

AT: Welcome to the Infinite Women podcast. I'm your host, Allison Tyra. Today I'm joined by Dr. Jess Bugeja, a CERC postdoctoral fellow in the CSIRO Australian eHealth Research Centre, Neurodevelopment and Plasticity team, to talk about Dr. Jacquelin Perry. So, what is Dr. Perry best known for?

JB: So Dr. Perry was a pioneer in the mechanics of gait, diseases that affect motion, including things such as polio and cerebral palsy, and orthopedic surgery. So, she used gait and motion analysis techniques to investigate mobility-based conditions, rehabilitation exercise, and sports science. To those in her field, she was really known as the grand dame of orthopedics. She was really an incredible person. In fact, one of her colleagues, Dr. Jessica Rose, who is the Director of the Motion and Gait Analysis Lab at Lucile Packard Children's Hospital, stated that Dr. Perry's pioneering work in the field of orthopedic surgery and motion analysis has had a lasting impact on diagnosis and treatment of gait disorders. She promoted evidence-based medicine early on and advanced orthopedic care for complex gait disorders.

AT: And so, my understanding is that she was a surgeon earlier on, but then in the late '60s, she had a cerebral artery stenosis. So, she sort of had to change gears with her career.

JB: Yes, absolutely, she did. In fact, her colleague, Dr. Keenan, who's the Director of Neuro-Orthopedics Education at the University of Pennsylvania, stated that she dealt with those kinds of adversities with a great deal of grace. And it freed her up to be thinking more. So, rather than being caught up in the demands of clinical practice, she had more time to stand looking at science and investigating the things that she really wanted to make a difference in.

AT: And so, in 1968, she founded the Pathokinesiology Laboratory at Rancho Los Amigos to analyze the biomechanics of walking. So, what does that mean?

JB: So, biomechanics could be thought of as a study of human movement, so that includes the interaction between the participant and equipment. So, you can break this down into two sort of broad areas, and that would be kinetics, which is the study of forces acting on the body, and kinematics, which is the study of the movements of the body. So, she focused on gait analysis, and this led to international reputation as a leading authority on walking biomechanics. In fact, in 1992, she published a pivotal textbook entitled *Gait Analysis: Normal and Pathological Function*.

AT: So, she was studying this for decades, and it sounds like sort of the intersection of biology and physics.

JB: Yes, yeah, yeah. It's a really incredible field of work. So, you can sort of think of ourselves as like a whole system of moving parts, and those parts, you know, they function in a particular way, and sometimes they might not function the way they should. And it's these types of science areas where we try to work out why that is and how we can improve the way people move and the way they feel when they move.

AT: And so, before she had to change gears on her career, she was working in the field of polio.

JB: So, in 1955, the Rancho Los Amigos Rehabilitation Center recruited Dr. Perry to launch its physical therapy program, and she treated patients with severe spinal and respiratory muscle paralysis. So, her patients couldn't tolerate the anesthesia and needed a surgical stabilization. And during this work, Dr. Perry and Dr. Vernon Nickel developed the halo for spine, head, and neck immobilization, which aided an upright positioning for polio patients and became widely reused in hospitals. So, clearly Dr. Perry was an innovative and astonishing scientist who found the right answers to questions people had never asked before.

AT: And she was also treating symptoms of fatigue, joint pain, muscle weakness, so what's considered post polio syndrome.

JB: She really had such a broad range of fields that she covered and didn't limit herself to any particular condition. And I just think it's really incredible that she just wanted to focus on the patients rather than the condition.

AT: And if we go back even further, she actually started her career working with the US Army, which I would imagine was not terribly common for women at the time.

JB: Yes, yeah, you're completely right. And Dr. Perry, she earned her bachelor's degree in physical education from the University of California in Los Angeles in 1940. So, in her senior year, she was introduced to physical therapy and the timing of that introduction was serendipitous. She once stated that the Army announced that its physical therapy school had become a civil service program. And her one-unit classes on Greek and Latin roots helped her pass the vocabulary entry exam and that's where her future began.

AT: And so she wasn't a doctor at this point. She had her bachelor's, as you mentioned, in physical education. And then from 1940 to '41, she received physical therapist training at Walter Reed Army Hospital. And then she worked for the Army for five years.

JB: Yes, yeah, quite an amazing woman. And one of her colleagues, Dr. Keenan, reflected on Dr. Perry's journey during that time. And she stated that as a physical therapist during World War II, Dr. Perry was getting orders from physicians that she did not think were correct. And this was the ember that lit the fire for Dr. Perry to decide to attend medical school and become an orthopedic surgeon. She studied at the University of California. And in 1950, she earned her degree in medicine and completed that residency in 1955.

AT: And from what I've read, she was both highly professionally respected, but also from a personal standpoint, her colleagues and proteges really lauded her temperament and her approach to the work.

