# Health and Human Science Matters Season 1, Episode 4: Neha Lodha

Matt Hickey: One of your key tools in your lab course is this driving simulator.

Neha Lodha: Yes.

Matt Hickey: So have you been in the driving simulator yourself?

Neha Lodha: Yes, I have.

Matt Hickey: And are you an expert driver? Have you done the Indy 500?

Neha Lodha: Oh, no.

Matt Hickey: Any Formula 1 simulated races in there? Anything like that?

Neha Lodha: I'm not an expert driver in the driving simulator. I'm a very safe driver on road in my Honda CRV. That I can promise you.

Avery Martin: Welcome to Health and Human Science Matters, a podcast by Colorado State University's College of Health and Human Sciences. I'm your co-host and digital media strategist, Avery Martin.

Matt Hickey: And I'm Matt Hickey, Associate Dean for Research and Graduate Studies. In our college, we make it our mission to optimize human health and wellbeing through discovery and innovation, but don't just take our word for it. Each episode we sit down with people who fulfill that mission: our college faculty and staff. And today we're fortunate enough to have a friend and colleague from my home department, Dr. Neha Lodha. Neha, welcome. Thanks for joining us.

Neha Lodha: Thank you for having me here. It's such a great opportunity to speak with you today in this setting.

Matt Hickey: We're looking forward to getting to know you a little bit better as we were hinting at just a few minutes ago.

Neha Lodha: Okay. I'm looking forward to it too.

Matt Hickey: Can you tell us a little bit about you, your life outside the academy? And this, again, could range as far back as early childhood memories, influences on your educational trajectory. You may even have some special memories that you'd like to share to help us to get to know you better.

Neha Lodha: So I'm originally from India and I spent 24 some years getting my education in engineering in India. And I have had a strong influence of my mom and dad, both of whom are in science field. My mom is a plant pathologist, so she had a PhD early on, and my dad is a veterinary doctor. Mom was very invested in our education, especially the science education, and so I went on and did an engineering degree.

But when I was in my sophomore year, I realized that I didn't want to become an engineer. And when I say that, what I mean is that I was in a program with a major as information and communication technology. And the goal of the program was to teach us how to program cell phones and cellular networks. So this was 2001, really early on when cell phones were just coming out.

I realized I didn't want to sit in front of a computer in the office of a multinational company and program. I wanted to be with people and serve people, especially those who have disability. So I felt like a misfit in my program and I was a very shy person too, so I didn't have the courage to venture into a professor's office and tell them that I'm feeling like this is not for me. But there was a professor... His name was Dr. Arvin [inaudible 00:03:10] and he was very well known for striking conversations with the least known students. And one day he-

Avery Martin: Sounds like somebody I know.

Matt Hickey: Yeah, right?

Neha Lodha: Yes, I know who you're hinting to. So one day he found me at food court and he asked me, "So are you enjoying being an engineering student?" And to that, I immediately say, "Well, not really." So in my times, the classrooms were 240 in a single classroom and huge lecture halls. I just didn't enjoy being in that setting learning math and calculus and electronics. So he told me, "Okay, so if you're not enjoying going to the regular lectures, what about the special lectures on Fridays?" So in my time, the special lectures were these kind of TED Talks organized every Friday evening. And in those seminars or talks, Arvin used to bring people from diverse backgrounds who had just fantastic stories to tell.

So I remember one of those was an artist who was using technology to build art. I heard a social activist and how he was using theater to spread awareness about menstrual hygiene in rural villages of India. And then I heard this man who was an engineer and he talked about how he was studying brains to understand walking behavior. So he went through his slides and at the end very casually he mentioned, "All these pictures of brightly illuminated brains that I have shown you is actually fly brain." So I, as an engineering student, was incomplete awe that so much is possible to study just with a fly brain. And I thought, "This is what I want to do." He was talking about neuroscience and drosophila melanogaster, which I now know as drosophila [inaudible 00:05:07]. It was a fruit fly.

