Background

- Slow walking and generalised psychomotor slowing are frequent consequences of injury, illness, pain and ageing
- Treadmill training with fast walking speeds can improve walking outcomes
- Lack of motivation, pain and fear of falling can create challenges for treadmill-based therapy
Current Knowledge

• Virtual Reality can be used in rehabilitation to increase engagement, improve movement and decrease pain

• Changes in optic flow can affect treadmill walking speed – no studies on sustained effect

Perception of Movement

• Vestibular (balance, acceleration)
• Proprioceptive (musculoskeletal feedback)
• Cognitive (higher level awareness)
• Visual (e.g. optic flow)

*Visual information may dominate other sensorimotor input*
Optic Flow

The image of an object on the retina enlarges as it comes nearer and shrinks as it moves away.

Used as a visual cue for assessing movement of ourselves or objects in our environment.

Experimental Questions

- If subjects walking on treadmill are exposed to mismatched optic flow from a stereoscopic animation, will their walking speed be influenced?

- If an influence is found, can it be sustained for up to 5 minutes?
A large-screen stereoscopic display with optic flow creates a feeling of self-motion

Experimental Setup

Non-motorised treadmill in front of a 5m wide stereoscopic display
Pilot Study

- Participants (n=9) walked for 5 minutes at a steady pace on self-driven treadmill in front of 5m wide display
- Animation displayed at 0.75, 1.5, 3 m/s or static image
- All participants walked in each of the four conditions (counterbalanced order)

Results

Error bars represent standard deviation of walking speeds of subject group - consistent between tests
Summary

- In slower optic flow conditions participants walked faster (and vice versa)

- Significant differences in walking speeds between optic flow conditions persisted for the duration of the optic flow stimulus

- Reducing the rate of optic flow in a Virtual Environment will facilitate the treatment of locomotor slowing in a variety of disorders.