JB: Yes, absolutely. She was a highly respected person, both professionally and personally. In

fact, a colleague of hers once stated that her approach was a methodological analysis to improve patient care and everyone around her. She could be very intense and stern, but the endgame was improving. And she didn't let anything distract her from this.

AT: As we were discussing earlier in relation to her work with polio patients, she was very innovative in terms of finding solutions.

JB: Yes, yes, she had a commitment to teaching and improving the lives of patients. And she was considered a relentless problem solver. She had an inquisitive mind, intellect, and no-nonsense approach to finding solutions where others did not see problems. And despite the impact that Dr. Perry had on so many lives medically and scientifically, she remained very modest and didn't believe she had done anything special during her career.

AT: When we're talking about she found solutions where others didn't even see problems, I wonder if that's part of the empathy gap that we often see when you've got, say, someone who is able-bodied, treating people who are physically or otherwise disabled in some way, like they don't understand that experience. And so it's harder for them to recognize that there even is a problem to solve.

JB: Yeah, yeah, that's really true. I think that some people have a really special connection in being able to feel what other people are feeling and without taking that away from them as well and just knowing that they have an ability to help them. And that's exactly what they're going to do. And we treat patients as people with lives. They have families, they have things, they have dreams that they're not just a number in a bed to treat and move to the next person. And as Dr. Lattanza, her colleague and chair of the Department of Orthopedic Surgery and Rehabilitation at Yale School of Medicine stated, a lot of that came from the fact that she was always doing what she loved and felt like it was an honor to be taking care of patients and teaching people. Dr. Perry looked at the patient as a whole person, not just with regard to their disability, but who they are, what their goals are and what's important to them.

AT: And it wasn't just this empathy that contributed to her success in that regard, but I read that she also thought very functionally as opposed to other orthopedic surgeons who thought mechanically. So what is the distinction there?

JB: Yeah, so Dr. Perry really was ahead of her time. I think traditionally orthopedic surgery could be thought of as a very mechanical job. We have bones, we have muscles, we have tendons, we're tied together in a particular way. But Dr. Perry went ahead of that and she tied that anatomy to physiology and that's really important because we can't separate structure and function. And she was one of those incredible people that thought of that before those other surgeons and I think that's really amazing.

AT: So she was looking at sort of the bigger picture of how things are interconnected.

JB: Yes, yeah, yeah. So we might be connected in a particular way, but we also have to move using that system and she was the one who put that all together.

AT: And too often when I'm talking about amazing women, we have to say that, oh, you know, her life was cut short and what could she have accomplished if she'd only had more time? That is definitely not the case with Dr. Perry, who had a very long and productive career.

JB: Yes, yeah, that's very true. So Dr. Perry's career has spanned across 70 years and in that time, she authored more than 400 publications, which is astounding. She was actually one of 35 spine specialists in 1966 and in fact, the only woman to establish the scoliosis research society.

AT: Part of her legacy is also that she, in addition to being a pioneering woman herself, she promoted and mentored other women in the field as well.

JB: Yeah, so she was one of the first internationally prominent women in orthopedic surgery and helped promote and develop other women in the field through the Ruth Jackson Orthopedic Society, which is known as RJOS. And more recently in science through the Perry Initiative. So just a quick note on the RJOS, it was founded in 1983 and named in honor of Ruth Jackson who's another amazing person who was the first woman certified by the American Board of Orthopedic Surgeons in 1937.

AT: A couple of the people that we've mentioned previously who have said, you know, nice things about her were actually people that she mentored herself and apparently, you know, that mentorship wasn't just professional, "this is how you do the job." There was also an emotional component as well.

JB: Absolutely, yeah, Dr. Perry, her mentorship, it went beyond orthopedics and extended to lessons of integrity. She was instrumental in guiding others to fulfill their greatest potential and to dream big, both professionally and personally. In a parking lot, just casually, she told Dr. Lattanza, "you either need to go to medical school or you need to get a PhD." And Dr. Lattanza felt, in that instant, she became her mentor.

AT: Dr. Jessica Rose has also said that Dr. Perry was key to her decision to pursue an academic career.

JB: Yeah, yeah, so Dr. Perry really inspired Dr. Rose to investigate mechanisms underlying neuromuscular deficits in children with cerebral palsy. And she believed that Dr. Perry's innovation and then the intelligence were an inspiration to all. As an engaging role model, she encouraged entry of young women into the fields of orthopedic surgery, biomechanics, physical therapy and promoted the pursuit of research in academic careers.

AT: And today, her legacy lives on in the Perry Initiative, which we mentioned earlier, but do you want to tell us a bit more about it?

JB: Yeah, absolutely. So in 2009, in an effort to inspire young women to become leaders in the fields of orthopedic surgery and engineering, Dr. Buckley and Lattanza founded the Perry Initiative. So there were colleagues at the University of California and they started brainstorming about how to make a bigger impact and expose more young women to their careers.

AT: And so their first workshop had 18 women coming together for four consecutive Saturdays in 2009.