So this man who gave the talk was Dr. [inaudible 00:05:14] and he was an engineer turned biologist and a bulb just went on. I thought, "That's what I want to do. I am an engineer, but I want to study human brain." So from there, started my journey of seeking to understand biological systems, but from the lens of a technologist. And I went to his lab as an intern and then as a junior research fellow for a year before I came to US to study how flies walk and to understand their nervous system.

Matt Hickey: Isn't that fun? So I have a follow up. I'm curious about the genesis of your interest in disability. Where does that come from?

Neha Lodha: As an undergrad student, I used to volunteer for people who have disabilities of different kinds: mental disabilities, people who are unable to... Actually, kids who are unable to speak or listen. And through those experiences, I learned that these individuals with less senses in one domain have so much amplification of senses in other domains. I remember one day teaching a class of children who were mute and deaf and I would turn to the board and write something on the board and then try to explain them. The moment I turned to the board, these hands started flying in the air and they were talking to each other and like a natural classroom where you would hear a murmur. I didn't hear a murmur.

And that was a moment where I realized that you know what? This is amazing that they have this sense that is so extraordinarily developed which is not developed in me. And I always felt very humble being in their presence and curious. So I felt that I want to work with people who push me to learn more about life. And that's why I just got interested in working with people who have disabilities.

Matt Hickey: That's fantastic. [inaudible 00:07:18] a story. We want to get back to your educational trajectory, but I want to loop back and talk a little bit more about family if I can. So how often are you able to get back to see family in India?

Neha Lodha: Well, I haven't seen them in the last three years because of COVID, but I'm very, very close to my family. My dad and mom both have had a strong influence on my upbringing, but my siblings too. They are spread apart. Sister is living in Russia right now.

Matt Hickey: Oh, wow.

Neha Lodha: Yes. And my brother is in Mumbai, so we get to see each other at least once a year if we are able to, but because of exceptional circumstances we haven't.

Matt Hickey: And tell us about your husband and your beautiful family, if I can ask.

Neha Lodha: Yes. So my husband... His name is [inaudible 00:08:09] and he's a data scientist by training, but he's very much the support system because of which I'm flourishing I think in academia. And then my kids... I have two. One is a four year old boy who loves working with machines and sleeps with a screwdriver under his pillow. And in the morning there is a period of quiet when he's using his screwdriver to open equipment that we still use. But if he's awake and if he's quiet, it means that he's unscrewing something.

Matt Hickey: Isn't that something? Wow.

Neha Lodha: Yeah. And my daughter... She is just phenomenal because she's very mature for her age. Dad was away initial part of my academic journey for about two years so she really took on this role of a big sister and looking after her younger brother. But she's a dancer and a reader. So if she's quiet, she's reading a book.

Avery Martin: That's fun.

Matt Hickey: Brilliant kids already. The apple doesn't fall far from the tree, does it?

Neha Lodha: Thank you.

Matt Hickey: And how about personal interests? When you're not thinking about movement disorders or VR based tools, which we'll talk about in a few minutes as well, what do you do for fun?

Neha Lodha: Well, a few things. I enjoy my life outside of academia as much as I enjoy it inside academia. I am a classical dancer. So very often just any kind of music just turns me on. So you'll see me dancing in the kitchen or doing a little play and then it has a little dance embedded in it. So both me and my daughter love dancing. I also love cooking and feeding people all kinds of cuisines. So that's my other thing that brings me a lot of joy.

Matt Hickey: Nice. And is your husband light on his feet or is he just a happy observer of your skills?

Neha Lodha: Well, he has become light on his feet. Over years, he's realized that it's these little joys in life that we really together as a family enjoy. Dancing is one of them and being outdoors is the other one. So a really simple life, but something that keeps us happy and light.

Matt Hickey: That's great. That's fantastic. Work life balance as we say, right?

