Virtual Reality in Chronic Pain and Rehabilitation

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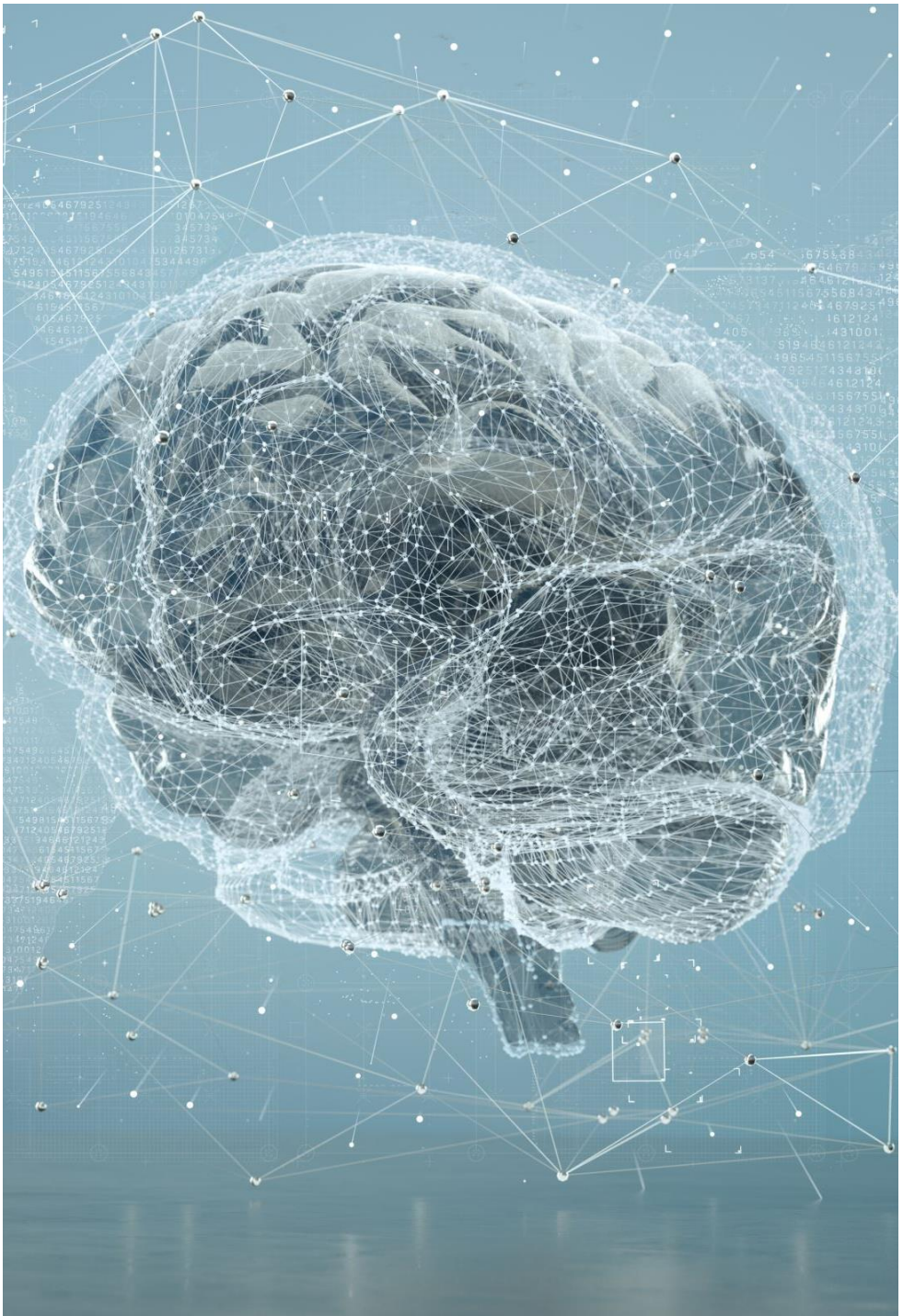
Overview