JB: Yes, yes, they did. And Dr. Lattanza had explained that they had conducted simulated surgeries, fixed saw bones and biomechanically tested their own constructs. So the Perry Initiative brought women together, increased their confidence and helped them reach their greatest potential. Dr. Lattanza felt that most of them came in never having done anything like this, never had been exposed to anything remotely similar. They started on the first day, shy and timid and by the end of the seminar, we're fighting over who gets to make the cut or hammer or saw.

AT: Hard core. (laughter) So after that initial success, Dr. Lattanza and Dr. Buckley expanded it further. And it's now been estimated that around 3,000 women have participated in the Perry outreach program, which is for high school students and the medical school outreach program for first- and second-year med students since it began. And today it attracts around 1,200 students per year at almost 30 sites across the US.

JB: Yes, it's really made an incredible impact. In fact, Drs Buckley and Lattanza are also keeping data to see what that impact is really doing and how it's having an effect on their participants. And they reported that responds from students has been universally positive. And it's not unusual to hear that the people attending their outreach program had a life-changing experience.

AT: And the numbers back that up. So according to Dr. Buckley, among the high school participants who have since gone on to college, 84% were enrolled in STEM majors, 62% in the biosciences and 20% in engineering, which is four to five times the US national average, which is really impressive.

JB: Yes, it's really an amazing program. And it influenced all of these people's decision to pursue that STEM major. And as Dr. Buckley stated, their goal is really that every young woman in their country will be able to make it to that Perry Initiative program.

AT: I think it also speaks to, I don't know if you're familiar with the Scully effect?

JB: I don't think I've heard of that one.

AT: So it refers to The X-Files. And I believe her name is Dana Scully, but Gillian Anderson's character on that show was both law enforcement and a medical doctor, I believe. And over the

last couple of decades, we've actually seen this trend where there is an appreciable impact that seeing her character just on TV, just a fictional character in what is clearly not a, reality-based show, shall we say. But just seeing that character has that impact of, you know, you can't be what you can't see - well, seeing her has demonstrably impacted. And they've actually studied this, like it's actually been properly researched that just seeing a woman like that, even in a very fictional context, inspired women to later go on to pursue paths in STEM or law enforcement. And you would think that seeing real women actually doing this thing and getting to, you know, meet them and having a hands-on experience and everything, you would have to think that that would be substantially more impactful for the participants than, you know, just seeing someone on a popular TV show.

JB: Yeah, and I have to agree that it is, it's really an incredible program. And even in, for example, in engineering degrees, I think that even in my experience, just seeing that your colleagues are also female and it's not just a whole male cohort, you feel moral supported that you can do this and it's just a much nicer environment to be in.

AT: Now, we've talked before about Marian Diamond and the connection there between her work in neuroplasticity and your work in neuroplasticity, that was a very clear connection. So I'm curious, is there a particular reason that you wanted to talk about Dr. Perry specifically this time?

JB: So earlier this year, I attended the International Society of Biomechanics Conference and that was in Fukuoka in Japan. And so one of the more interesting sessions was the Wartenweiler Memorial Lecture and this was given by Emeritus Professor Julie Steele of the University of Wollongong. And she really deserves a whole podcast dealing her achievements. But in her lecture, Julie talked about the pioneering women of the ISB, which is what's the short way of saying the International Society of Biomechanics. And Dr. Perry really stood out to me as a true trailblazer and scientific leader. And I think we all need to hear her story, so how she broke down the barriers and conducted good research with equal parts, compassion and scientific reason. And in addition to this, my postdoctoral fellowship here at CSIRO is within neurodevelopment and plasticity team, as we mentioned previously. And so it is a little bit different to Dr. Perry's work. But again, that compassion, scientific rigor and selflessness of Dr. Perry has inspired me to think out of the box.

[Listen to our conversation about Marian Diamond](#) or [read the transcript](#).

AT: In what way, what's she got you thinking about?

JB: Yeah, so I really want to know, can we combine biomechanics and neurodevelopment to investigate how we can help infants and developing children predicted to or currently living with mobility difficulties? And I really think we can. And I'm currently in the brainstorming stage with Dr. Dana Bradford here at CSIRO. She was a neuroscientist, psychologist and an incredible mentor. And with the neuromuscular biomechanics team within the School of Biomedical Sciences at the University of Queensland. And this UQ team includes James Williamson, an biomechanics and ankle exoskeleton expert and Dr. Taylor Dick, a wonderful leader in

biomechanics who was actually the inaugural winner of the International Society of Biomechanics Jacquelin Perry Emerging Female Scientist Award. But beyond all of these biomechanics lessons, the lessons that Dr. Perry has for all of us are applicable to any scientific field and in fact, any field, any life. For example, to produce good science, be compassionate, a mentor to others, to be tenacious, have a determination to find the emphasis and to live a life of kindness.

AT: Join us next time on the Infinite Women podcast and remember - well-behaved women rarely make history.