Avery Martin: Yes, yes. That's how you keep that smile.

Matt Hickey: So I'm going to bring us back to your educational journey. I think we left off with you arriving in the states. And so tell us more about what that was all about in terms of this trajectory that fortunately for us brought you to CSU eventually.

Neha Lodha: So I landed in Gainesville, Florida at the age of 24. That was the first flight I took, believe it or not.

Matt Hickey: No kidding. Oh, wow.

Neha Lodha: Yes. At the age of 24. And I started my doctoral degree in applied physiology and kinesiology. Again, actually at this department I was the only engineer so I felt like I'm different yet again, but this time I actually knew why I was here, why I was doing what I was doing. I had the tool set of engineering and I wanted to study people who have movement disorders. I worked at a lab that was specializing in stroke rehabilitation. So in that lab I developed computer programs to run experiments on patients and I felt very grateful that I had a very useful tool set as an engineering student to study anything. My specific interest was movement disorders in people who have had strokes.

Early on there too, my mentor was actually known... He was an old school mentor. He was known for setting really hard and high goals for students. One of those incidents was right after Thanksgiving. He walked into my office... Only one year into the program. Walked into my office and said, "Neha, there is this deadline for the American Heart Predoctoral Grant in two months and I want you to write one and submit." And in all my naivety, I said, "And I will." I had no idea what that meant. I just was motivated. I just knew I had to do what I was told to do and I had to do my best. So I think that was also one of the most profound milestones in my doctoral work because I learned how to write clearly and to convince somebody to give you the money to do the work that you love to do. And so I finished my doctoral degree with an American Heart Predoctoral Fellowship and then went on to do postdoc.

Matt Hickey: I want to follow up a little bit. I've heard you share that story before and I've always enjoyed it. It's the old school bit I get a kick out of. As you reflect now that you're here at CSU and you've had some time to think about this... All of us have these wonderful educational journeys. Some of them are a little more linear than others. Others are non-traditional or atypical in some ways. But if you take a moment to reflect on people, places, or times, not unlike what you just shared... This write a grant moment. Whose fingerprints are still on Neha as a scholar? People that have had an enduring influence on you?

Neha Lodha: Two people that come to my mind specifically in the area of scholarship. One of them is Dr. Evangelos Christou and he is a neurophysiologist. He was my mentor for my first career development grant. And he is a Greek guy that I first met actually at a summer school and he used to tease me for being vegetarian. He would say that I was on a mission to save all the cows and I would always starve at all the seminars because there was not much food for me to eat in those times. But that interaction that started as a nice little teasing interaction actually evolved in a very strong mentorship relationship with him because up until that point I had learned the art of doing science. By that what I mean is I learned how do you identify what are the important questions in the literature to answer? And develop the skills to answer them, write proposals to get the funding to do the work, and then publish the work.

But it was in Evangelos' lab that I learned how to be a scientist. And by that what I mean is that as a scientist, you need to learn how to balance your life in academia. So being a researcher and a teacher, how do you balance that while still having fun in life? That was the key thing that I learned from him because he was an individual who would not only push us to do the best in our research and really develop critical thinking for science and for literature that we were reading, but he was also a person who was very compassionate and cared for the people around him. He used to say, "I never give up on anybody." And I really took that from him that as we care for our science, we care for the people who do the science. So I would give him a lot of credit for teaching me how to do science while balancing both teaching and research, but also never losing the human part of our being.

Matt Hickey: Well said. Well said. You hinted at two, so I want to make sure I don't interrupt you here.

Neha Lodha: Yes. The second one is Dr. Manfred Diehl from here. He's at HDFS, Human Development and Family Studies department at CSU. He has been a tremendous influence on me. We shared common interest, which I didn't actually know until I met with him. So just a little bit of a step into my academic brain. I'm highly interested in understanding how motor fluctuations affect our functional performance. And motor fluctuations means the unintended fluctuations in our movement. For example, if you're trying to sew a needle, you will never be steady. There would be some fluctuations as you are trying to string the needle with the thread.

