# Health and Human Science Matters Season 3, Episode 2: Jaclyn Stephens

Jaclyn Stephens: We have people that have concussion that tell us I don't feel like myself. And a lot of the work that I'm able to do is able to validate what they're feeling. So the brain imaging can show things that we can't measure with behavioral assessments alone. So really, if I really, really zoom out and tell you the big picture, I really want people to be able to do what they want to do and love to do without difficulty. And that's kind of the essence of occupational therapy. We want people to be able to participate and perform their daily occupations without difficulty. And being able to pair my OT perspective with my neuroscience perspective allows me to look at a wide range of things that might be impacting participation and performance.

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 at our mission to optimize human health and wellbeing through discovery and innovation. Don't just take our work for it. Each episode we sit down with people who fulfill that mission, our college faculty and staff. And today I get to say that I have a friend and colleague, and we've done this very thing on many occasions. We've brainstormed over coffee more than once. Dr. Jacqueline Stevens from Occupational Therapy. Jacqueline, welcome.

Jaclyn Stephens: Thank you. Happy to be here.

Matt Hickey: We're glad to have you. I want to start with a recognition. So you're only the second Boettcher Investigator in the College of Health and Human Sciences. So tell us a little bit more about what that means.

Jaclyn Stephens: Okay. So the Botcher Investigator title is for early career investigators, and it supports a research project that is biomedical in nature. So I'm part of the occupational therapy department. I'm also a cognitive neuroscientist, so my work is inherently interdisciplinary and does fall into some of the biomedical research realm. The Boettcher Foundation provides $235,000 of grant funding to support a research project that has some translational impact on humans. So primarily they've been funding a lot of animal studies. So a lot of the previous investigators were studying animal models that translate into human health. But my work is focused directly on humans, so it has a direct impact on human health. And the focus of the project that got funded was using yoga for individuals that had chronic brain injury. So folks that live in the community that have had a brain injury, they're often experiencing lasting impairments that didn't get resolved while they were in the hospital.

So people get treated for the first couple of weeks and months after their brain injury and then they go home. But they're not always fully back to doing all the things that they love to do, their occupations, as we call it in OT. And so recognizing this, we knew that yoga could potentially help these folks because they often have balance impairments and make it difficult for them to go out into the community, to the grocery stores, to socialize.

And so Dr. Arlene Schmidt has been doing a lot of work with yoga. So I partnered with her a few years ago, and for the Boettcher study, we decided to see if we could look at if the brain changes before and after yoga. So that's how I'm integrating my cognitive neuroscience background. That's how it branches into the biomedical sciences. And we're really curious to understand if yoga, which is showing that it's improving balance in this population and other populations with neurological conditions, if it makes a change in the brain. So simply put, if your balance is getting better, it's probably coming from the brain, the motherboard. And so we are using neural imaging techniques before and after the yoga intervention, and we'll be comparing it to a control exercise intervention, which was actually developed by Dr. Heather Leach in Health and Exercise Science.

Matt Hickey: That's great.

Jaclyn Stephens: Yeah, So another collaborator. We also have Dr. Chris Bell from Health and Exercise Science who's helping us with some autonomic nervous system measurements before and after yoga. So we're really curious to understand if yoga, beyond what happens with other exercise, has some benefits for this population. And we're looking at it in the brain. And then the autonomic nervous system.

Matt Hickey: I want to use what you just described as a platform for you to talk about the big ideas or big problems that you pursue in your lab and are clearly related to some of what you just talked about with the Boettcher award.

Jaclyn Stephens: Yeah. So the population that I've been studying has been primarily traumatic brain injury, but as I mentioned, it's chronic brain injury for the Boettcher study, which includes people that have had acquired brain injury, which includes stroke. But a lot of my work has actually been focused on concussion. And so there's some overlaps in people with concussion and chronic brain injuries. So concussion is a mild traumatic brain injury that people experience subtle deficits that originate from the injury. Likewise, people who are in a chronic state might also have some subtle deficits, or if they're getting better, those improvements might be quite subtle. So a lot of what I do is try to measure some of these nuanced difficulties that people are experiencing or when we do intervention studies, some of the nuanced improvements that they experience. But even though they're nuanced and even though they're subtle, they're really, really important to these people, both groups.

So we have people that have concussion that tell us, "I don't feel like myself." And a lot of the work that I'm able to do is able to validate what they're feeling. So the brain imaging stuff can show things that we can't measure with behavioral assessments alone. And likewise with these improvements after an intervention, the brain can tell us a lot more sometimes in some of our behavioral assessments.

So really, if I really, really zoom out and tell you the big picture, I really want people to be able to do what they want to do and love to do without difficulty. And that's kind of the essence of occupational therapy. We want people to be able to participate and perform their daily occupations without difficulty. The population that I've worked with is individuals with brain injury, whether those are sustained from sport or other mechanisms. And being able to pair my OT perspective with my neuroscience perspective allows me to look at a wide range of things that might be impacting participation and performance.

