S3, E10— Research Roundup: Telehealth and Virtual Reality Could Make Treatments More Accessible and Engaging

**Dr. Marie McNeely** 00:01

Hello and welcome to Changing What's Possible:The Disability Innovation podcast brought to you by Cerebral Palsy Alliance Research Foundation or CPARF. I'm your host, Dr Marie McNeely, and this season, we are excited to bring you cutting-edge stories and insights on research, technology, and innovation for people with CP and other disabilities. All of the studies featured in today's Research Roundup represent interesting, innovative work happening in the CP research space, outside of the projects that CPARF has funded.

**Dr. Marie McNeely** 00:33

Today, I'm going to talk about three new research papers examining telehealth and virtual reality or VR interventions that have the potential to increase access to and engagement with therapies for children with CP. In the first paper, lead author, Dr Byron Lai from the University of Alabama at Birmingham, and his colleagues aim to address the important problem of developing an age-appropriate, convenient, and efficient way for kids with CP to exercise for better health and fitness in terms of their heart, lung, and metabolic function.

**Dr. Marie McNeely** 01:08

They published the protocol for an ongoing pilot, feasibility-controlled trial of an innovative exercise program that combines telehealth delivery with a type of training called sprint intensity interval training or sit—s i t. So in sit training, participants complete repetitive bouts of maximal exercise effort with interspersed rest periods. And this kind of training has shown results similar to moderate exercise training, but in a much shorter training duration. The researchers specifically designed this training program to focus on arm exercises and also to include music to make it more fun and engaging. Kids with CP are being randomly assigned to the sit training group that completes three remotely supervised exercise sessions each week for 12 weeks. Or they're being assigned to a waitlist control group that will continue their usual activities for the next 12 weeks.

**Dr. Marie McNeely** 02:05

Now, the researchers are measuring standard outcomes related to cardiometabolic health and cardiorespiratory fitness. So these include things like maximal oxygen uptake during exercise or the amount of insulin in the blood, blood pressure, as well as other metrics, we are particularly excited about seeing the outcomes for this study, because we know that regular exercise in childhood is critical for preventing health decline in adulthood, and this team of researchers has developed really an accessible and low-cost exercise program that's based on known principles of high intensity exercise and could serve as a convenient, engaging program for children with CP and other physical disabilities.

**Dr. Marie McNeely** 02:50

The next two papers that we'll discuss are review articles. So these kinds of papers look across the scientific literature and combine, compare, and synthesize results across multiple studies to assess the collective evidence related to a particular topic or intervention, and also to help identify areas of opportunity and gaps that still need to be addressed by future research.

**Dr. Marie McNeely** 03:14

So in the first review article, lead author, Dr Maria Komariah from Padjadjaran University in Indonesia and her collaborators conducted a systematic review and meta analysis of published research studies on the impacts of VR therapies to improve balance, motor function, activities of daily living, and arm function in children with CP. They included a total of 19 randomized control trials in their analysis and looking at these 19 studies, VR therapies had significant benefits in every study for improving things like balance, motor function, and activities of daily living. They also compared the effects of different types of VR, including non-immersive, semi-immersive and fully immersive VR experiences.

**Dr. Marie McNeely** 04:01

And interestingly, this review and meta analysis did not see statistically significant overall effects of VR therapy compared to a control group on upper limb or arm function across the studies that were included. Now in their discussion, they highlighted some of the key differences across studies that may impact the kinds of effects that VR may have on balance and motor function and activities of daily living and arm function as well. And this includes maybe the nature of the VR tasks, the different kinds of equipment used, the level of immersion and the duration of therapy, among other factors. So keep that in mind.

**Dr. Marie McNeely** 04:37

In another review article published earlier this year by researchers at Gannon University in Florida. The authors focused specifically on the effectiveness of virtual reality for arm function and motor performance in children with CP. They included a total of 21 research studies in their analysis. And looking at these studies, the authors did find statistically significant improvements in arm function after virtual reality therapy. The findings also supported using VR to improve general motor performance and fine motor skills. And importantly, the authors noted that there may be a threshold where VR sessions should be at least 30 to 60 minutes long, and there should be at least a total of 360 minutes over more than three weeks for VR therapy to provide measurable, noticeable improvements in arm function in children with CP.

**Dr. Marie McNeely** 05:30

And differences in things like the duration of an intervention between studies can explain why you might not see consistent results across studies, or why a review or meta analysis that's looking at multiple studies may ultimately not be able to detect statistically significant effects like we saw in that first review paper. But if we take a step back and look at the big picture, I think these two review papers collectively support that virtual reality based therapies really have potential to improve motor function in children with CP and additional large randomized control trials are needed to then just sort of determine which kinds of VR interventions may have the largest impacts, or whether different kinds of VR interventions may be best suited to address specific motor symptoms that a child with CP may have.

**Dr. Marie McNeely** 06:17

And I think this technology is really exciting because prior research has shown that using VR can make therapy more engaging, and it can be a good way to incorporate a lot of repetitions into a therapy session in the clinic and then also potentially in someone's own home. So the papers that we talked about today really highlight the potential of telerehabilitation and VR approaches in therapy for people with CP, and I'm pleased to welcome Jocelyn Cohen, CPARF's, Vice President of education, back to the show to talk about the findings of these studies and what they could mean for people with CP or other disabilities.

**Jocelyn Cohen** 06:55

Thanks, Marie. This is all really fascinating, and the first thing that resonates with me here is the idea of getting children interested in and excited about the exercises they can do, especially within short bursts. Because by showing kids with cerebral palsy what they can do, researchers are fostering a positive association to exercise and working within your own abilities. This sets the stage for good habits into adulthood. And the second thing that struck me was the idea of access. Telehealth and virtual reality interventions make it possible for people to receive guidance and therapies that they might not be able to access otherwise, whether it's due to physical, financial, or geographical factors. The virtual reality therapies meet kids and their caregivers where they are so that they have the opportunity to make meaningful progress.

**Dr. Marie McNeely** 07:43

Definitely. And Jocelyn, thank you so much for joining us and sharing your perspectives on the show today.

**Jocelyn Cohen** 07:49

Thanks so much for having me.

**Dr. Marie McNeely** 07:50

And listeners, thank you for joining us as well. You can find links to the abstracts for the papers we talked about today with the notes for this episode on CPARF's website. And now listeners, we're excited to let you know about CPARF's upcoming STEPtember campaign, which runs for the whole month of September. Join thousands of people across the country to raise funds for life changing cerebral palsy research and assistive technology that will positively reshape what it's like to live with a disability. And if you want to pair any physical activity with your fundraising, you can challenge yourself to get moving all September long. Make a team of up to four people and get your friends and family in on the fun. Sign up today for free at www.STEPtember.us that's www. Dot, S, T, E, P, T, E, M, B, E r.us. And we look forward to connecting with you again in our next episode of changing what's possible.