So I was interested in motor fluctuations and I had 10 years of background looking at motor fluctuations, the neurological underpinnings of that, and how that affects everyday function. But Dr. Diehl... He had interest in cognitive fluctuations. So with him, I am currently actually learning how to understand the intersection of cognitive fluctuations and motor fluctuations and how does that impact everyday function.

I can talk a lot about his personal side, but he is also one of those individuals who really believes that their mentee has all that they need to succeed and they will do every single thing to the detail to make sure that they succeed. So I owe a lot to him in terms of my academic development and starting to think about cognitive fluctuations and how they might be impactful in everyday function.

Matt Hickey: Manfred's a great guy, isn't he? We're quite fortunate to have him in the college.

Neha Lodha: Yes. Yes.

Matt Hickey: You might be happy to know that he will be part of season one as well, so we'll be interviewing him very soon. Yes. So this is a great springboard. So we'll transition into Neha as a member of the College of Health and Human Sciences and CSU communities. And my first question, which I think is a natural follow on to what you just said is, to talk to us about what you're most excited about your current research programs, plural.

Neha Lodha: Yeah. Yes, absolutely. So I'm a movement neuroscientist by training and I have worn that hat of movement neuroscientist and looked at life with that. So we've tried to solve problems related with safe mobility, which includes both walking, driving, and falls in older adults with the lens of movement. More recently, I'm trying to integrate how both movement and cognition interact to enable people to drive safely or walk safely or use their both hands in a steady manner.

So recently in the last three years or so, I have had the opportunity to integrate my training as a movement neuroscientist along with my undergrad background as a technologist. And what I'm trying to build my research towards is to basically integrate these two things and see if we can predict who will have... And I'm going to take a leap here. Dementia five to 10 years down the line.

So one of the proposals that we've been working on has been to integrate both of these passions of mine and backgrounds of mine. So what I'm trying to do is that we want to build a black box that we can let's say place on the dashboard of an older individual. And that black box is going to track how they drive over several years. And we use that information, especially the fluctuations in their driving performance over several years, to detect if they are on the path to have cognitive impairments of some sort down the line. So it's a big five, 10 year vision in my mind, but it's not very far because we've already started working towards it. We are getting preliminary data in my lab in a driving simulator, but we have put in proposals to try to take it on road. And I'm working with some colleagues here at CSU from the engineering department to make this happen and make it a reality.

Matt Hickey: That's fun.

Neha Lodha: Yes. I'm so excited about that because it brings together both the science but the applied part of science where it can then start impacting people's lives.

Matt Hickey: Well said. I'm going to take advantage of you referring to five to 10 years down the road to ask you what can sometimes seem like a cliched question, but imagine yourself now five years down the road. Talk a little bit about your aspirations for what impact your research is having.

Neha Lodha: So five years down the line, I think that we would have established that... At least that's my goal. That we have fun foundation of understanding how fluctuations in both cognition and movement are impacting everyday function and more specifically in the field of safe mobility, but I want to take it further and say that we would have built a prototype of this black box that I just referred to and would've tested it in vehicles of real individuals to see if we are able to detect those fluctuations and how that is impacting their mental wellbeing and physical wellbeing to enable them to be independent for longer a period of time. So we want people to drive for longer and drive safely for longer both.

So my goal is that with the work that we are doing with our NIH grant and also with our AHA grant, we would have had enough background information to be able to determine that this is an important parameter. Fluctuations is an important parameter. That's one. And the second one would be to then start using this information to provide rehabilitation to people, both cognitive and motor rehabilitation, that will impact their driving performance and their walking and reduce the likelihood of falls.

Matt Hickey: Excellent.

Avery Martin: That is awesome.