Matt Hickey: So I have to ask you, is there a consistent transition from acute to chronic brain injury? Is it a matter of repetition or severity of the original injury, or is it really hard to predict?

Jaclyn Stephens: So if we think about acute to chronic, I'm typically just thinking about time. And if you have an acute concussion, it might look a lot like a chronic concussion because again, the deficits are really subtle. And after about the first seven to 10 days, people who've had a concussion are not experiencing symptoms anymore. So the deficits that they're experiencing are much, much more difficult to detect and they're impacting their daily life, but not in a way that somebody from the outside is able to see.

When you look at more severe types of brain injury, people that move from acute to chronic phases, the acute, they might be unconscious. So we've got people that are not responding to cues, they're lying in hospital beds. I worked a lot with these folks when I was working in an inpatient rehab hospital. And then you start to see them emerge, and then they merge from disorders of consciousness and they're starting to participate in activities. And it might be as simple as sitting at the edge of the bed or just opening their eyes and responding to cues. So for them, the acute to chronic looks quite different.

And typically, we don't discharge people to home until they're able to manage their activities of daily living, which are bathing, dressing, grooming, feeding, sleeping, those kinds of things, more or less independently. So that's when we help them get to home. But that doesn't mean that they have the full scope of all the things that we do. A lot of those things are rote behaviors that people can do, even if they don't have all of their cognitive abilities back.

So what they'll experience are deficits that are, even from the acute phase, they're incredibly obvious. It's very obvious that people with moderate and severe brain injuries have something wrong. And then even when they get home, they might have noticeable disturbances in gait. They might have clear differences in how they communicate and how they think and how they remember things. But often they'll be at a level where they can more or less take care of themselves, but the deficits are much more marked than what you would see in a more mild brain injury kind of population.

So that acute to chronic definitely looks quite different when you are talking about a more severe injury versus a mild injury. But it's more about the time that's passed since injury. Some will say that six months post is when you start getting into that chronic, although we've learned in recent years that people can have gains in performance even 20 years past an injury. Wow.

Matt Hickey: Yeah. That's great. Yeah.

Jaclyn Stephens: Yeah. We used to only think it was six months. We were like, you get six months and then if you've plateaued, there's nothing else that's going to happen. But we're seeing very clear evidence, especially in the yoga studies, that that is not true.

Matt Hickey: Fantastic. That's great news. I have a another timely question for you. We've discussed in the past, is this safe return to play for athletic concussions, et cetera. And of course that's timely. There's national news now about a quarterback for the Miami Dolphins, right? And of course, those scenes of him with that more recent hit, you almost look like he had a seizure of sort.

Jaclyn Stephens: Yeah. He was in a fencing posture. So that is indicative of brain injury after concussion. So you see some of these reflexes that are supposed to have integrated when you're a baby, these reflexes integrate as part of normal development. And brain injury can actually cause a reemergence of reflexes. So we'll see some of these infantile reflexes with people with severe brain injury. But that image that we saw of the quarterback doing that strange posturing with his hands, that's actually indicative of a reflex reemerging that shows that he's had brain injury.

Matt Hickey: It's unfortunate that moments like that sometimes are the tipping point to get people's attention. I know the Players Association, of course, is upset.

Jaclyn Stephens: Of course.

Matt Hickey: [inaudible 00:10:35] about this. So I think your work in that domain is obviously important as well.

Jaclyn Stephens: Yeah, I think it's quite important. And it's really interesting because I am an athlete, and I love sports. I watch football. I'm not anti any of the sports that people play that get head injuries. And so I think there's sometimes this misconception that those of us who study concussion are like, "We should cancel football." I don't want to cancel football. What am I going to do on Sundays? I think we just need to be really careful and mindful about how we manage return to play and how we measure these things. So as I mentioned, my work is really trying to pick out these subtle deficits because these subtle deficits, while they're not obvious to an everyday person walking by the athlete that sees like, oh, their reaction time's a little slow. Those are the kinds of things that make the difference between dodging the opponent and being hit by the opponent. That kind of speed and processing time is so essential. So even very subtle deficits I think are potentially causing this higher rate of re-injury when people have concussion.

So let me back up just a moment. So the reason that I study athletes at the point of return to play is because we know that athletes, even when they're cleared to return to play using the best protocols, when you have the best athletic trainers and physicians and everybody's well intentioned, even in those cases, athletes can still get re-injured. That tells me that there's nothing wrong with the people assessing. It says that there's something wrong with our assessment measurements and that they're just not quite sensitive enough. If these athletes look normal or neurotypical, that could be really bad because they're not normal or neurotypical. They have reaction times that are standard deviations faster than average people. They one time studied Al Pools, who's also been in the news lately for hitting-

Matt Hickey: Remarkable career.

