Case Study: Effects of Virtual Reality on Motor Control with a Child Diagnosed with Spastic Ataxic Cerebral Palsy

01. CP Causes & Risk **Factors**

Cerebral Palsy (CP) can be defined as a non-progressive neuromotor disorder that can affect an individual's motor control and balance, most often occuring in fetal development.



02. Purpose

The goal of this study is to determine the effects of virtual reality technology with children who have cerebral palsy by focusing on motor control such as: **functional reach**, functional movements to promote **independence**, sitting balance and trunk control.

Meta Quest 2





Related Literature:

Park et al; Effect of posture control training using a virtual reality program on sitting balance and trunk stability in children with cerebral palsy;

- 4 weeks; 20 children diagnosed with spastic CP • Control: Arm reach training in the sitting position • Experimental: VR
- Looked at effects of postural control training using VR (Wii Balance Board)
- Modified functional reach test Dynamic balance
- Korean Trunk Control Measurement (K-TCMS) -Trunk control

Related Literature (cont.)

Silva & Marchese: Using virtual reality for motor rehabilitation in a child with ataxic cerebral palsy: case report

- 12 y/o M diagnosed with ataxic cerebral palsy
- 4 months; 40 sessions; 30 minutes each session
- Looked at effects of VR on balance and gait of a child with ataxic cerebral palsy
 - Nintendo Wii
 - Wii Fit Plus, Wii Balance Board
 - GMFM-66
 - BERG Balance Scale
 - Kay Kerney Protocol
 - Gait kinematics (step number/length/width, average speed, and frequency of steps/min

03. Methodology

One participant recruited through purposive sampling with a diagnosis of Spastic, Ataxic Cerebral Palsy that fits all inclusion and exclusion criteria will be selected as a participant.

Virtual Reality Protocol



Each session will last 60 minutes and performed two times per week for a total of 24 sessions

- **Outcome Measures** will be collected prior to 1st session, on the 12th session, and after 24th session • Gross Motor Function Measure (GMFM)

04. Implications for PT

- participation
- real-life
- home
- Intrinsic feedback opportunities

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- Trunk Control Measurement Scale (TCMS)
 - Pediatric Outcomes Data Collection Instrument (PODCI)



- Fujii (VR)
- Tilt Brush
- Nature Treks
- Raccoon
 - Lagoon
- Hand Physics Lab

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 VR games are typically low cost, making them easy to implement into treatment • Games are engaging to children, increasing their

• Repeatedly training targeted musculature while receiving biofeedback in real time • Individuals with a disability can perform activities virtually that

might be difficult to achieve in

• Can be performed not only in the treatment room but also at



05. Discussion

- Lower GMFM scores indicate a child with cerebral palsy is non-ambulatory.
- Trunk stability is crucial for performance of independent activities of daily living for a child with spastic, ataxic cerebral palsy.
- Sitting balance plays a very important role in children who lack sitting posture ability.
- VR training motivates a child to improve sitting balance and trunk control due to them having to achieve the goal in the game.



