



Digital Intelligence for Older Adults' Mental Health

Research Group Introduction, Research Directions, and Key Achievements
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01 | Research Group Introduction

Who We Are

We are an interdisciplinary research group examining how digital environments—internet use, digital skills, and intelligent living spaces — affect older adults' mental health, cognitive function, and healthy aging. Using multinational cohort data, we explore key pathways to develop equitable, scalable digital health solutions for aging societies.

Focus

- Digital Behaviors and Mental Health
- Digital Behaviors and Cognitive Health
- Intelligent Environments and Health Outcomes
- Cross-National Comparative Research

Strengths

- Interdisciplinary Expertise
- Large-Scale Data Platforms
- Rigorous Methodologies
- Translational Orientation

Keywords

Aging · Digital Health · Mental Health · Internet Use · Digital Skills · Intelligent Living Environments · Cognitive Function · Depressive Symptoms · Healthy Aging



02 | Research Directions

Digital Intelligence Technology Empowers the Mental Health of the Elderly

Focusing on mental health challenges in ageing societies, our research constructs a whole-chain framework of screening, assessment, intervention, and long-term management supported by digital intelligence technologies.

Core Challenges	Digital Intelligence Pathways	Application Scenarios
Depression, anxiety, and loneliness	Screening: AI risk identification	Medical institutions: Screening and auxiliary diagnosis
Cognitive decline and multimorbidity	Assessment: Multimodal affective computing	Home-based elderly care: Monitoring and emotional warning
Urban–rural service disparities	Assessment: iCBT, VR, robots, generative AI	Community services: Group screening and digital intervention
Low recognition and delayed care	Management: Monitoring, warning, follow-up	Long-term care system: Integration with LTCI and ageing services

Implementation Principles

Evidence-based support · Age-friendly design · Digital equity · Implementation science · Interdisciplinary integration

03 | Representative Achievements

- Causal Identification Beyond Correlation**
Internet skills show causal protective effects on depressive symptoms; PSM supports cognitive preservation evidence.
- Granular Disaggregation of Digital Engagement**
Digital exposure is decomposed into skills, duration, activity types, and intelligent living environments.
- Socio-Technical Mechanisms: Mediation and Negative Moderation**
Social participation, social support, and self-efficacy explain how digital environments shape health outcomes.
- Cross-National Explainable Prediction**
Interpretable machine learning identifies shared and context-specific predictors across multinational ageing cohorts.
- Policy Reorientation for Digital Aging**
The evidence supports a strategic shift from first-level digital access to second-level digital skills, safe use, and age-responsive design.

Key Publications

- [1] Peng Y, Liu Z. Intelligent living environments and older adults' health outcomes: Roles of social support and self-efficacy. *BMC Public Health*, 2026.
- [2] Lu C, Wan S, Liu Z. Determinants of depressive symptoms in multinational middle-aged and older adults. *npj Digital Medicine*, 2025.
- [3] Pan Y, Liu Z. The impact of Internet usage on cognitive impairment among Chinese older people: A social participation perspective. *BMC Geriatrics*, 2025.
- [4] Mu A, Liu Z. Assessing the impact of internet skills on depressive symptoms among Chinese middle-aged and older adults. *JMIR Aging*, 2024.
- [5] Mu A, Yuan S, Liu Z. Internet use and depressive symptoms among Chinese older adults: Two sides of internet use. *Frontiers in Public Health*, 2023.