

### **Academic/Industry Source #1**

- **Title:** Virtual Reality and Its Effectiveness on Motor Development and Rehabilitation in Children with Disorders
- **Author(s) / Organization:** Brent Brooke, Tao Zhang, Joonyoung Lee, Xiangli Gu, Ana West
- **Publication Year:** 2020

### **Summary of Key Findings / Insights**

This review explores the application of virtual reality in pediatric rehabilitation, focusing on its impact on motor development and physical activity among children with various disorders. The authors analyze existing studies to identify effective VR systems and assess their influence on motor competence and physical activity levels in children with conditions such as developmental coordination disorder, cerebral palsy, hemiplegia, Down syndrome, and developmental dyspraxia.

The findings indicate that VR is a useful tool in rehabilitation, particularly for children with the mentioned disorders. VR interventions have the potential to increase daily physical activity. The review also highlights the limited amount of research evidence concerning the long-term effectiveness and feasibility of VR on motor competence among children.

### **Focus on Motor Skill Development or Physical Activity**

The article specifically addresses motor skill development and physical activity in children with special needs, including those with developmental coordination disorder, cerebral palsy, hemiplegia, Down syndrome, and developmental dyspraxia. VR interventions are noted to enhance motor competence and increase engagement in physical activities.

### **VR Interventions, Tools, or Strategies Explored**

The review discusses various VR systems utilized in pediatric rehabilitation, such as Nintendo Wii and Sony Eye-Toy. These systems offer interactive environments that simulate real-world scenarios, allowing children to practice specific movements and movement patterns. The immersive nature of VR provides real-time feedback and an engaging platform for motor skill acquisition.

### **Relevance to Project**

The insights from this article are directly applicable to the project. The evidence supports the integration of VR scenarios to enhance motor development and physical activity in children with special needs. The use of accessible VR systems like Nintendo Wii and Sony Eye-Toy can inform the selection of appropriate tools for our interventions. Additionally, the article underscores the importance of further research into the long-term effects and feasibility of VR in pediatric rehabilitation, guiding future directions for our project.

## **Academic/Industry Source #2**

- **Title:** Effectiveness of Virtual Reality–Based Interventions for Children With Cerebral Palsy: Systematic Review and Meta-analysis of Randomized Controlled Trials
- **Author(s) / Organization:** Yifan Chen, Qian Liu, Liping Liu, Bo Wu
- **Publication Year:** 2022

## **Summary of Key Findings / Insights**

This review assess the effectiveness of virtual reality interventions for children with cerebral palsy (CP). The analysis found that VR significantly improved motor functions, particularly gross motor function, balance, and upper limb activity. The use of immersive and semi-immersive systems provided engaging and motivating rehabilitation experiences, potentially enhancing therapy adherence and outcomes.

## **Focus on Motor Skill Development or Physical Activity**

The source targets children with cerebral palsy and focuses on improving their motor function through physical rehabilitation. The studies reviewed specifically measure improvements in balance, motor control, and limb coordination—key components of physical development in children with motor disabilities.

## **VR Interventions, Tools, or Strategies Explored**

Both immersive and semi-immersive VR systems were analyzed. These included devices such as VR headsets and screen-based systems that simulate interactive physical tasks. The interventions varied in duration and intensity but commonly used game-like VR activities designed to encourage repetitive movement and active participation.

## **Relevance to Project**

This study strongly supports the use of VR for motor rehabilitation in children with physical impairments. For the VR workout project, the research provides validated evidence that immersive and semi-immersive VR can be effective in improving motor skills. It also highlights the importance of structured, engaging scenarios tailored to specific motor challenges.

### **Academic/Industry Source #3**

- **Title:** Virtual reality-based interventions improve balance skills in children with developmental coordination disorder: systematic review and meta-analysis
- **Author(s) / Organization:** Marina Piñar-Lara, Esteban Obrero-Gaitán, Rafael Lomas-Vega, María Del Carmen López-Ruiz, Héctor García-López, Irene Cortés-Pérez
- **Publication Year:** 2025

### **Summary of Key Findings / Insights**

This review evaluated the effectiveness of virtual reality interventions in improving balance skills in children with developmental coordination disorder (DCD). The study concluded that VR-based interventions significantly enhance balance performance in this population. The immersive and engaging nature of VR activities provides a motivating environment for children, encouraging active participation and consistent practice, which are crucial for motor skill development.

### **Focus on Motor Skill Development or Physical Activity**

The article addresses the improvement of balance skills, a critical component of motor function, in children diagnosed with developmental coordination disorder. By focusing on balance, the study highlights the importance of targeted interventions to address specific motor challenges faced by children with DCD.

### **VR Interventions, Tools, or Strategies Explored**

The review examined various VR-based interventions, including those utilizing immersive VR headsets and screen-based systems. These interventions involve game-like activities that require children to perform balance-related tasks, providing real-time feedback and promoting active engagement. The use of VR technology allows for the simulation of diverse scenarios, enhancing the therapeutic experience and facilitating the development of balance skills.

### **Relevance to Project**

The findings from this study are directly applicable to the project. The demonstrated effectiveness of VR in improving balance skills supports the integration of VR-based interventions into the program. The use of engaging and immersive VR scenarios can motivate children to participate actively in rehabilitation exercises, potentially leading to improved motor outcomes. Additionally, the study emphasizes the importance of tailored interventions that address specific motor challenges, guiding the design of our VR scenarios to meet the unique needs of each child.

#### **Academic/Industry Source #4**

- **Title:** Exploring the Opportunity to Use Virtual Reality for the Education of Children with Disabilities
- **Author(s) / Organization:** Ioana Bianca Chițu, Alina Simona Tecău, Cristinel Petrișor Constantin, Bianca Tescașiu, Tamara-Oana Brătucu, Gabriel Brătucu, Ioana-Mădălina **Purcaru**
- **Publication Year:** 2023

#### **Summary of Key Findings / Insights**

This study utilized the Focus Group method to gather insights from 31 specialists working with children with disabilities. The research aimed to identify the potential opportunities and limitations of using virtual reality technology in the education of children. The findings revealed that most specialists viewed VR as a novel and promising tool that could enhance the educational process for children with disabilities. They appreciated its potential to create interactive and engaging learning environments tailored to individual needs. The study suggests that VR could become a valuable asset in supporting inclusive education practices.

#### **Focus on Motor Skill Development or Physical Activity**

The primary focus of the article is on the educational benefits of VR for children with disabilities but the insights gathered imply that VR could be leveraged to support motor skill development and physical activity. By creating immersive environments that encourage movement and interaction, VR has the potential to engage children in activities that promote motor coordination and physical engagement.

#### **VR Interventions, Tools, or Strategies Explored**

The study highlighted the general potential of VR technology in education. The specialists expressed interest in VR applications that could simulate real-world scenarios, provide interactive learning experiences, and be adaptable to the diverse needs of children with disabilities. The emphasis was on the collaborative development of VR applications involving IT companies and educational institutions to ensure the creation of effective and accessible tools.

#### **Relevance to Project**

The insights from this article align with the project. The positive reception of VR as an educational tool among specialists underscores its potential applicability in rehabilitation settings. The emphasis on creating engaging and tailored experiences supports the objective to design VR scenarios that cater to the specific motor challenges faced by children with developmental disabilities.