Jaclyn Stephens: ... whole bunch of home runs. Yes, I'm a huge St. Louis Cardinals fan. But they looked at his reaction time, his visual reaction time, and it's just remarkably faster than everyday people. So if you take athletes who are performing at this high level, and then their reaction time is that of a normal person that's a non-athlete, that could mean horrible things for them when they return to this highly complex and highly demanding environment that asks so much of them. And like I said a moment ago, just a split second of not reacting quickly enough is the difference between dodging and getting hit by the ball, the opponent, the ground, whatever it might be. So we think that that could potentially be what's driving this higher rate of injury after concussion. And my lab, my research, is really designed to figure out what that is, to figure out what the potential neural mechanism is behind some of these really subtle deficits so that we can target those with both our evaluation and treatment protocols.

Matt Hickey: So I want to rewind the wheel even farther.

Jaclyn Stephens: Sure.

Matt Hickey: Talk about your pathway to where you are. Boettcher investigator, you were just talking about a few minutes ago, your tenure promotion package is under review as we speak.

Jaclyn Stephens: It is, it is.

Matt Hickey: It's not literally the next time we see you, but soon [inaudible 00:13:47] say, associate professor with tenure.

Jaclyn Stephens: Here's hoping.

Avery Martin: Yes, indeed.

Matt Hickey: But talk to me about, these may be family influences, they could be teachers in secondary schools. It could be, "I got to college and I wasn't thinking grad school." I wasn't when I was an undergraduate. Moments, people, mentors that have influenced you and where you still in some ways act in a manner that reflects their influence on you.

Jaclyn Stephens: Absolutely. Yeah. So I was the particular brand of nerd, and I use this as a positive term. I think-

Matt Hickey: Oh, yeah, you're here.

Jaclyn Stephens: Yeah, I use that word positively. That when I was 17, 18 and applying to undergrad, I was like, "I want to get a PhD."

Matt Hickey: Wow.

Avery Martin: Wow. Determined early.

Jaclyn Stephens: Yes. And part of my interest in that was I had taken a really cool psychology class in high school, and I had also for personal reasons, had worked with clinical psychologists. This is another thing that I mentioned regularly that I've been diagnosed with anxiety and depression. I've been working with therapists since I was 16 on these issues. I think we need to normalize them and talk about them.

Avery Martin: Absolutely.

Jaclyn Stephens: And say that they exist in people who are highly productive, and sometimes they are both part of the reason we're highly productive and part of the reason that we're seeing a therapist. And so I was really interested in psychology for a number of reasons, and then I went into undergrad with a psychology focus.

Matt Hickey: And where did you go?

Jaclyn Stephens: I went to Illinois Wesleyan University, and I was really interested in this potential to do clinical work, and do research, and to teach. I thought all three of those things sounded really interesting and I wanted to do all three.

Matt Hickey: You haven't lost a moment of energy over [inaudible 00:15:34] sounds like it.

Jaclyn Stephens: No, I don't think so.

Matt Hickey: It's remarkable.

Jaclyn Stephens: And so I really thought that clinical psychology was a path that I was to be on. So I was taking all of the classes, and I was trying to get clinical experience. I worked for a rape crisis counseling center as a volunteer, as an undergrad. Worked in a couple labs, and then I was looking for summer internships in the St. Louis area. Again, Cardinals fan. It's also close to home. And my undergrad advisor, Dr. Lena Kuhn, said, "Have you thought about OT?" And this was January of my junior year. This is a very important time point because January of my junior year, she says, "Have you thought about OT? Because we have a three/two program with Washington University in St. Louis.

Matt Hickey: Oh, wow.

Jaclyn Stephens: And that meant that after your junior year, you went to grad school and you started the OT program. And I had inadvertently, with all of my goals to be a clinical psychologist, I had inadvertently taken every prerequisite for the OT program at Wash U.

Avery Martin: It was made for you.

Jaclyn Stephens: It was made for me. So I had six days to apply. Wow. I got myself together, got my application in, and I was accepted into-

Matt Hickey: My goodness.

Jaclyn Stephens: ... this three-two program at Wash U.

Matt Hickey: That's a nice little time nudge there.

Jaclyn Stephens: Yes. And I really, really enjoyed that transition. It was abrupt, but it was really interesting. I learned what OT was quite quickly, and many of my classmates in the OT program knew a lot more than I did about what the field was. But again, it had this opportunity for that tripartite clinical, teaching, research. And at the time I thought I wanted to do an OTD, so a doctor of occupational therapy.

