, a family moved in above me, and they had two small kids who used to run the length of their floor, which was my ceiling, for what felt like 24 hours a day. So because my living space was also my workspace, it was really hard for me to escape that. Escaping that meant I had to literally stop working. So in that process of trying to, I'm just gonna be, you know, I'm not gonna have any shame about what I'm getting ready to say, but in the process of trying to get them evicted from their apartment, a family with two small kids, trying to kick them out of their apartment is probably not the best thing. Through that process, with trying to figure out if I had grounds to take them in small claims court, I realized that this was impacting not only my life but the life of other people who lived in shared spaces. Other people who live near airport communities, other people who live near highways, and sort of in that process of trying to gather research, I realized that the problem was just a lot bigger than myself. And, you know, I get really obsessive, in the sense that when I have a goal, I get fixated on it and I don't stop. So I was collecting sound levels, like I was recording when they were making noise. I was actually collecting saliva samples cause I was going to send them up to a lab to be analyzed for, like, stress hormones. Through that process, I was telling one of my friends about it, and she was like, you know, I think you would really like this field called public health. And I'm like, what is public health? And so through that whole process of trying to get my upstairs neighbors evicted, I learned about this whole other world called public health.

A: I think anyone who lives in any urban area completely agrees with you and where your research started, and it's a really very real problem. What do you consider your current research focus?

W: So you know, forgive me for my many artistic analogies. A big part of being an artist is that we undertake this iterative process, meaning that there's always something we can add to a

painting or in my case, a furniture piece or a book, that can make it better, and so we're constantly improving our work until we have to make this decision to sell it off and make money. So I kind of look at my research career as an iterative process. So what I'm doing today has been informed by a series of successes and failures in my past. So right now, I feel like the most important thing for me to do is to make sure that my research toolkit is being used in the smartest way possible. In the smartest way possible means being used in communities that need this work and working on a problem in an area that doesn't have the privileges that I have been able to take advantage over the past. So my work has primarily been in New England, in the state of Massachusetts, which has these excellent resources. So I've been able to do a lot of noise work with communities, working on things ranging from live concerts to aircraft noise, but I've been able to do that in a place that has a significant amount of infrastructure that I was just able to capitalize on. So as a researcher, it is important for me to still do that work, I still want to engage communities around very specific issues. So for example, like I just mentioned, I worked with communities in Boston as they were trying to get a baseball stadium that's in their community to stop being a live concert venue during the summer. I still want to do that work, but I wanna do it in places where I'm not able to capitalize on these privileges. Privileges include things like, you know, data, data availability. In the Providence/Boston area, you can throw a stone and meet an expert who knows how to do something a million times better than you. But what if I did the same work I'm doing in a place that doesn't have those same resources, and being a person who's from the Deep South, the state of Mississippi, I knew that that work would be facing that way, going back home and doing the work in a place that doesn't have the infrastructure to support a project like this, but still has significant noise issues and also health issues as well. So, to make a long story short, I'm taking Community Noise Lab, which is a lab that works with communities on really unique specific noise issues, but working in a place that doesn't have the infrastructure that I was able to rely on.

A: Yeah, thank you so much for sharing that. It is really important to move out of these, like, highly developed privileged areas and take that research and your expertise to places that don't have as much. Can you talk, I know you talked a little bit about it, but do you mind expanding a little bit more about the challenges that you expect to face, or you're currently facing, as you're moving out of the Boston/New England area?

W: Yes, yes. So this is the exciting part because as an artist, a large part of your work were people coming up to you saying, hey, I love that table, but can you make it do something that's not traditional? So it would involve you having to go and do research on structure and all of these kinds of things. So I actually really thrive in a space where there's problem-solving things. But one of the things that's gonna be really significant is getting people to understand that noise is a significant stressor. Right, so imagine going to a state that has major health disparities, you know, had really horrible COVID-19 outcomes, health outcomes, high infant mortality rates, social, socioeconomic disparities, racism, like there's a bunch of different things. So imagine me going down and being like, hi, I'm studying noise. So that's in and of itself, just like it's not a priority, but trying to make it a priority because a lot of these communities are right next to these major highways, and trying to be like of the other fifty million things that you have stress in your life, let's focus on this one. So I think it's an, it's an attitude, getting people to

understand that this is a significant problem, but making them prioritize it over the other things that are going on in their life, I think it's going to be probably the most significant challenge. But then also dealing with the place that doesn't have infrastructure, right, you know to get a data set, is challenging. To, you know, to yeah, to get a data set is challenging. To get people to put a sensor up at your house for no reason, like why are you doing this? Like there's nothing wrong. It's also very challenging. So I think that those are gonna be some of the challenges, and there aren't as many institutions of higher education. There are great institutions of higher education there, but you know, are the professors there experts in everything? You know, no. So finding the expertise is going to be a challenge as well, especially because I work in a really, very small area of noise research. I think it's a bunch of different things. Primarily attitude, data availability, and getting people to see the importance of this over many things that's going to be the most challenging. Oh, and I just wanted to say too, you know, a large part, forgive me, but, you know, a large, actually, we'll probably get to that in a minute when we talk about the app. So I'll just hold off on that.

