新界西·醫院聯網
New Territories West Cluster

青·山·醫·院
Castle Peak Hospital

Examining Feasibility and Effectiveness of Immersive Virtual Reality for People with Dementia in a Hospital Setting

A Single-Arm Pre-Post Pilot Study

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The Growing Challenge of Dementia in Hong Kong

- 1 in 10 elders aged 60+ living with dementia
- Driven by rapid population aging, 280,000 projected cases by 2036

(Centre for Health Protection, 2025)

A Growing Public Health Priority

The need for improved care strategies and innovative interventions has never been more urgent

Behavioral and Psychological Symptoms of Dementia (BPSD)

Common BPSD

- Psychotic signs and symptoms
- Agitation and restlessness
- Depression and withdrawal
- Anxiety and confusion
- Sleep disturbances

Impact on hospitalisation

- Unfamiliar environment increases distress
- Limited mobility restricts engagement
- Noise and disruption worsen symptoms

BPSD management is crucial for improving patient's well-being and preventing prolonged hospital stays

Immersive Virtual Reality (IVR)

An Innovative Digital Health Intervention

What is IVR?

A technology that creates a **360° immersive environment**, transporting users to calming or stimulating virtual worlds for therapeutic use

(Restout et al., 2023)

IVR combines gentle exercises with cognitive engaging tasks, helping to slow cognitive decline, and evoke positive emotions

Clinical Benefits on dementia care

- **Cognitive Engagement**
- **Physical Benefits**
- **Emotional Support**

(Konecny et al., 2026)

Cave System vs Wearable Goggles

Cave Automatic Virtual Environment (CAVE)

- Natural movement and posture
- No equipment on head or face
- Easy therapist interaction
- Reduced claustrophobia risk
- Immediate exit capability
- Group participation possible

VR Headset

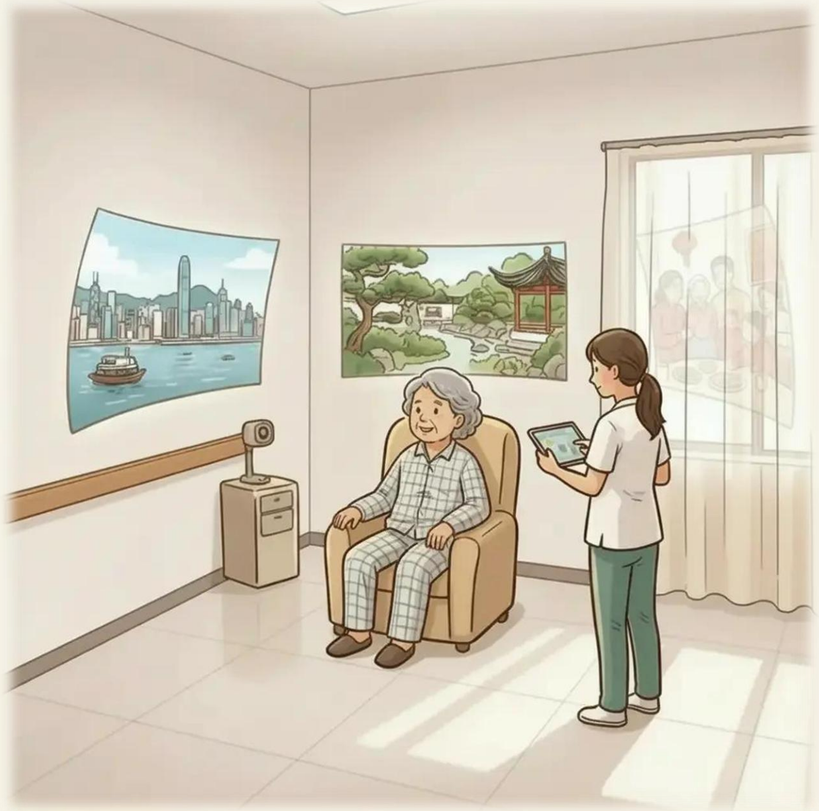
- Heavy equipment on head
- Fall risk from isolation
- Limited collaboration with others
- Motion sickness and fatigue
- Hygiene concerns

Cave system provides safe environment with elderly-friendly design

Study Objectives and Hypotheses

Primary Objective

Evaluate **the feasibility and effectiveness** of IVR rehabilitation for managing behavioral and psychological symptoms (BPSD) in hospitalized dementia patients