While I was in the program, a couple serendipitous things happened. My partner at the time got a job offer in the Middle East, and our professional organization, the American Occupational Therapy Association, started nudging schools to have at least 50% of their faculty with PhDs. At the time, there were not very many PhD programs within occupational therapy programs. So I wasn't sure what my next move was, but I was able to switch from the OTD to the master's degree. So I got a clinical master's degree, master's of science. It did include a thesis. And I went overseas for two years. So I lived in Dubai for two years.

Matt Hickey: How about that?

Jaclyn Stephens: I worked at Dubai Center for Special Needs with young adults and adolescents with developmental disabilities. I created a position for myself because licensing for new grads was not an option in Dubai, you had to have a license in your home country for two years before you could apply for one. So there was no mechanism for me to get a license. So I used my OT skillset to be a transition planning coordinator for these adolescents and young adults that had developmental disabilities. And we found ways for them to get job training in the communities. And we even made a few successful placements with some of these kids and young adults. So that was really-

Matt Hickey: There were no hurdles in your field of vision, apparently.

Jaclyn Stephens: There were plenty of hurdles, there were plenty. I only placed four kids, and there were so many of them. There's so many. This center had opened 25 years prior to my arrival there. And so the child who had come at three was 28, and he was still singing Head, Shoulders, Knees, and Toes with all the other ones at morning assembly. And we know that even adults with developmental disabilities need age appropriate roles. This is fundamental to occupational therapy and other rehabilitation fields. We really advocate for the rights and roles of these individuals. And that's not how individuals with disabilities were perceived in Dubai. So it was a huge culture shock in that way. And there was a lot of resistance to my placing some of these students in these workforce areas, even for training, because parents were particularly worried about the safety of their young girls with developmental disabilities in places where men could appear.

So it was really interesting to kind of learn that culture and to be a minority in that culture. As a Western, very tall woman, I would get stared at quite a bit over there. It was very strange to me. But there were a lot of really interesting things that I learned from being there and became very, very appreciative of the Americans with Disabilities Act and how many rights and provisions it provides for people. And really felt like I needed more tools in my toolbox to continue on the path that I was going to continue on.

So while I was in Dubai, I applied to PhD programs across the United States. I wasn't quite as lucky as I was with OT, where I got into the first and only school I applied to. That doesn't happen for students who are listening-

Matt Hickey: Pretty rare.

Jaclyn Stephens: ... to this. Yeah, this one is more accurate. So I applied to nine PhD programs. I got interviews at two and accepted to one. So I got eight rejection letters, which is good for you. It helps you stay motivated, stay passionate. And I got to work in a lab at the University of Nevada-Reno under the mentorship of Dr. Marian Berryhill, who was amenable to my interest in this translational research.

So as I mentioned, there weren't PhD programs. At the time that I was applying, it was 2010, 2011, CSU, Colorado State's OT program just started their PhD program in 2013. So that was not a program that was even available to me to apply to at the time. So I was applying to clinical cognitive psychology, neuroscience focus kind of labs. And I ended up, as I said, working with Dr. Marian Berryhill in the memory and brain lab studying working memory and how working memory changes as people get older. So an element of aging in that lab.

And we were using transcranial direct current stimulation, which is a form of noninvasive brain stimulation. So you're applying a electrical current through the scalp, very, very, very small electrical current. And it changes the activity of the brain cells, making them more likely to fire action potential. So they're just a little bit more active. And we were using that during simultaneous brain training paradigms to see if we could change working memory performance and how long it lasted. So that was the work that I got to do there, which was really fun.

I was telling my husband this yesterday. I really miss studying aging. That was a population that I was also quite interested in. So as an occupational therapist, you go into the clinical setting and you see anybody and everybody. You'll often see the same age range, like 18 and older or a pediatric population, but you're not going in there and only exclusively seeing people with traumatic brain injuries. So I had a wide range of folks that I was working with.

And in this aging work, we were looking at people who, they were healthy aging folks. So unfortunately, our working memory starts to decline as soon as we have it in full capacity. As soon as we've got it just starts to go slightly downhill until we're older. So we were trying to find ways to maintain or even improve this in an older population, which was the focus of my dissertation work. And we were successful. So long story short, we provided lots of stimulation to the brain daily for over the course of a week, computer-based working memory training paradigms. And a month later we were able to see that people who got the greatest degree of stimulation and the training tasks outperform the people who got smaller amounts of stimulation or sham, fake stimulation. So that was a really cool discovery from my dissertation work.

So I really am quite interested in interventions like that, that use neuroscience techniques to address an issue that faces everyone and faces people that have cognitive impairments or have just age-related cognitive decline. And partnering that with an exploration of how that actually affects everyday functioning. So we actually ask these folks, How are you doing? So in addition to doing all of our very methodologically sound and quantitative assessments that were standardized in all of this very rigid science, we were also asking interviews of people. We had people say, "I'm playing my cello better. I'm able to manage my medicine easier." We got these really fantastic quotes from folks showing that it was doing more than what we were even able to measure. So in addition to measuring the brain, we're also starting in current work to add these qualitative pieces to really interview people and see what's happening. Things that our measures are just not designed to detect because they're so individual to each person who are in studies like this.