Matt Hickey: Now tell us about your team. So very few of us operate in a vacuum of course and you've already alluded to the fact you've got a fantastic mentor here, but you serve as a mentor as well to a team of aspiring young scholars. And so walk us through a day in the life at the Lodha lab. What happens on a day to day basis?

Neha Lodha: So we call it the Movement Neuroscience and Rehab Lab. I have a very diverse set of students in my lab, diverse in terms of both cultural background but also educational backgrounds. In the MNR or the Movement Neuroscience Rehab Lab you are going to find engineers working on devices, but you will also find physical therapists and undergrad students from health and exercise science and biomedical sciences working together helping a patient or testing a patient.

A day to day life in my lab involves communicating with patients, making sure that we get them all the information they need to participate in our studies. We bring them in. We would be testing them on a three or a four hour long experiment with a crew of a very diverse students. We would then spend the afternoons analyzing the data.

I also want to mention not a day to day, but month to month, you would also find that we have lab meetings where we are presenting data and taking two hour periods just to write. So we are all writing all together. And at the end of the writing session, we would check in with each other if we were able to reach our writing goals.

And then the last lab meeting of our month is usually fun day out. So we would be playing volleyball pretty often next to the-

Matt Hickey: [inaudible 00:25:06].

Neha Lodha: Yes, next to the department we have a beach volleyball court, so we are playing volleyball or we could go a little bit more crazy and go downtown or do something together. But yeah, I really believe that doing science together, but also having fun together is critical to build a strong team.

Matt Hickey: This sounds like some of the influence of Evangelos, right? Doesn't it? This work life balance.

Neha Lodha: Yes. Absolutely.

Matt Hickey: Yeah. And the folks that are in and out of our lab, whether they're research subjects or are part of our team... They're people too. They're not just instruments as part of our goal to get our next grant or our next publication. That's really [inaudible 00:25:45]

Neha Lodha: My philosophy with the students, especially in my lab, is that as I train especially more and more young women, I want them to be equipped both academically but also have all the soft skills to really thrive in an academic environment. And I can only do that best by sharing my own stories and sharing the stories where I did not do so well, because those are the examples that they will remember and hopefully use that in their own context as they become independent investigators too. Right now... I think Matt already knows this. I have a really phenomenal post-doctoral fellow in my lab. She's a physical therapist by training, Dr. Prakriti Patel. She's been successful to get her own postdoctoral fellowship.

Matt Hickey: She sure has.

Neha Lodha: And she's actually heading the falls work in my lab and she's en route to become an independent investigator in near future.

Matt Hickey: So neat to see, isn't it?

Neha Lodha: I think that when your students are your living legacy, that really gives me a lot of gratification in addition to being an excellent scholar.

Matt Hickey: It's fun to see. And it reminds me. My first PhD student is now a dean at another... Which is a reflection of my age, not my training skills. I was really quite struck by that. So neat to see. And again, it's as fun as it is to follow them while they're here and they're a member of our team when they land somewhere else and we can watch them unroll their wings and begin to fly and really be independent scholars it's so much fun. And then those annual meetings that we all miss because of COVID where you get to reconnect and I think those are things that you look forward to for sure.

The question that's been plaguing me for as long as I've met you... I have to ask this and let everybody hear this. Okay. One of your key tools in your lab course is this driving simulator.

Neha Lodha: Yes.

Matt Hickey: So have you been in the driving simulator yourself?

Neha Lodha: Yes, I have.

Matt Hickey: And are you an expert driver? Have you done the Indy 500?

Neha Lodha: Oh, no.

Matt Hickey: Any Formula 1 simulated races in there? Anything like that?

Neha Lodha: I'm not an expert driver in the driving simulator. I'm a very safe driver on road in my Honda CRV. That I can promise you. But we've developed quite a few scenarios and some of them are highly challenging in the driving simulator because we want to simulate how people might drive under challenging driving scenarios, whether it is snowing or whether it is driving on interstate and then having several roundabouts soon after as they exit. So we've been trying to test those scenarios. I'm a decent driver, but I'm not the most fastest driver is what I will say.

