

Melvin Mejia on balancing time to capture quality data for outcomes in movement rehabilitation-Ep5

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- MELVIN MEJIA: 00:07 [music] I probably couldn't have chosen a better jumping off point in my career than working at the Foundation. It feels like my job is worthwhile.
- JOAN BANKS-SMITH: 00:16 That was Melvin Mejia, a research engineer from our Center for Mobility and Rehabilitation Engineering Research. And this is another episode of Life at Kessler Foundation. I'm your host, Joan Banks-Smith, creative producer here at the foundation and editor and producer of this podcast. Welcome to the show, Melvin.
- MEJIA: 00:37 Thank you for having me, Jody.
- BANKS-SMITH: 00:39 Melvin, how long have you been with the foundation and what made you decide to come to the Foundation?
- MEJIA: 00:44 I've been at the foundation for six years and two weeks exactly today. Back in 2015, I was interning at the Hospital for Special Surgery in their biomechanics lab. And during my time there, I discovered a [inaudible] that led me to Kessler Foundation. I had never heard about it at the time, but I saw that they had openings for research engineer jobs here at the department. So I set up an interview with Dr. Barrance and Dr. Nolan, and about a month later, I was in. And yeah, it's been great ever since.
- BANKS-SMITH: 01:17 What is it that you do at the Foundation? What's your role here?
- MEJIA: 01:20 As a background in biomedical engineering, my main role is collecting and analyzing data where studies have given movement and rehab in populations such as traumatic brain injury, stroke, osteoarthritis and cerebral palsy. I've used many different techniques and devices to gather this data, things such as motion capture, force plates, walkways, MRI images, EMGs, which stand for electromyograms that helps us measure muscle activity, IMUs which stand for inertial measurement units. That helps us track orientation of certain body parts so that we can easily measure angles of the joints in between those segments. So, for example, if I have a sensor on the thigh and the calf, I can measure the knee angle with those sensors. But probably the most important tool I use is MATLAB. It's a software and a programming language all in one, and that's probably what we all use at the lab to help us not only collect the lab but put it all together and turn it into nice neat graphs so that we can present to conferences all over the country and around the world and help present our research in a nice way.
- MEJIA: 02:35 I'm also involved in other projects just in general, helping out the team any way, shape that I can. As one of the few Spanish speakers in the department, I also help anyone with any translations, consent screenings, baseline and follow up for any Spanish speaking patients.
- BANKS-SMITH: 02:52 Throughout the day, how do you challenge yourself on the job?
- MEJIA: 02:56 I would say the biggest challenge for me has been balancing my time between the different studies that I'm involved in. I would say week to week, I would probably get my hand in four to five studies, and all of these studies have different timelines and schedules, and a lot of times they conflict with each other. So these are probably the

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moments where we rely on team the most to be able to balance the time with everyone so that we can get everything done for every project efficiently and have everyone involved at the same time. It makes that challenge a lot less daunting when everyone is working together as a team.

- BANKS-SMITH: 03:35 You and I have worked together as colleagues, but we've also worked together with you being the researcher and me being the participant.
- MEJIA: 03:43 That's right.
- BANKS-SMITH: 03:44 When I spoke with you recently, you mentioned a new study that you're working on that has to do with cerebral palsy. What does that involve?
- MEJIA: 03:51 This new study is led by a team by Dr. Peter Barrance, and we are helping children with cerebral palsy train themselves to walk more symmetrically.
- S3: 04:03 I'm going to start walking with my normal gait pattern. And then about halfway through, I'm going to start trying to step further forward. Normal pattern. I'm currently scoring two points, and I'm going to transition to stepping further with my foot down. Now, getting up into +4, +5.
- MEJIA: 04:29 I'm not sure how familiar you are with cerebral palsy, but it's basically a disease that children get early on in their lives and they live with for the rest of their lives. And it entails very difficult, strenuous situations where they have very, very stiff and immobile muscles at times and bones. It's just a very debilitating disease that they have to live with for their lives, and there isn't really a cure. So what we're coming up with is a way for children to be able to train themselves by looking at a screen in front of them as they're walking on a treadmill. And we use eye IMU sensors that I mentioned before. We place them all along their legs so that we can measure different things like their knee and hip angles. As they're walking on the treadmill and looking at the screen, they're seeing a red dot going up and down. That red dot represents their foot position relative to themselves. And as they take a step forward, the red dot goes up towards these, what we call, scoring zones. The farther out the step is, the higher the points they get. They would progress through their training. I don't remember how long the training is, but we'll say it's a month, three times a week. They'll do those training sessions, and each day they're trying to improve their score so that by the end of the sessions that affected side - usually with cerebral palsy, you have a more affected side - that affected side is more symmetric than their more not affected side. The end goal is to try to make their steps more symmetric from each side.
- BANKS-SMITH: 06:14 Now do you have any outcomes so far for this study?
- MEJIA: 06:17 We're still piloting it, so we haven't started collecting any data. We haven't recruited anyone. We're still in the pilot phase. We're almost done with that pilot phase, and we're almost ready to recruit. We just have a couple of things to iron out, and we're actually moving most of our stuff to the data lab. That's where we're going to be collecting our data. So we're probably going to start collecting data either at the end of September or the beginning of October.
- BANKS-SMITH: 06:39 What age group are you looking for?