So that was a really excellent experience. And I was a bit of a workaholic, which I don't recommend that people follow this path. But I was in the lab every day, Monday through Friday. And then every Saturday I was in the hospital doing per diem occupational therapy work. Like I said, in OT, we work with a wide range of folks, but because they knew that I was doing a PhD in neuro, they were giving me a lot of the neuro clients to work with. So I also was working with folks with traumatic brain injury, and I was noticing that we were starting to divide people into these components. So if they had cognitive impairments, those cognitive impairments were only going to be addressed by the speech and language pathologists.

And those practitioners, they do an amazing job with it. Absolutely. But if I think from occupational therapy as occupations and helping people return to the things that occupy their time, you have to have physical functioning, cognitive functioning, emotional wellbeing. You have to have a spectrum of things. And we were getting pulled out of the cognitive pieces because they were saying, "Oh, if they have cognitive issues, just send them to speech." But it's like, how can I help someone manage their medication, which requires cognitive functioning? How do I help them return to their job? How do I help them cook a meal that requires planning and problem solving and dovetailing so that everything is ready at the same time without cognition? And so I ended up doing a review paper on why occupational therapists and how occupational therapists should be involved in cognitive rehabilitation in folks with traumatic brain injury.

That paper was serendipitously published right before I attended a conference. I was in this leadership program during my dissertation year for leadership in education on neurodevelopmental disability. So a LEND program, which they have in Denver. We don't have a LEND program up here in Fort Collins, but they're really great training programs. And part of that training program sent me to a conference in Washington DC, and I met up with someone, Dr. Bruce Shapiro, from the Kennedy Krieger Institute, and somebody at the Kennedy Krieger Institute, Dr. Stacy Suskauer, was looking for someone who was interested in doing a traumatic brain injury focused postdoc.

Avery Martin: So where'd that take you?

Jaclyn Stephens: So all these things happened that I ended up doing my postdoc work at Kennedy Krieger after I finished my dissertation work. I was at my postdoc for two years, and it was Kennedy Krieger Institute, which is partnered with Johns Hopkins School of Medicine, which I've described this multiple times, is like, you can't walk to the water phone without learning something from somebody or running into the person who invented the thing that you're doing.

Matt Hickey: What a great opportunity.

Jaclyn Stephens: It was such an incredible learning opportunity. And Dr. Suskauer was an incredible mentor. And I was able to really, in those two years, get really, really well versed in the pediatric traumatic brain injury literature. And I use that to form the foundation for what I'm doing here at Colorado State. And so I got experience and exposure to lots of those things knowing that I needed quite a bit more than two years to be considered having expertise in it. But that allowed me to really build upon some of the neuroimaging and neuroscience skills that I had.

And then it helped me identify one of the gaps that I had, which was another method called Electroencephalography or EEG, which I started to build and started to write a National Institute of Health Career Development Award application while I was at my postdoc, recognizing that I needed EEG experience, and being an OT and a neuroscientist, I was looking for an OT and a neuroscientist to mentor me.

And so Dr. Patty Davies here at CSU was an obvious choice. And so as she tells it and I tell it, I started stalking her at our annual American Occupational Therapy Association conferences and just started saying, "I'm doing this. I'm thinking about this. I'm going to be interviewing here. Do you think you could be my mentor?" And she, of course, agreed. And so she has been instrumental in helping me really expand my neuro imaging skill set, expand my skills, and the way that I think, the way I write grants. The easiest way to describe my mentorship from Dr. Davies is she's an EEG expert. That's the easiest way. But obviously it's a lot more than that because she was my mentor when I first started here and helped me navigate all the different demands of being a faculty member and what I need to do next and what the next steps are and how to negotiate.

She helped me negotiate with what I needed for my startup before I came here. So she's been really helpful in getting me started and up and running here. And I'm now starting to feel the very good growing pains of like, "All right, I'm ready to be the mentor." Of course, I stay in contact with all three of my primary mentors. So Dr. Berryhill from my PhD work, Dr. Suskauer from my postdoc, and then of course, Dr. Davies. But I'm really moving into that next stage of my career where I'm the mentor, and I'm hiring a post-doctoral fellow for the upcoming Boettcher study. And yeah, we're really expanding what we're able to do. Should we talk about the Spur Campus?

Matt Hickey: Why not?

Jaclyn Stephens: And how that fits into things?

Matt Hickey: Absolutely. I'll let you describe it, but to tell our listeners, when we say Spur campus, what do we mean, before we [inaudible 00:30:39].

Jaclyn Stephens: Maybe you should describe it.