Research Hypotheses

- H1: IVR rehabilitation will significantly reduce BPSD, particularly agitation and depression symptoms
- H2: Patients with dementia will demonstrate positive attitudes toward IVR rehabilitation interventions

Methodology

Inclusion Criteria

- Convenience sample of inpatients from psychogeriatric acute ward at Castle Peak Hospital
- Diagnosed with dementia (mild to moderate)
- Hospitalized for at least one month
- Mentally fit for ward-based Occupational Therapy programs

Exclusion Criteria

- Severe communication deficits
- Visual or hearing impairments
- Physical impairments hindering participation
- Inability to engage safely in VR activities

The IVR Intervention Protocol

Intervention Protocol

- 2-3 group sessions
- 45 mins per session
- 2-3 participants in one group
- Led by experienced therapists

Pre-assessment → **IVR sessions** → **Post evaluation**

Person-Centered Occupational Therapy Approach

Cantonese Music

Festival Themes

Dim Sum Restaurant

Nostalgia Tuck Shop

Clinical Outcome Measures

Comprehensive Assessment of Behavioral and Psychological Symptoms

Neuropsychiatric Inventory Questionnaire (NPI-Q)

Assesses behavioral and psychological symptoms including delusions, agitation, anxiety, and apathy

(Leung et al., 2001)

Cohen-Mansfield Agitation Inventory (CMAI)

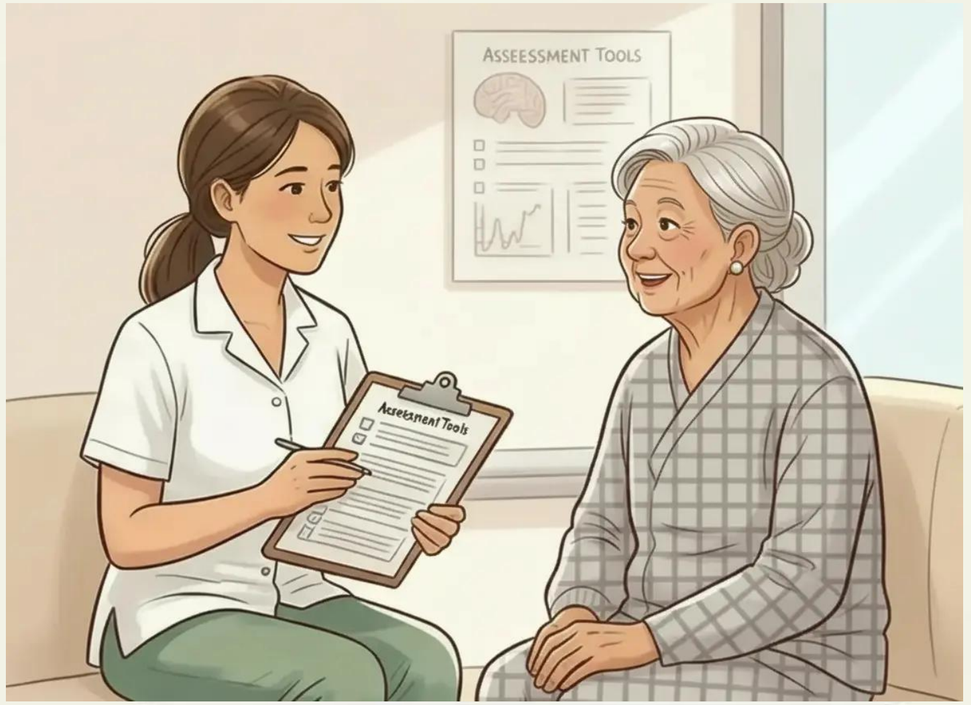
Proxy assessment tool specifically designed to measure agitation behaviors in dementia patients

(Choy et al., 2001)

Cornell Scale for Depression in Dementia (CSDD)

Evaluates signs and symptoms of major depression in individuals with dementia

(Alexopoulos et al., 1988)