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- MEJIA: 06:41 I believe it is kids from 7 to 17.
- BANKS-SMITH: 06:46 Is this study listed on our website so if a parent wants to try to get their child signed up for it?
- MEJIA: 06:53 If it's not on the website, it will be soon. So stay tuned.
- BANKS-SMITH: 06:57 Once we get that link, we'll make sure it's in the program notes.
- MEJIA: 07:00 Absolutely.
- BANKS-SMITH: 07:01 What's interesting was, last night I was watching American Ninja Warrior, and they had a young gentleman on who was 16. And he was really a top athlete. And they said that he had cerebral palsy. And one of the things he mentioned, of course, was that he always had to be mindful of stretching. So to do what he's able to do, having studies like this that can help young people potentially be able to do whatever they want to do in life.
- MEJIA: 07:30 Absolutely. And as you said, the biggest struggle for people with cerebral palsy is in fact trying to move their bones and muscles the way that they want to without too much tone. So stretching is a huge part of that, and it's at least a temporary relief.
- BANKS-SMITH: 07:49 What motivates you every day to do the work that you're doing?
- MEJIA: 07:53 My motivation is pretty straightforward, and it probably goes in line with the mission statement the Foundation has, the belief that the research that we're doing is going to help out millions of people around the world with better lives. Also my favorite part about working here, I probably couldn't have chosen a better jumping off point for my career than working in the Foundation. It feels like my job is worthwhile, and it also justifies my career choice. So all of those things motivate me.
- BANKS-SMITH: 08:24 As an engineer, where do you see yourself say in the next three to five years? What type of engineering do you envision or that you would like to be a part of?
- MEJIA: 08:35 I guess the short answer would be I'd like to expand on the rehab and include sports rehab in addition to physical rehab.
- BANKS-SMITH: 08:43 Is there a research participant that stands out?
- MEJIA: 08:47 Yeah. I had a participant enrolled in our [DOD?] funded [inaudible] study for TBI a few years ago. It was his first study with the Foundation in about three years. And when we first recruited him, we were warned about his various diagnoses in addition to TBI, such as schizophrenia and bipolar disorder. But at the time, it was controlled with medication. So at first, even though he was compliant when he came in, it was clear he wasn't really enthused to do the physical therapy that was involved with the study. And as a result, he missed the first couple of visits early on. However, we noticed that his issues weren't necessarily with us, but more with himself and the way that his life had turned out. So in addition to the interventions, we made sure that we kept a healthy conversation throughout as a way to improve his morale and make time go by faster. And as a result, we became pretty fast friends. We discovered we had mutual love for both baseball and hip hop, and he became a lot more motivated in his therapy. After the intervention of two months, his results from baseline to that point had improved greatly, and he was really ecstatic to find out that he was placed in

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additional therapy with us for maintenance sessions. So that was an additional two months that we spent with him. And he continued to improve, and our relationship to this day has been pretty solid. He still gives me phone calls just catching up, talking baseball and hip hop. And yeah, we're still we're still pretty good friends to this day.

BANKS-SMITH: 10:27

Well, that's great to hear that even though somebody can come in as a participant, you just don't know what the future holds and how somebody can affect your life and the friendships that have been gained throughout this process, because I know we have a number of participants that are repeat participants.

MEJIA: 10:45

Yes. And I would just say, this participant, since that study, he's maintained his presence at the Foundation of coming to many studies since then. So I feel like it's the little things that further motivate participants to be able to come back and not just do the research for themselves, but do the research for others.

BANKS-SMITH: 11:10

Absolutely. And we'll make sure we have a general link that goes to our website. So if somebody is interested in looking at other types of studies that are available that they can sign up for. It's a real easy process, a couple of clicks, and then somebody will get in touch with you. Melvin, I just want to thank you for spending some time with us. Talk about some of the research that you're doing at the foundation and what motivates you to come to work each day. So thank you very much.

MEJIA: 11:39

Thank you so much for having me, Jody. It was a pleasure.

BANKS-SMITH: 11:43

Interested in learning more about Melvin, the Center for Mobility and Rehabilitation Engineering Research, or a career at Kessler Foundation, links are in the program notes. Tuned into our podcast series lately? Join our listeners in 90 countries who enjoy learning about the work of Kessler Foundation. Follow us on Facebook, Twitter and Instagram. Listen to us on Apple Podcast, Spotify, SoundCloud or wherever you get your podcasts. This podcast was recorded on Tuesday, August 31st, 2021, remotely and was edited and produced by Joan Banks-Smith, creative producer for Kessler Foundation. [music]