- Chronic pain is relevant to all clinicians
- Treating chronic pain
- VR in pain and rehabilitation
- A pilot study at ADHB
- Future directions

The problem: Not everyone gets better

- Not everyone responds well to tx
- Some continue to report pain
- Often no observable pathology
- Remain distressed and disabled long after expected recovery times



Chronic pain

Prevalence:

- Leading cause of disability globally, 20% NZ

Definition:

- >3/6m or expected time of healing

Mechanisms:

- Structural and functional changes in brain and nervous system / central sensitisation

Relevance:

- Comorbid with other diagnoses but does not respond well to biomedical interventions

Problem:

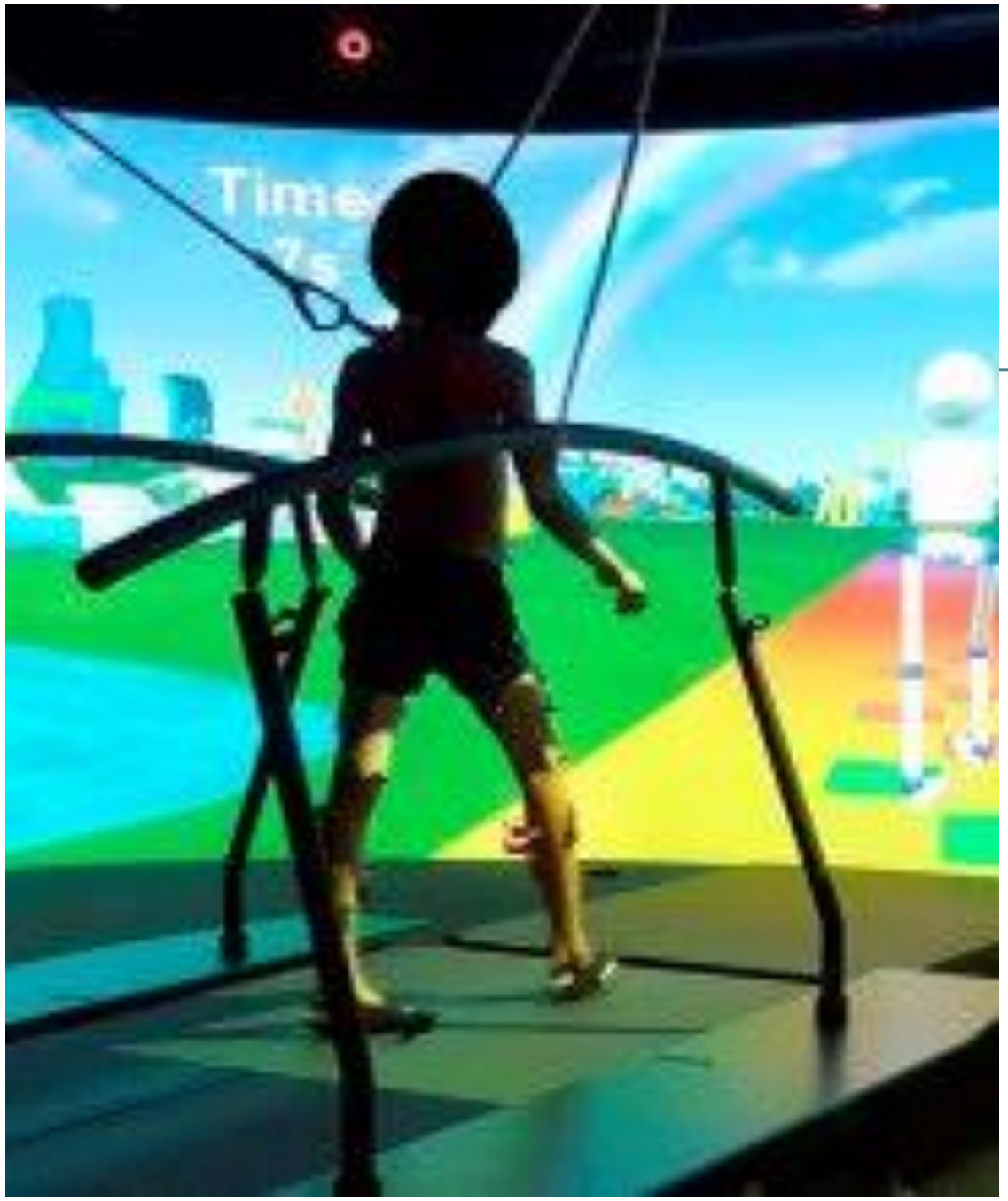
- Pain is thought of as biomedical but (unlike acute pain) biomedical treatments do not help