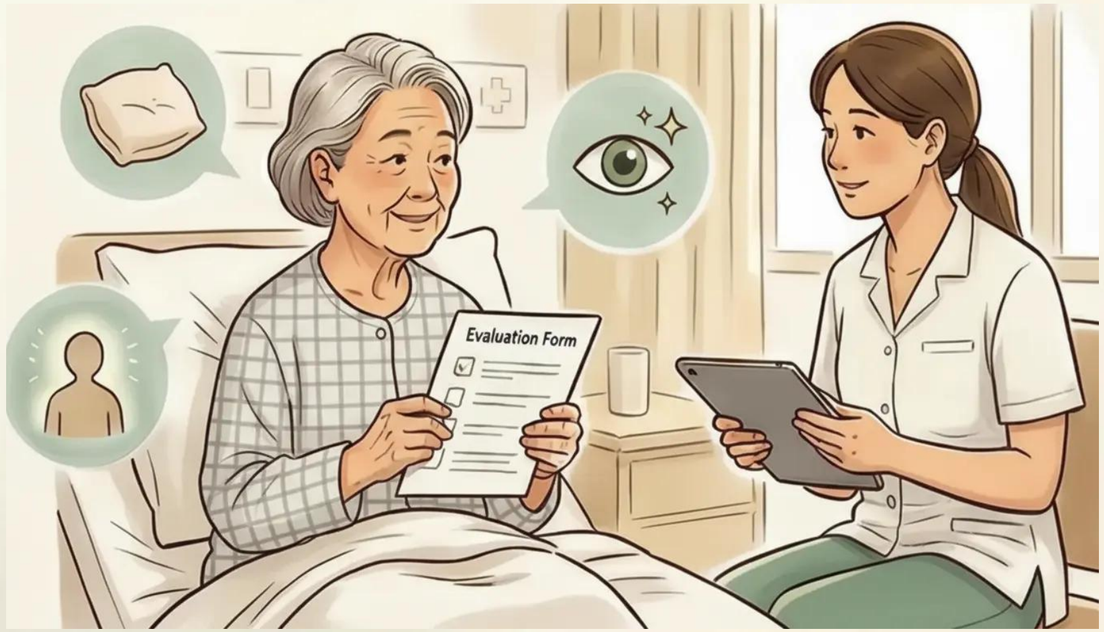


Pre and Post intervention assessment administered by case Occupational Therapist

Virtual Reality System Usability Questionnaire (VRSUQ)

Understanding Patient Experience Through Systematic Evaluation

- Subjective scale addressing VR-specific patient concerns
- Five-point Likert scale measurement (1-5 rating)
- Total score range: 0-100 points
- Higher scores indicate better usability and user satisfaction



Key Evaluation Areas

✓ Effectiveness

✓ Efficiency

✓ Satisfaction

(Li et al., 2025)

Results: Participant Demographics

6 **Female participants**

Mean age: 79 years

(range from aged 73-92)