A: Yeah, so perfect transition. I know you have created an app, Noise Score. Can you tell us a little bit more about the app and what it does?

W: Yes. So going back to this whole iterative process, when I was a doctoral student, I was very interested in understanding the soundscape in Greater Boston, so I would go out and capture and record sound levels pretty much 24 hours a day, so I would go out at 3:00 in the morning, 2:30 in the morning, you know, in the middle of the day. So one of the things that happened was I'm out there standing with this sort of reporting-looking equipment and people would come up to you and be like, well, what are you doing? And some people called the police, some people were very curious. It led to conversations, but those conversations were really interesting because it really helped me to figure out what I was doing right and what I was doing wrong. And mainly I was collecting data, but it was in a way that was sort of me-centered. I was collecting data because I was interested in the problem, but other people weren't collecting data that was meaningful to them. My data was meaningful to my research, but it may not be meaningful to people in the community. And they were also sharing with me these experiences that I didn't know about. So I was thinking that the most pressing issues in the community would be aircraft noise or road traffic noise. But in talking to people, that was like people playing basketball or, you know, or barking dog and things that weren't really on my mind. So I knew that I wasn't capturing that community voice, and I knew I needed to create a tool that was able to capture that. So Noise Score, the smartphone app, which is available on your Androids and your Apple phones, or what do they call them? iPhones. Okay. It's a tool that allows anyone to create a noise event where they're able to measure sound levels, but then also talk about some of the more subjective aspects of it. Does it make you feel stressed? Does it make you feel relaxed? Are you indoors? Are you outdoors? Anything you wanna talk about or wanna comment on about this event? And we take that data and then we map it on a real-time heatmap so other individuals who are using it, interacting with the app, can also see the "noise climate" in their neighborhoods. And so one of the things when I was a doctoral student, another issue I had was that, you know, my work stopped being relevant as soon as it stopped. Noise is a very dynamic issue, right. I was capturing a snapshot in time, so one of the beauties of

the Noise Score app is not only am I hearing from a variety of community voices, I'm hearing about them over a period of time, so I'm able to capture that perception piece, but also the dynamic nature of sound.

A: So you're crowdsourcing your data in a way that is highly engaging with the community, doing what the community needs in real time.

W: Exactly, well said, exactly. And on issues that, and it's a tool that has helped to correct for my blind spots. Like as researchers, we need to be very open and honest about our blind spots, especially, when it comes to our "community work". So can I just give you an example, if you don't mind. So this past year, at the beginning of the COVID-19 lockdowns, you know, I got a lot of, you know, cause I do noise stuff, I got a lot of calls from reporters and other researchers. Erica, how quiet is it in your community? And granted, I live in a, in a very quiet community. And so my answer was, at first to be like it's really quiet. I can have my window open, I can hear people walking by, I can hear kids playing in the park. There's no, I live like on a really busy street so there's a train line that runs along my street, I don't hear the trains because they're not moving, it's really great. So I would have been in that space, had I not had the app. So when I began to look at the app, and thanks to my community engagement, like out there talking to people, people also began to email me or message me on Facebook. They were like, hey Erica, it's really loud where I am. And I started to see responses in my app that were talking about firework noise. I'm like, where is fireworks coming from? I don't hear fireworks in my community. And so I started to look at that data, and I realized that a lot of Black and Brown neighborhoods in Boston were being inundated with incessant firework activity. And I was like, oh my goodness, I didn't even know that. So that allowed me to go out and put up a series of noise monitors in these communities, and use that data to serve on a task force to kind of inform the community that this is an issue. So it was, it has allowed me to remain focused on the issues in a way that I probably wouldn't if I would just be a regular professor in my suburb life, you know, not really in the moment because I'm sort of removed from it. So it has kept me really on the ground, in real time with the action, not only the action but the action that matters, and I think that's really important.

A: That is definitely really important as a researcher, and I hope that is something that researchers go forward doing. You talked a lot about the advantages of using this type of data collection, what are some disadvantages?