Matt Hickey: I mean, we can team up on this. So the Spur Campus is an hour south of where we're sitting right now. So Colorado State University is in Fort Collins. We're 55 miles or so north of Denver. The Spur campus is a really, really neat new development. It's on the grounds of the National Western Stock Show, which has been held in Denver for over a century. So the state legislature appropriated a significant amount of money, several hundred million dollars, in order to buy the grounds and then build three different buildings, two of which are operational. A third is supposed to come online in January. And I think the total square footage is going to be in the neighborhood of 200,000 square feet of new space. And it's meant to provide programming for local communities. These are our primary minority population. So this is an opportunity to give back, to serve. We'll talk in just a few minutes about CSU as a land grant institution. And Spur is very consistent with the land grant vision, of course.

So the programming done is multifactorial. It's educational. There's an engagement or outreach piece. There's also a research component. Just last year for the first time, Spur put out a call for proposals that if you want to do something down here, again, the CSU system will provide some resources to help you get started. Now the point is get started. All those programs are meant to sort of have a business plan and a multiyear model where if you'd like to stay, we'd love to have you, but can that be supported by the National Institutes of Health or foundations? Or whatever it might be. And Jacqueline and a team of colleagues were able to successfully compete on that first round of funding. So I've teed you up.

Jaclyn Stephens: Yes, you did a much better job. I couldn't have come up with the square footage off the top of my head. That wasn't in my brain. So Dr. Arlen Schmidt, who I collaborate with on a number of the yoga studies, and then Dr. Jen Weaver, who is relatively new to CSU and the OT department, and I, we have secured a space down at Spur to do quite a bit of research, but also quite a bit of outreach. So the three of us are aligned in a number of ways, but we've all studied people with neurological conditions, including those with traumatic brain injury in one way or the other. Arlene has been excellent at developing interventions like yoga and really being able to see, to standardize these interventions and to develop measurements before and after. And really be very thoughtful about that intervention piece, which is an area that I haven't gone into quite as much. But she's been a great mentor for that as well, and great partner to work with on this.

And Jen has done a lot of measurement development as well. And she also works with people with traumatic brain injury and disorders of consciousness. She has a lot of implementation science background, along with both qualitative and quantitative research methodology expertise. And then my area of expertise comes in with the neuro imaging piece. So collectively, we can span kind of the basic science to implementation science spectrum, which is really quite exciting. And we have this model population of traumatic brain injury that we've all had some experience with, both clinically and in research realms. So that's nice to have the overlap there.

And we foresee this space as a way to continue our research programs for sure. And that's a huge priority for us. But also to support the new Doctor of Occupational Therapy program, to build our PhD program, to be a place for a lot of traditional learning. And by traditional learning, I mean students that come and learn in a research lab. But also less traditional learning where we have community members coming in and learning from us, and we have these outreach programs. We have individuals with brain injury who are coming to learn from us and then joining us on the research team. This is the kind of thing that we envision.

We really want the work that we're doing to meet the needs of the population that we're serving. And we don't want to come at this from the, "We are the experts and we know best," but rather, "We know how to do these things. We know how to do research. What do you know about yourself? What do you know about this disorder that you have and that you're living with? And how can we best design our studies and what we do and how we train our students to meet your needs now and the needs of people across the US, across the world as we disseminate what we're learning?"

Because I think that disconnect that I sometimes feel now that I'm no longer working in the clinical setting will be resolved by having this space down there. Because there's a lot of level one trauma centers in Denver that we don't have as quite as many in this area. I think there's a new one in Loveland, but I'm not sure, which is a town close by. And there's just a lot more opportunity for us to connect with the populations that we study down there and really serve as a hub for learning and innovation and outreach. And so we're really excited to have that space and see what comes of it. So I think there's a lot of potential and we're still grasping at what our first project's going to be, what our next project's going to be, and how we're going to keep it funded.

Matt Hickey: Yeah, that's great.

Avery Martin: So incredible. So I want to talk a little bit about the transition to CSU and just tell us how long you've been here. When were we lucky enough to, or when did you recruit yourself? By the sounds of things, right?

Jaclyn Stephens: So interestingly, there was a call for faculty applications, or there was faculty openings in 2016. So I had started my postdoc in July of 2015. And in October of 2015, I saw that CSU's OT program was hiring. And I knew Dr. Davies was here. I knew Colorado was a great state for someone like me who likes to hike and be outside a lot. And so I reached out to the chair, Dr. Matt Malcolm, who's a chair for this search, and let him know that I had just started my postdoc, and I was really interested in the faculty position, and should I interview, even though I wouldn't be able to start for over a year from when I would interview? And they said, "Yeah, sure. Come on out." Or, "Submit your application." And so I submitted my application. I got invited to do a phone interview, which is pretty standard procedure. I actually found a list of phone interview questions online, and I answered all of them. And then when I did my phone interview, they asked a lot of them. So I was-

Matt Hickey: Good preparation.