Treatment

- Interdisciplinary medical, psych, physio
- Focus is on improved/maintained function despite pain
- Goal is pain self-management
- This approach is challenging and drop out rates are high

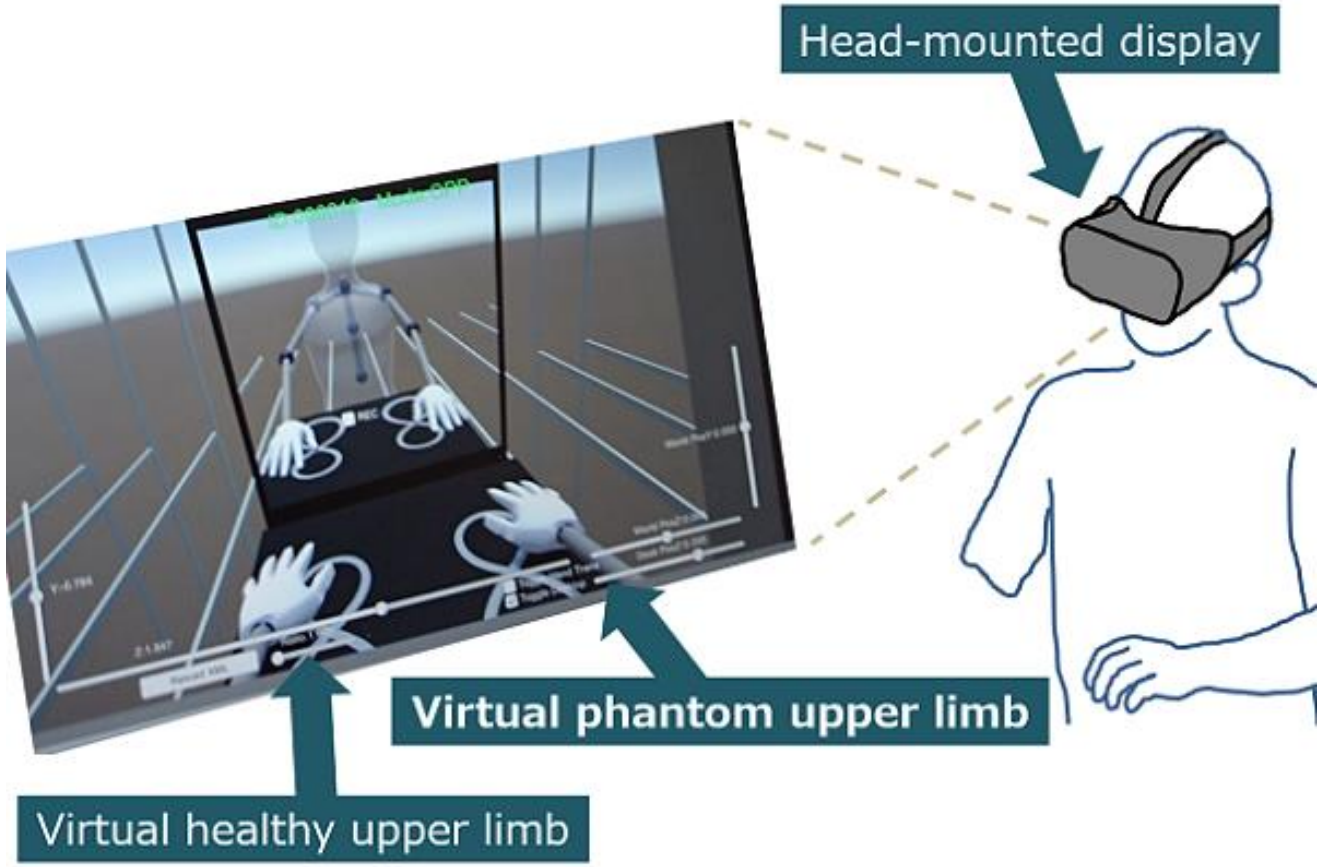
VR in Acute Pain

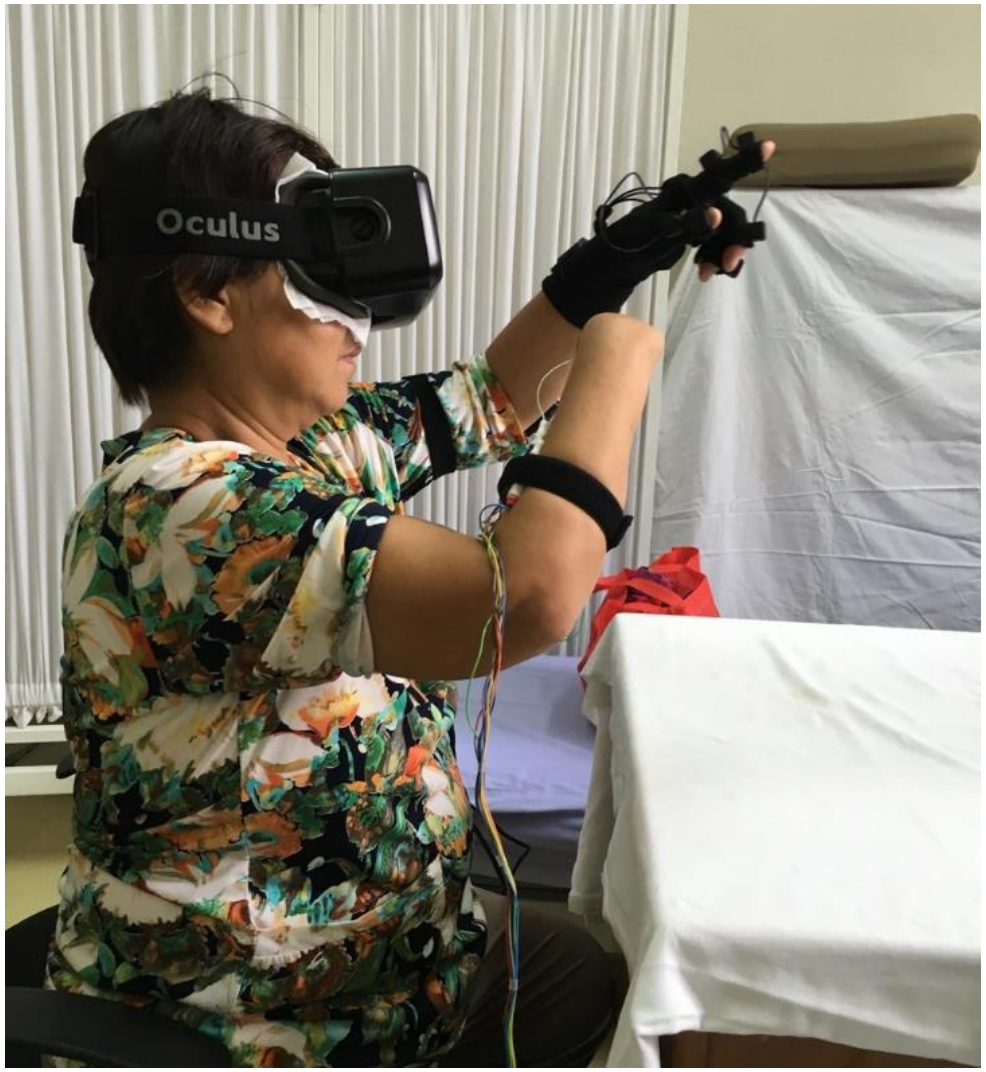
- Procedural pain; burns and needle insertion
- Mechanism is distraction