W: Yes, there's many. So, you know, like all of us, like, as researchers, if we see some like new technology, we're like Ooh! That's gonna make me stand out! and you have to be very careful. So believe it or not, as a person who has this sort of sensing technology and as a person that does a lot of sensing in communities, I feel like there's a point where we can turn into Big Brother. So just because you can, doesn't mean that you should. And I always encourage people, even though I spend a lot of money keeping the app up-to-date, only use it when you feel like it's needed. Don't let this become a burden or a tool to keep us connected to a system that we don't need to be connected to. Use it when you need to, but you know, abandon it when you don't need to. So I think that we tend to, as researchers, get into this whole big data, I call it big

data crisis, where we feel like just because we can, we should collect data, and I don't agree with that. I believe that, that we should have the tools when people need to use them, but then we should take a step back when it's not needed. Also two, I think that, so earlier we were talking about, you know, working in a place with less privileges. So working in Mississippi, there are significant Internet availability issues. So it's a huge broadband desert. So me rolling out an app in a place like that, it's gonna cause me some concern because people don't have Internet access. They're definitely not downloading an app, and they're definitely not using it, so those are issues that we're going to have to think through down in Mississippi. It doesn't mean that I'm not gonna do it, but I'm gonna think about how can we do this and what are the tools and technologies that are available to bring something like this to a place like that? And then also two, we call it citizen science. I did a lot of work in Chelsea, MA, which is a sanctuary city, and a sanctuary city is defined as a city that is a home for undocumented immigrants. So imagine me going into a community and being like, hey, let's do a citizen science activity. You immediately disenfranchise a group of people just on the name alone, so thinking about ways to make sure that this is a democratic process, you know, I don't like the word democratic. It's just a process that anybody can use anywhere when they want to, and they can stop using it when they want to, is really important to me. But I think that we can sort of lose the focus of work because we're trying to collect data, data, data, data, we need to power our study, we need to do this, and it's not necessary. Maybe a benefit to the researcher, but it's not necessarily the benefit to the community. And for me, I want to make sure that I balance the benefits for myself, because don't get me wrong, you know, I'm an Assistant Professor, I have, you know, I need, I need to publish, I need to get grants, I need to be promoted. But for me, it's not at the expense of the community. And I think that that's, I think, that some of these app things can cause us to lose focus of the bigger picture.

A: So would you say this person-centered approach, focusing on autonomy for the community, is the most important part of engaging with community partners?

W: Yes, because the way I, the way I started studying is, is I'm thinking about the end first and the end is: what am I leaving behind? Because, I don't know, coming from the artist world, if I am doing something, I'm working on a piece for 15 years and it hasn't advanced, it's a failure, so I'm actually thinking about: what does this work look like when I'm no longer there? I want to eventually write myself out of all of this because if I'm there, it means that the problem is still there, and so I want to make sure that what's left behind is a bunch of strategies, tools, etc. that can exist without me being there. So I kind of view my work as a snapshot in time, but not a bigger picture. So for me, the most important thing is to make sure that what's left behind are a series of strategies, learned experiences, tools that can be used to empower the community without me being there.

A: So to kind of wrap this up and continue on this line, how do you think we can best use digital health and your app to understand noise in the future, say, 30-40 years from now?

W: I hope the problem solved before then, but you know, life is weird. I think that when it comes to digital platforms, smartphone technology, I think we really have to ask ourselves, is it

important? And it's a question that I ask myself every day and some days I like, some days I say yes, it's important. And some days I say it's not important. So I think that we should sort of ask ourselves, is it important and if it's important, and important means that there's going to be some benefit to the population that you're working with long term, then proceed. If the importance is sort of self-focused, then think about: is it something that you should do or how can you reengineer it in a way that it is meaningful? And so I think that that's the biggest part. And then sometimes we don't always have to be plugged in. Like I said, I think I'm probably the only person that has an app that's like use only when needed, so I like seeing when people are using it, and I also like that people have the power to disengage with it or delete it from their phone when they feel like they don't need to use it. So I think that creating things that are meaningful, that aren't burdens to people and that aren't sort of blurring that line between, I guess we can call it Big Brother and use. Like, knowing as a researcher when you need to get to that point where you need to hop off the train is a very good thing to keep in the back of your mind. Does that make sense?

A: Yeah, for sure. For sure. Well thank you so much for taking the time to be here on this podcast, I learned so much and you are such an inspiration. And I encourage everyone to download Noise Score, an incredible app. Use it when you want to, don't use it when you don't!

A: Thank you! To learn more about the Brown-Lifespan Center for Digital Health, check us out at digitalhealth.med.brown.edu. Don't forget to listen to our past episodes, available wherever you get your podcasts.