Mild to Moderate Dementia

100% Completion Rate

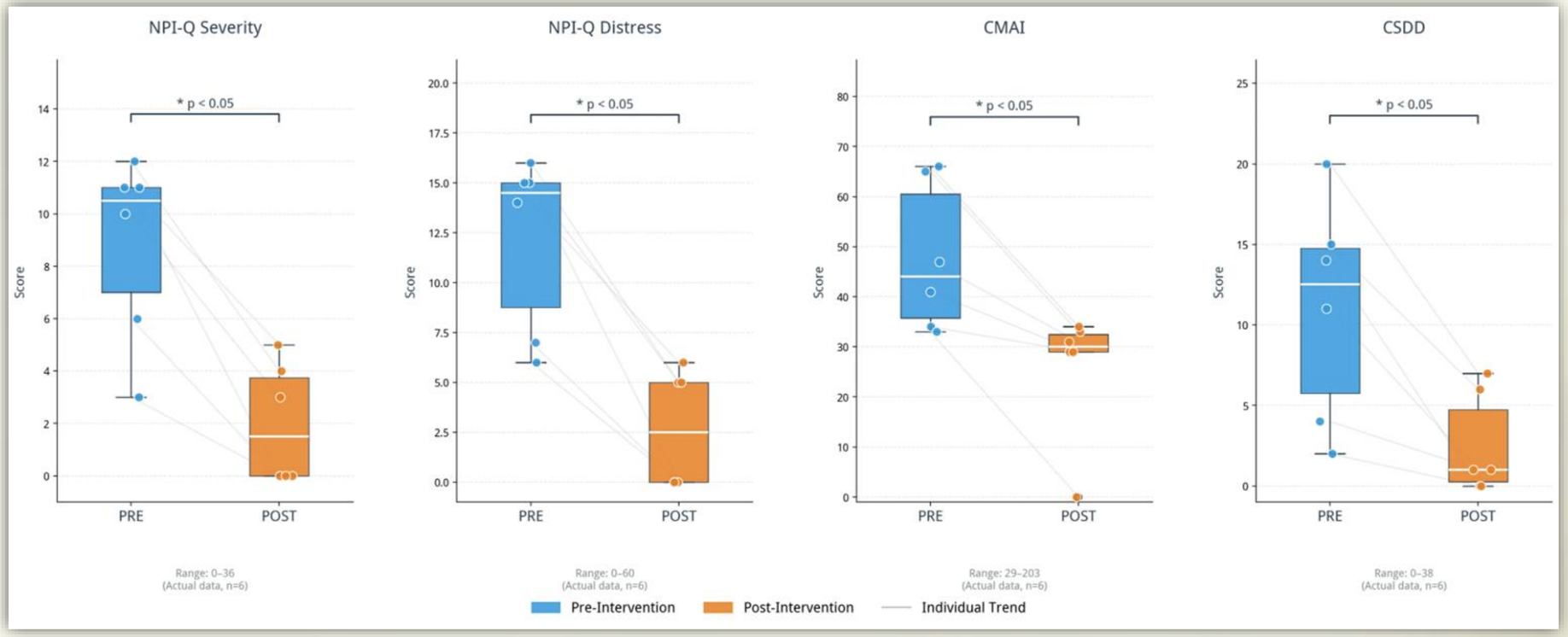
Zero dropout rate

All participants completed training within 2 months

Significant Reduction in BPSD

Wilcoxon signed-rank test revealed statistically significant reduction in NP-Q, CMAI and CSDD,

which indicated **improvement of BPSD, i.e. less irritability, less depressive mood**



- NPI-Q Severity scores ($z = -2.207$, $p = 0.027$)
- NPI-Q Distress scores ($z = -2.201$, $p = 0.028$)
- CMAI ($z = -2.207$, $p = 0.027$)
- CSDD ($z = -2.201$, $p = 0.028$)