Matt Hickey: Now, I haven't been in it. I have to confess. But I'm also curious. Your sense of how much it actually reflects what it's like to drive out there?

Neha Lodha: Yes. So this is a really elegant driving simulator, I think one of the few in the nation, because what we've done with this driving simulator is we have NADS miniSim as our software from University of Iowa, but what we have done is we've integrated this with motion enabled driving simulator from SimGear and both SimGear and University of Iowa work together to make them talk to each other so that when our participants are driving they could get this motion feedback when they're driving. And that really makes it more real world rather than sitting in front of a computer screen and then trying to drive.

The problem with stationary driving simulators is that there is incongruence in the visual feedback that they are getting from the eyes of the traffic flowing, but their body tells them that I am still, so the confusion creates simulator sickness. However, in a motion-enabled driving simulator, both your visual feedback and your motion feedback are in sync and it really reduces the simulator sickness. So I would still say that this is closer to the real world driving experience, but in a safe lab environment.

Matt Hickey: Boy, it sounds phenomenal. My goodness. Sign me up. Take it first. Take a [inaudible 00:30:11].

Avery Martin: [inaudible 00:30:13]

Neha Lodha: I will. Thank you for offering yourself.

Matt Hickey: That'd be good fun. We have two remaining questions and they're really about the broader environment, so we move out of your lab and into the College of Health and Human Sciences. And I'm just curious if you can share some reflections on what you enjoy most about being a faculty member in the College of Health and Human Sciences?

Neha Lodha: Well, I think it is people. It's as simple as that. At the college, I have felt highly supported both as an academic, young investigator, but as a woman early stage investigator. I think that there are people who I can talk to because they have complimentary research interests and the really nicely knit system that constantly provides me feedback about what I'm doing, how I can get better... That really helps me. But they also do it in a very supportive way and not in a punitive way. And that I think reflects on the culture of the college. So I really value the people that I'm surrounded by, both in terms of their academic proficiency, but also in terms of the people that they are. So that's what I would say. People.

Avery Martin: That's fantastic.

Matt Hickey: That's really great.

Avery Martin: That's a common sentiment too, so that tells us something.

Matt Hickey: It is, isn't it?

Avery Martin: So that tells us something. That's awesome.

Matt Hickey: So CSU is a land-grant institution, as is the University of Florida. What does that mean to you?

Neha Lodha: To me, it means that trying to achieve excellence not just in research scholarship, but also teaching and outreach. And so I think that the most unique thing about Colorado State University to me is this nice integration of research, teaching, and outreach or community service that comes all together and they're all valued. To me, that is the most important thing. And I had never imagined this, but in the last one and a half years or so, we've taken that back to my lab where we are trying to now develop an outreach wing of a lab where we try to serve people in the community offering what we call as mobility clinic to try and assess their risk for driving crash and also falls. And I take it too hard where I'm actually trying to promote this as a service that we are offering to the community because we have expertise in research. We want to share it with people in Larimer County. So that's what CSU as a land-grant institution means to me.

Matt Hickey: Oh, that's great.

Avery Martin: I love that.

Matt Hickey: I do too. Neha, thanks so much for coming to join us today and sharing a little bit about who you are and how you got here and what your aspirations are.

Neha Lodha: Thank you for inviting me, Matt.

Avery Martin: Of course.

Matt Hickey: We're lucky to have you.

Neha Lodha: Thank you for having me here. And it's a real joy to be a part of a community where people support each other and we all grow together.

Matt Hickey: Well said [inaudible 00:33:13]. And that's our show. As always, thank you for listening to Health and Human Science Matters.

Avery Martin: Be sure to check out our other episodes. If you want to learn more about our CSU College of Health and Human Sciences, visit our website, chhs.colostate.edu.