Jaclyn Stephens: It was good preparation. Because I wasn't sure exactly what was going to go into this phone interview. It was my first time interviewing for a faculty position. Then I came out to do an in-person interview, which was over the course of two days. And I was offered the position in March of 2016 with a start date of August 2017. So I was able to have my position in place and then really focus on my research as a postdoc and getting a lot of papers written and submitted for publication before I came here to start my faculty job.

And for anyone who's listening, who's considering a postdoc, do it. It was the best two years where I really just got to focus on research and myself and my own development and didn't have a lot of responsibilities to other people apart from my mentor, Dr. Suskauer. It was really about my development as a scientist and learning.

And of course, all those steps of learning were also quite productive and useful for Dr. Suskauer. But it really gave me the opportunity to have some time and space to just get established or start to get established as an early career investigator, so that when I did start my faculty position in 2017 and have the multiple roles of service and research and teaching, I was in a good spot to do that. I knew what my research plan was going to be for the next five-ish years, and I had a lot of papers under review, so that helped a lot too since I was tenure track. So yeah, I've been here since 2017 and this is, believe it or not, my sixth year here, which seems remarkable.

Matt Hickey: Blink your eyes.

Jaclyn Stephens: I know. My goodness. It goes so fast.

Matt Hickey: So you've talked, I think, a little bit about a day in the life, what it's like for you and your collaborative team. I really want to shift that lens a little bit to talk about the influence you aim to have on your trainees. "When I'm training somebody here, here's what I'm shooting for or aspiring to."

Jaclyn Stephens: Yeah, I love that question. I really want research and science to be fun. I want it to be exciting.

Matt Hickey: There's an idea huh?

Avery Martin: Yeah, right?

Jaclyn Stephens: I really do. I've been in different settings, different lab cultures that are more rigid and higher stress, and that works really well for people. And I'm not knocking that. That is absolutely necessary in certain cases to keep things happening at a productive level.

For myself, that kind of environment isn't great for me, and I have high expectations for myself, and I have high expectations for my students. But if they don't love what they're doing, I don't think that they need to be in the lab. So I have an open door policy in my lab that any undergraduate who's interested in studying concussion or brain injury or yoga is welcome to come to lab meetings, welcome to observe sessions with participants so long as the participant's okay with that, and they've completed the necessary training, just in case someone from IRB is listening. But I want people to come and experience it. And if they're like, "Oh my gosh, this is so exciting, I want to do it," that's the student that no matter what their GPA is, their scores on their SAT or their ACT, if they get excited, they can do it.

And I firmly believe that anybody can do neuroscience. I really do. You just have to get excited enough. You just have to be curious and excited, and you really want to learn the next thing. I'm not great with computers. Sometimes they do not do what I want them to do. But if you give me a new device and new piece of technology, I will figure it out because I'm stubborn enough and curious enough about what the answer is that I'm trying to answer, that I will figure it out. And that is what I try to convey to my students is that we will have to work hard, we will have to make some sacrifices at times, but if you love it, it's not going to be that difficult.

And so I really want undergrads and grad students in my lab who are excited and want to do it. So if somebody comes to my lab and says, "This isn't for me," I say, "That's great. Go to another lab, go to another lab meeting, and then if you do end up back here, the door is always open."

So I really want to foster an environment that is supportive to students mental health and physical health and fosters their excitement and creativity because those are the students that I have no trouble getting them to do their thesis. I have no trouble with them showing up. We had an 8 AM lab meeting this morning. Most everybody was there by 7:57. They want to be there. And we're really just trying to make it a fun and great learning experience that is lower stress, so that people feel like they can be successful.

I don't want people in the lab that are just stressed and anxious that things are going to go wrong. Things go wrong, but then we recover. I mean, there's so much rejection in this field. Most of the time I expect that I submit an article, I submit a grant, and it's going to get rejected. That's my expectation. So I celebrate the effort that I put in and my students put in, in submitting. We celebrate what we can. We celebrate all the accomplishments that we make, big or small, because once it gets to other people, it's kind of off our plate, and we just have to recognize that there's a lot of rejection. And so it's on us to really make it a positive experience to do science.

Matt Hickey: I want you to take a minute and project into future a little. We talk about impact, right? Aspirational impact on the field of occupational therapy, on occupational therapy research. If we put yourself forward five, 10 years, I hope that I have moved the field, the proverbial needle, in the following ways.

Jaclyn Stephens: That's a really good question, and I struggle with this. So part of my conversations with mentors and peers is, how does all this relate? Because I do more basic science than many of my occupational therapy research peers. But I do feel like there is a role of neuroscience in OT, and it makes sense. When we're really trying to understand what's going on for our clients, knowing as much information about them as we can is helpful. So getting windows into the brain of what's happening because of an injury, even a subtle injury like concussion, what's happening because of an intervention helps us refine the way that we evaluate and the way that we treat folks.