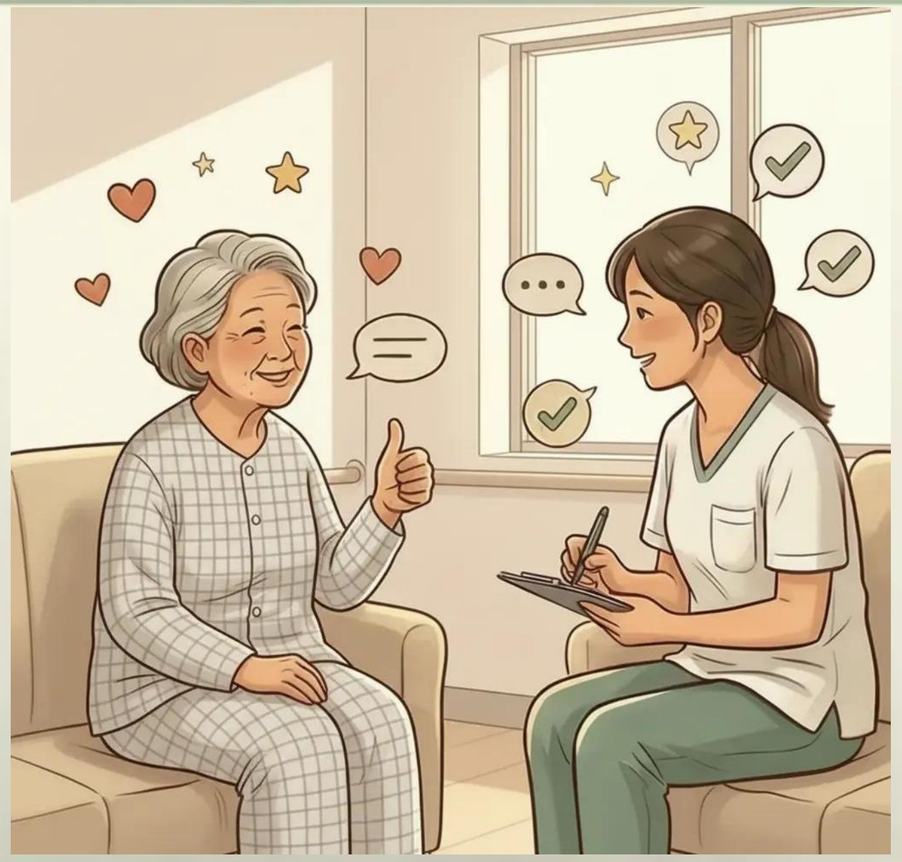
Usability and Patient Feedback

Results demonstrated **strong acceptance** among elderly participants:

- VR system provides clear information and feedback
- Easy for operation
- User-friendly to elderly
- **NO** cybersickness or mental stress

Mean VRSUQ Score

59.83 (SD=22.65)



Breakthrough Insight

How IVR Creates Transformative Therapeutic Experiences?

Environmental Control

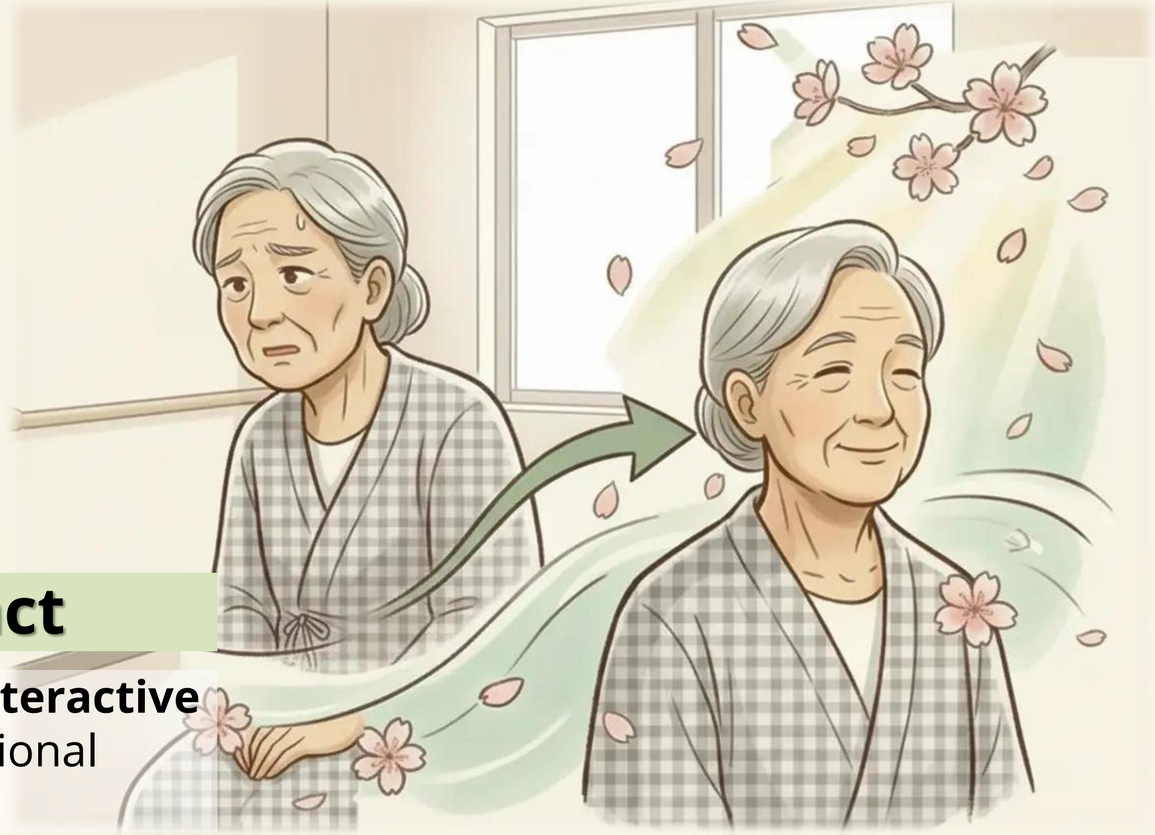
Provides a **low-stimulation, calming space** away from environmental noises and unfamiliar surroundings that often exacerbate BPSD

