

Additional file 1: VirCube VR Game Training Program (2021 version)

VR Game 1: Jogging exercise

Purpose: Physical balance and safe walking training

Grading: 3 levels (Level 1-by hand trackers; Level 2- by hand trackers & obstacle; Level 3- by hand/foot trackers & obstacles)

Device: 3D stereoscopic eyewear, hand, and foot trackers

VR game- Jogging exercise

Jogging in the park



Sequencing & Grading:

1. Participant uses hand trackers & selects a level of activity
2. Participant runs with arms movement and keeps on a running path (upper limb balance)
3. Participant runs with upper and lower limbs trackers and follows a running path (whole body balance & physical training)
4. Participant runs and avoids hitting any obstacle on a running path (advanced physical balance and coordination skill)
5. Participant runs faster and overcomes more obstacles (physical and



cognitive training)

VR demon (see video clip)



video clip 1.mp4





VR Game 2: Fire Drill

Purpose: Cognitive training - executive function (Problem-solving skill)

Grading: N/A

Device: 3D stereoscopic eyewear, hand controller, hand trackers

VR game – Fire drill

<p>Fire drill exercise</p>  The logo for the 'Fire Escape' VR game. It features a stylized fire flame in orange and yellow. Below the flame, the Chinese characters '火警逃生' (Fire Alarm Escape) are written in red, followed by 'Fire Escape' in white. The background is dark with some geometric shapes.	<p>Sequencing:</p> <ol style="list-style-type: none">1. When fire alarm on, participant moves tracker to point out and touch three important things (key, mobile & wet towel) for evacuation.2. Participant walks to the front door and uses tracker to unlock the door (balance and hand-eye coordination)3. Participant uses tracker to select different escape routes (judgement)4. Participant chooses either route 1(lift) or route 2(up/downstairs) to get out of fire scene safely (decision making) <div>A participant wearing VR glasses and a hand tracker is in a virtual environment. They are standing in a room with a sink and a mirror. A green line is projected on the wall, indicating a path or object to interact with.</div> <div>A participant wearing VR glasses and a hand tracker is in a virtual environment. They are standing in a room with a fire alarm and a door. A green line is projected on the wall, indicating a path or object to interact with.</div> <div>A participant wearing VR glasses and a hand tracker is in a virtual environment. They are standing in a room with a fire alarm and a door. A green line is projected on the wall, indicating a path or object to interact with.</div>
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VR Game 3: Community Living Skill Practice

Purpose: Cognitive training – executive function (classification & calculation)

Grading: 3 levels (Level 1- free choice; Level 2: shopping items- 2-3; Level 3: shopping items- 3-5)

Device: 3D stereoscopic eyewear, hand controller

VR game- community living skill

<p>Shopping orientation</p> 	<p>Sequencing & Grading:</p> <ol style="list-style-type: none">1. Participant uses hand controller & selects a level of activity2. Participant remembers a shopping list (memory skill)3. Participant goes to the selected shopping regions (making decision)4. Participant chooses and picks up the correct no. of items (classification & counting)5. Participant checks and goes to cashier for payment (calculation) <div></div> <div></div>
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VR Game 4: Balance & sport exercises

Purpose: Cognitive-motor training and advanced balance exercise

Grading: 4 levels:

Level 1- defender (keeping); Level 2-attacker (attacking); Level 3- penalty kick (attacking);

Level 4- penalty kick (goalkeeping)-

Device: 3D stereoscopic eyewear, hand controller, hand, and foot trackers

VR game- balance & sport exercise

Soccer exercise



Sequencing & Grading:

1. Participant uses hand controller & selects a level of activity
2. Participant wears hand and foot trackers, practices passing a soccer to other player (balance & stability)
3. Participant runs and kicks a soccer ball to different position (balancing & weight shifting training)
4. Participant kicks a soccer ball to goalkeeper repeatedly (balancing, stability, weight-shift training to prevent falling)
5. Participant as a goalkeeper uses hand and foot trackers to defend the attacker (advanced limbs balancing and coordination, ball tracking exercise, spatial orientation & higher executive function skill)



VR demon (see video clips)



video clip 2.mp4



video clip 3.mp4