So I really want to be moving the field forward by saying, and others have done this before me too. So I have to be really careful of saying like, "I'm doing this thing," because other people have done it as well. But really making it so that occupational therapy researchers can use tools that they're excited about. Because I get really excited about my brain imaging tools, and I just have to put a plug in for this because I'm using one tool right now called Functional near infrared spectroscopy that actually lets me measure brain activity while people are doing functional movements. Yeah.

Matt Hickey: So cool. Not just sitting there in a magnet or something.

Jaclyn Stephens: Exactly. Exactly. So I really feel like that's that intersection between rehabilitation sciences, like occupational therapy and physical therapy, and the neurosciences, when we're looking at functional movements in healthy folks and in people that have had some sort of neurological insult, as I'm often studying, because we're getting so much more information about how the brain works.

And I think the more that we understand, the better we're able to address deficits. It just makes sense to me. Sometimes the link between them is not always clear. I can see that this is the issue in the brain. Now what? That's a big question for me. That's the question I'm going to be tackling before I write my next grant because I've got a really cool brain finding, and I'm like, "But what does this mean?" What does this mean? And how do I use this to make an impact on the people moving forward?

Because I am interested from a scientific perspective, I really am. I'm very curious. I get really excited about findings, but I have to challenge myself to always be putting this into a lens of, how can I help people? How can I use the information that I'm so privileged to be able to gain and gather as a researcher to move rehabilitation forward? And that is a big task that it's going to be a lot of work to figure out what's next.

Matt Hickey: It's a good thing you got lots of energy.

Jaclyn Stephens: Today, yes.

Matt Hickey: Two closing questions about this environment we find ourselves working, and the first one is the institutional one. I've alluded to this a few minutes ago. CSU was a land grant institution. We take that seriously as an institution. One of the things I've always liked about CSU, it's not just lip service. Land grant means something, right? So talk to us about what working at a land grant institution means to you.

Jaclyn Stephens: I think it's part of that challenge that aligns with what I just said. I'm really interested in the scientific understanding of what's happening after brain injury. But that outreach piece, that connecting to people, serving the community that I live in, that is also really important. And it's quite easy to make these discoveries and then not translate it to the next step.

So it's really important to be here and to have CSU's mission align with my own, and mine align with theirs. Probably that's the directionality it should be. But yeah, it's important to me that we are serving our local community and then beyond our local community. And I really hope that as I continue to do this research and partner with people with brain injury, partner with community members, and really have the knowledge translation be bidirectional, having that as part of CSU'S intention, I think is really great because then my work gets recognized for things beyond publications and grants. And I'm excited for that next step, and I think the Spur Campus that we talked about a moment ago is really going to help facilitate those kinds of transactions.

Matt Hickey: Next layer down is this College of Health and Human Sciences, an eclectic, diverse, dynamic group of multiple disciplines, often even within a single department or school. So life as an academic. What do you like best about being in the College of Health and Human Sciences?

Jaclyn Stephens: There's a lot of things I really like about it. I have so many collaborators in health and exercise science. I know that I'm going to have collaborators in human development and family studies. There's just so many opportunities. I mean, the work that's happening in all of the different departments within our college is phenomenal.

And it's the thing that made writing my tenure and promotion application challenging, but also really exciting is that there's so much opportunity to showcase your scholarship. It's not in these certain ways that we've defined it before. And I really think that if we are going to truly impact our communities and our fields, all of the different work that all of the people within our college are doing, are doing it in different ways. And it's so great to see different models of dissemination and outreach because unfortunately, a lot of the work we're doing doesn't get read by the public.

And I think that people in other colleges are reaching the public better than some of us who were trained in these traditional research laboratory settings. So I see that as an opportunity to move forward. I also see that there's so many people where I'm like, "I don't know how to do this thing." It's like, "Oh, there's an expert over here in your college that knows how to do this thing." Like Dr. Chris Bell, who's helping us with the autonomic nervous system stuff. It's really fantastic. There's just a rich learning environment and collaboration environment across all of the different departments. And I know I've only spoken about a couple, but I think there's plenty of opportunity found. Yeah.

Matt Hickey: I agree. I agree. On behalf of the college, I want to say thanks. Thanks for coming. Congratulations on your Boettcher Investigator award.

Jaclyn Stephens: Thank you.

Matt Hickey: We look forward to hearing good news about the tenure promotion decision soon.

Jaclyn Stephens: me too.

Matt Hickey: Another great interview is in the books. Thank you for listening to this episode of Health and Human Science Matters.

Avery Martin: Stay tuned for the next episode. It's on the way. In the meantime, go listen to our episodes from Seasons one and two. And if you want to learn more about our College of Health and Human Sciences at CSU, go to www.chhs.colostate.edu.