Attention Redirection

Effectively **redirects focus** from distressing triggers toward enjoyable, non-threatening, and meaningful virtual experiences

Multisensory Impact

Combines **visual, auditory, and interactive** elements to create deep emotional engagement



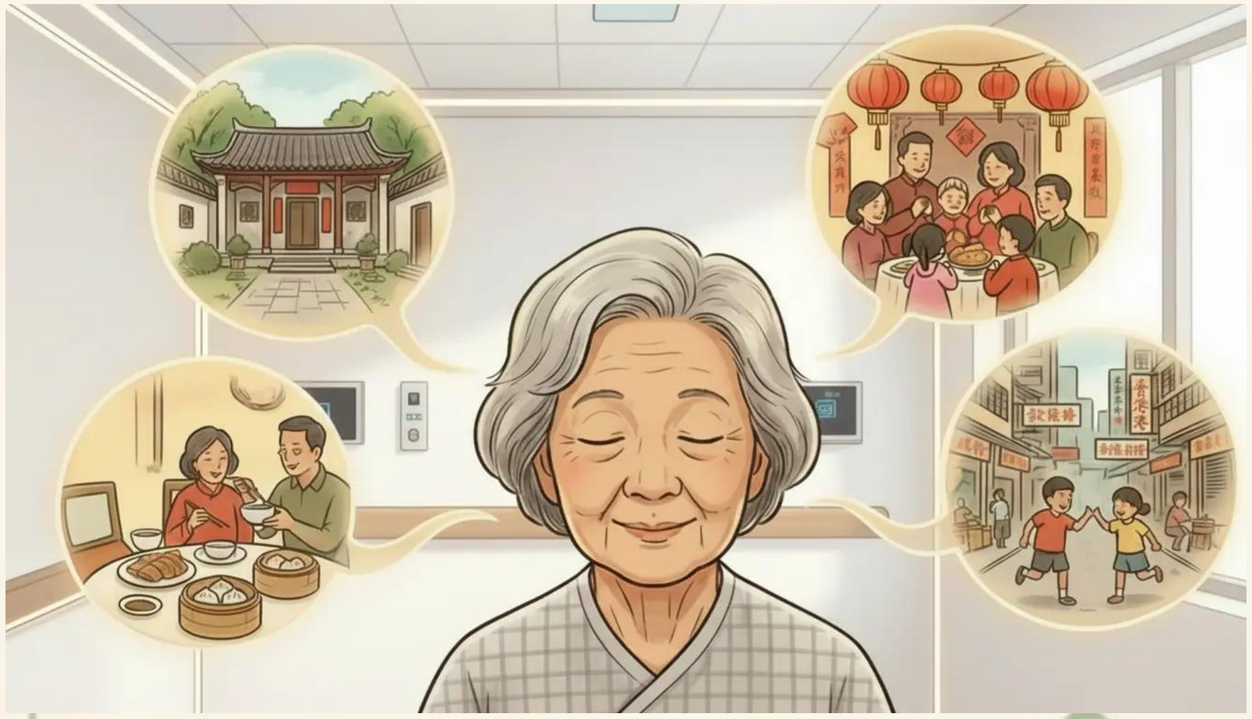
Reminiscence and Self-Identity

Autobiographical Recall

- VR triggers preserved long-term memories
- Cultural content connects to personal history
- Multisensory prompts enhance memory activation

Sense of Personhood

- Identity elements persist longer than recent memory
- Familiar environments restore self-recognition
- Positive emotions strengthen personal connection



The Memory Bridge

IVR creates a bridge between preserved memories and present experience, allowing patients to reconnect with their authentic selves through familiar sights, sounds, and cultural touchstones.

Study Limitations and Future Directions

Study Limitations

- **Small Sample Size with Single Group:** Results from 6 participants require confirmation in larger trials.
- **Gender Bias:** All participants were female, limiting generalizability.
- **Short Duration:** Long-term effects of IVR were not evaluated in this pilot.

Way Forward

- Conduct **Randomized Controlled Trials** to establish stronger evidence.
- Explore the **long-term impact** of IVR on cognitive and daily living functions.
- Test IVR in **diverse settings**, including community care.

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Embrace the Virtual World

A New Frontier in Dementia Care

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