

Virtual reality in physical therapy: A randomized clinical trial

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BACKGROUND

Chronic musculoskeletal (MSK) pain is a challenging and pervasive concern among youth and adolescents that can result in declines in sleep, physical activity, academic, social, and emotional functioning. Physical activity is essential to improve daily functioning for young people with MSK pain. Therefore, physiotherapy rehabilitation is a gold standard treatment for pain. However, engagement in physiotherapy can feel unattainable in the context of persistent pain. **Virtual reality (VR)** offers the potential for an immersive, nonpharmacological solution to increase engagement in physiotherapy, but has yet to be integrated into clinical care due to a lack of robust research evaluating the feasibility and effectiveness of VR in the pediatric clinical setting. Data from an initial pilot feasibility study indicated the feasibility of efficacy of significant change in decreased pain, fear, avoidance and functional limitations.

Aim: The purpose of the current study is to present the rationale, design, and implementation of Pain Rehabilitation Virtual Reality (PRVR) Innovations to Enhance Mobility in the Presence of Pain (NCT:04636177), a two-arm randomized controlled feasibility trial enhanced with a single-case experimental design (SCED) with multiple measures.

METHODS

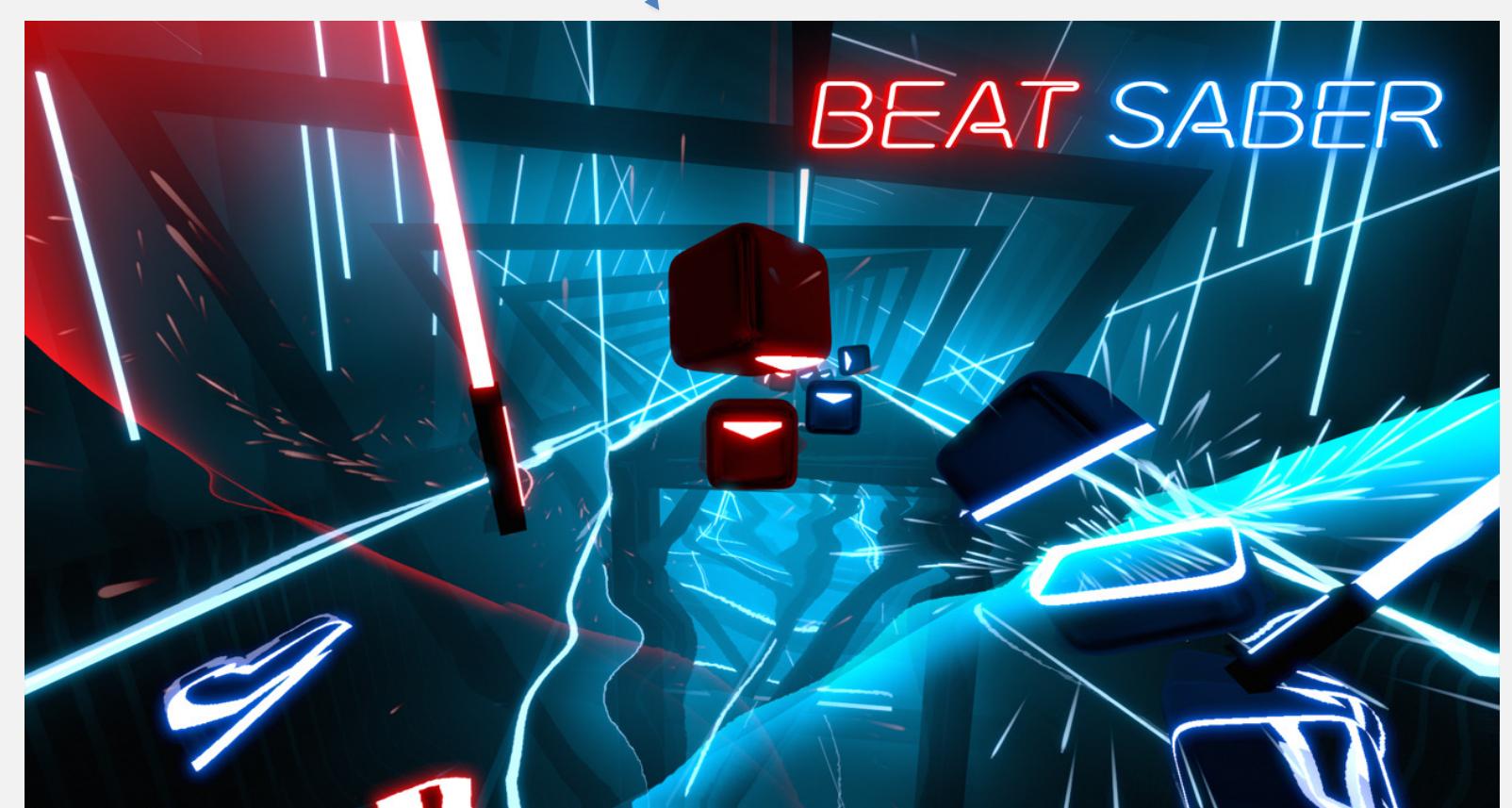
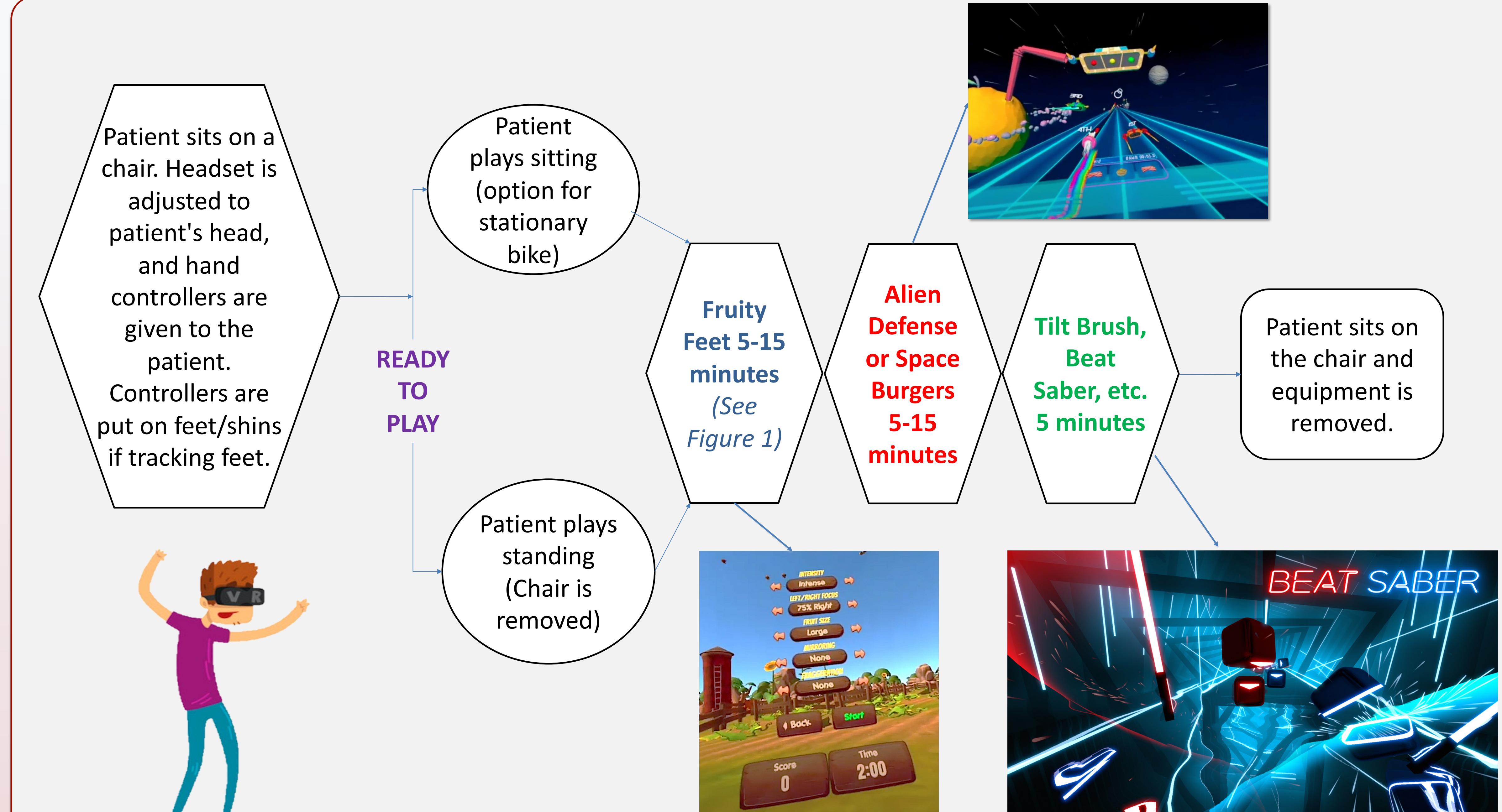
Participants:

- Adolescents from two physical therapy clinics (academic medical center, private practice)
- The goal sample size will be N = 86 with n=43 in each arm.
- Inclusion Criteria:**
 - Participants aged 10-17 years, English language proficiency
 - Diagnosed with musculoskeletal or neuropathic pain (e.g., localized [back, limb], diffuse) not due to acute trauma (e.g., active sprain or fracture)
- Exclusion Criteria:**
 - Significant cognitive impairment (e.g., brain injury), medical or psychiatric concern that would interfere with treatment (e.g., seizures, psychosis, suicidality)
 - Presents with condition that interferes with virtual reality usage (e.g., history of seizure, facial injury, visual impairment)

Measures:

- Aim 1 Primary Outcome: Physical Function**
 - Lower Extremity Functional Scale (LEFS)
 - Upper Extremity Functional Index (UEFI)
- Aim 2 Primary Outcome: Treatment Acceptability**
 - Treatment Satisfaction (PSST)
 - PRVR-VR Acceptability Questionnaire (adolescent version)
 - Pittsburgh Rehabilitation Participation Scale (PRPS)
- SCED Outcomes:**
 - Daily Check-in of 11-items assessing fear, avoidance, functioning, lower extremity functioning, upper extremity functioning, and adverse or exciting experiences
 - Actigraphy to evaluate sleep and movement

PRVR SESSION FLOW AND FEATURES

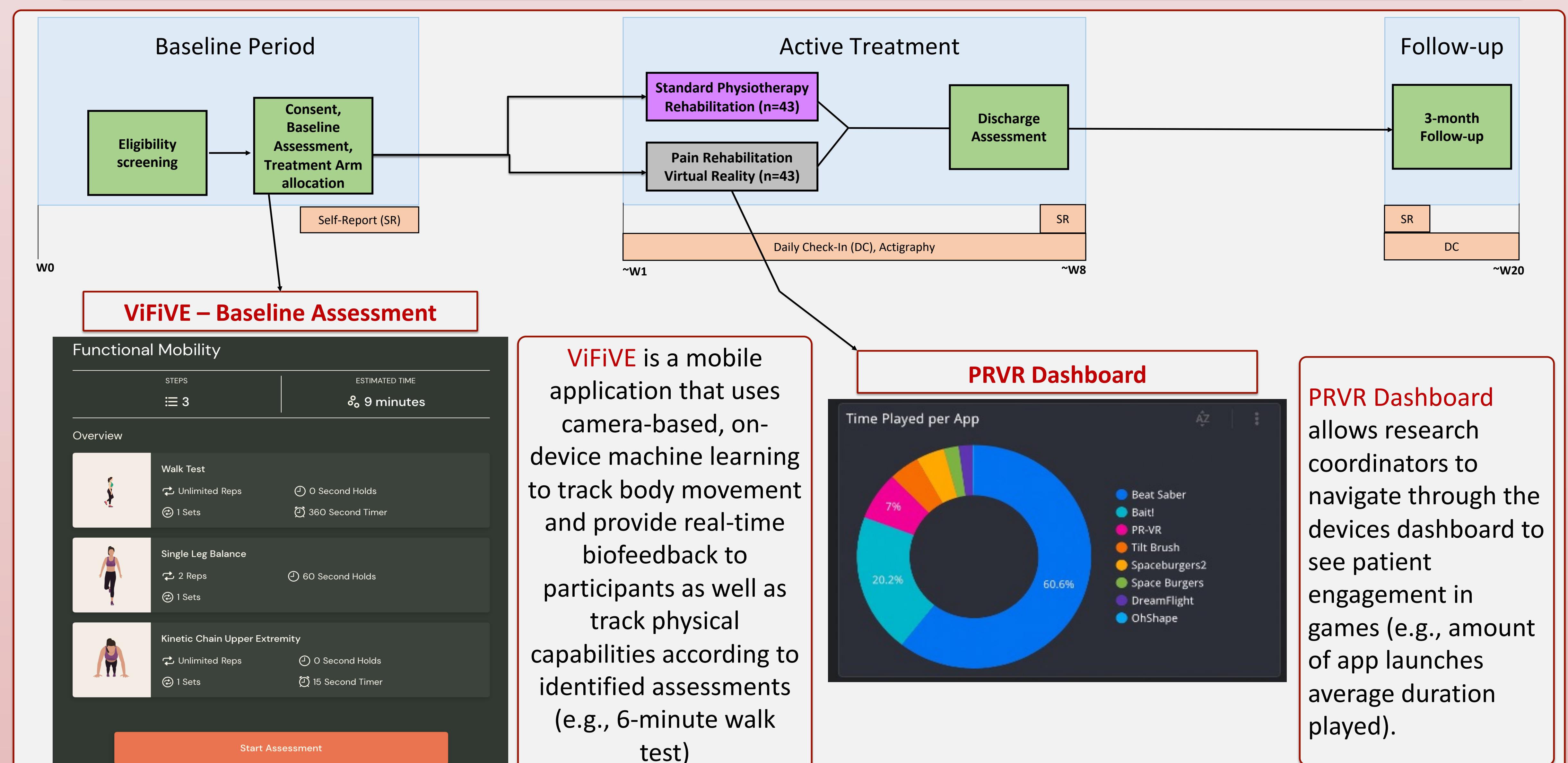


PRVR Treatment Arm:

- In-session engagement during 6-8 standard PT sessions
 - Recommended 15 minutes per session
 - Integration of VR games into home-exercise programs



STUDY DESIGN



NEXT STEPS

- Qualitatively assess stakeholder (patient, PT, family) experiences of VR integration
- Results will provide information regarding the feasibility of implementing VR within standard physiotherapy for patients with pediatric chronic pain.
- Assess SCED data to identify what works for who at what timepoint in treatment
- Results will inform whether it is advised to proceed with a large hybrid effectiveness-dissemination RCT and ultimately expand effective, tailored treatment options for adolescents struggling with persistent MSK pain and related fear and disability.