Rehabilitation

- Stroke, cerebral palsy, brain injury, Parkinsons disease, phantom pain
- Neuromodulation
- Focus is improving range or accuracy of movement
- E.g. gait training in cerebral palsy



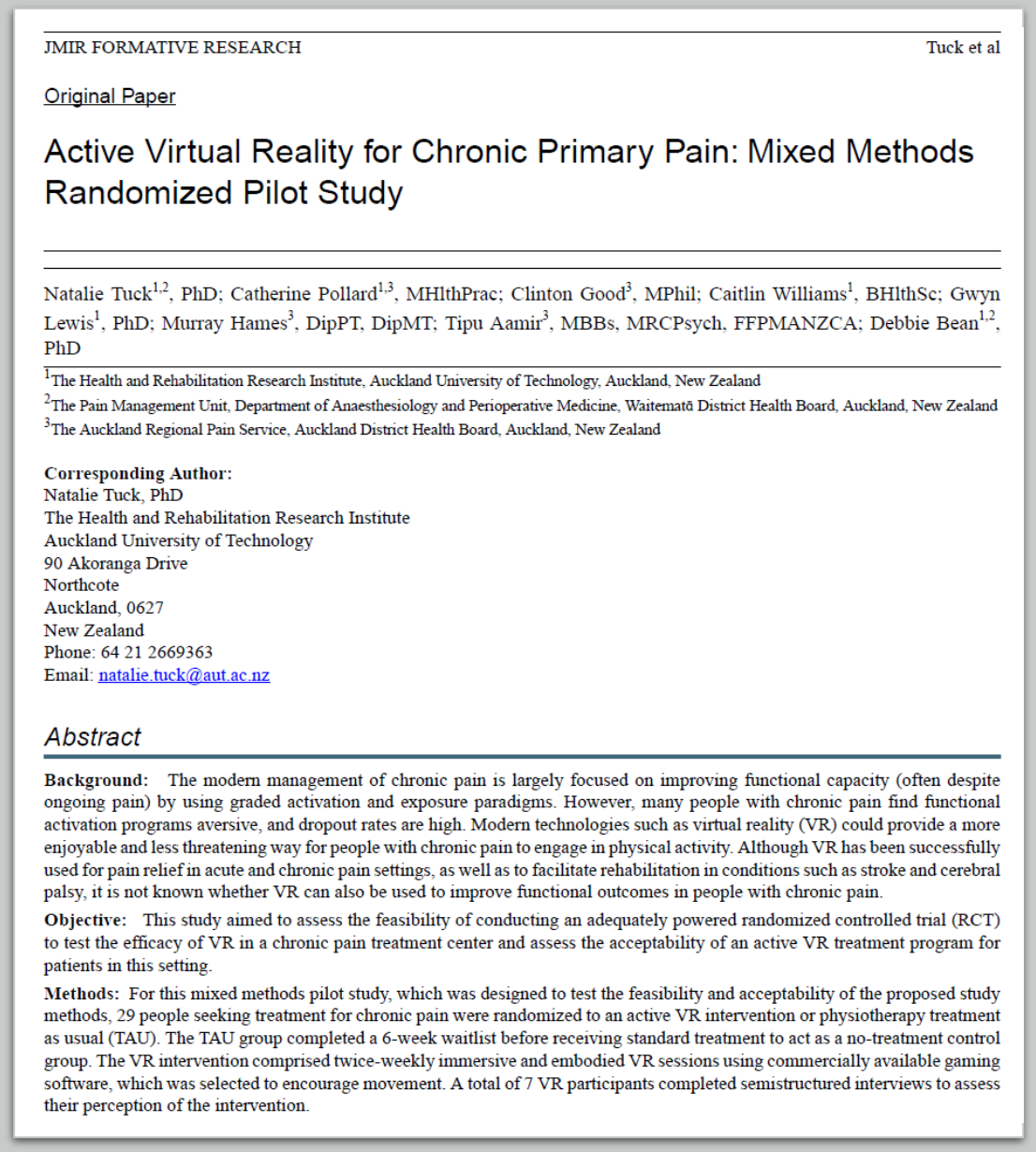


Dunn J, Yeo E, Moghaddampour P, Chau B, Humbert S. Virtual and augmented reality in the treatment of phantom limb pain: a literature review. NeuroRehabilitation. 2017;40(4):595–601.

VR at The Auckland Regional Pain Service (TARPS)

Pilot study

- The Auckland Regional Pain Service, ADHB
- Outcomes
  - Pain, Activity, Function
  - Treatment satis & perceiv improv
- VR: 2x 20m p/week, VR games (not health aps), Supervised by PT



Original Paper

Active Virtual Reality for Chronic Primary Pain: Mixed Methods Randomized Pilot Study

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Abstract

Background: The modern management of chronic pain is largely focused on improving functional capacity (often despite ongoing pain) by using graded activation and exposure paradigms. However, many people with chronic pain find functional activation programs aversive, and dropout rates are high. Modern technologies such as virtual reality (VR) could provide a more enjoyable and less threatening way for people with chronic pain to engage in physical activity. Although VR has been successfully used for pain relief in acute and chronic pain settings, as well as to facilitate rehabilitation in conditions such as stroke and cerebral palsy, it is not known whether VR can also be used to improve functional outcomes in people with chronic pain.

Objective: This study aimed to assess the feasibility of conducting an adequately powered randomized controlled trial (RCT) to test the efficacy of VR in a chronic pain treatment center and assess the acceptability of an active VR treatment program for patients in this setting.

Methods: For this mixed methods pilot study, which was designed to test the feasibility and acceptability of the proposed study methods, 29 people seeking treatment for chronic pain were randomized to an active VR intervention or physiotherapy treatment as usual (TAU). The TAU group completed a 6-week waitlist before receiving standard treatment to act as a no-treatment control group. The VR intervention comprised twice-weekly immersive and embodied VR sessions using commercially available gaming software, which was selected to encourage movement. A total of 7 VR participants completed semistructured interviews to assess their perception of the intervention.

Results - Quantitative

	Waitlist	TAU	VR	VR vs WL	VR vs TAU
Pain intensity	–0.3 (1.6)	–0.2 (2.3)	–1.0 (0.9)	–0.5 (med VR)	–0.5 (med VR)
Pain interference	–1.1 (2.1)	–1.0 (1.4)	–2.1 (1.5)	–0.5 (med VR)	–0.7 (med VR)
Δ daily steps	212 (2394)	1127 (2784)	852 (2934)	0.2 (sm VR)	–0.1 (sm TAU)
Δ daily activity (min)	2.2 (59.0)	–21.1 (91.5)	19.5 (64.5)	0.3 (sm VR)	0.5 (med VR)
Tx Satisfaction (/7)	4.8 (1.2)	5.8 (0.9)	6.1 (0.9)	1.2 (Large VR)	0.3 (sm VR)
Perc Improv (/7)	4.8 (0.8)	5.7 (1.0)	5.9 (0.8)	1.3 (Large VR)	0.2 (sm VR)

Qualitative Results: 3 themes

- VR is an enjoyable alternative to traditional physiotherapy
- Functional and psychological benefits despite continued pain
- A well-designed VR setup

Qualitative Results

- *“It’s a really good way to incorporate fun activity into your life on a regular basis. And for someone who struggles to find the mental and physical energy to do anything like that, it’s a really good pull to get you up.”*

- *“It helped me understand that I can move and do more activity. I can go for a walk outside and enjoy it and not have to focus on being in pain all the time. So, I think it just made me realise that that was actually an option.”*

Feasibility

- Effect sizes indicate that an RCT is warranted
- Approx N=50 people per arm
- High drop out rates and loss to follow up
- Not feasible in the DHB
- Multicentre trial or community settings

Future Directions

- Specialised health aps vs games?
- Trade off between fun and function
- Altering sensory information has health implications
- Partner with the game design industry
- Make health and rehab engaging and enjoyable

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  - Debbie Bean, AUT & WDHB
  - Caitlin, AUT
  - Gwyn Lewis, AUT

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