

Project Details	
Project Code	MRCNMH25Ex Fox
Title	Artificial Intelligence-enhanced mobile Behavioural Activation therapy for DEmentia and Mild cognitive impairment (AI-BADeM)
Research Theme	Neuroscience & Mental Health
Summary	Dementia affects around 55 million people globally, often leading to depression and unhealthy behaviours like physical inactivity and social isolation. These issues can worsen cognitive decline and reduce quality of life for both patients and their caregivers. Behavioural Activation therapy can help alleviate depression by encouraging engagement in enjoyable and meaningful activities. However, implementing behavioural activation faces several challenges and is not straightforward. Our study will test whether artificial intelligence-assisted mobile behavioural activation can overcome these barriers and improve accessibility and effectiveness for people living with dementia or mild cognitive impairment and their caregivers, ultimately enhancing their quality of life.
Description	<p>In the UK, approximately 944,000 people live with dementia and struggle with everyday activities, depression and social isolation. Behavioural Activation (BA) interventions focus on purposeful activity scheduling tailored to individual needs, are associated with improvements in activities of daily living and quality of life for people living with dementia(PLWD) and those with mild cognitive impairment (MCI). A meta-analysis of BA approaches found significant benefits, including higher levels of daily functioning and improved caregiver-rated quality of life(doi: 10.1002/14651858.CD009125.pub3). Emerging evidence suggests similar benefits for general older population, with better independence and quality of life.</p> <p>Despite promising early evidence, research on dementia prevention has been limited by implementation failures, unrepresentative samples, small effect sizes, lack of tailored interventions and ineffective technology integration. This PhD project addresses these gaps by exploring the use of an AI-assisted mobile platform (Iona Mind) adapted for PLWD and MCI, utilizing BA. The AI will categorize BA activities into themes: Routine, Enjoyable, and Necessary, targeting key risk factors for dementia and MCI progression. This innovative approach aims to improve accessibility, effectiveness, and overall quality of life for PLWD and MCI and their informal caregivers.</p> <p>KEY RESEARCH QUESTION: Can a mobile AI-assisted Behavioural Activation intervention improve mental and physical health outcomes for PLWD and MCI and their caregivers?</p> <p>SPECIFIC OBJECTIVES:</p> <ol style="list-style-type: none"> 1. Synthesize the existing literature on the role of BA in PLWD and MCI. 2. Co-adapt and optimize an AI-assisted BA Intervention. 3. Conduct a Pilot Study of the usability of the BA intervention and conduct an initial investigation of health outcomes. <p>METHODS: The proposed approach to intervention development follows the Medical Research Council (MRC) guidance.</p>

Phase 1 (Months 1-6): Updated Evidence Synthesis
Updated literature review on the role of Behavioural Activation (BA) in PLWD and MCI. A systematic search of PubMed and Web of Science will be performed to identify studies published since Cochrane Database Syst Rev. 2022;4:CD009125; (doi: 10.1002/14651858.CD009125.pub3). Randomized controlled trials and cohort studies examining the effects of BA on PLWD and MCI will be reviewed. The review will include studies that assessed mental or physical health outcomes. If the data is sufficiently homogeneous, mixed linear regression models will be used to model the relative effectiveness of BA interventions. Data will be pooled first for all studies and then stratified by participant group (PLWDvs.MCI) and type of BA intervention. These results will inform Phase 2.

Phase 2 (Months 4-18: Co-adapting and Optimizing the AI-Assisted BA Intervention(DOI: 10.2196/52389)
We will co-adapt and optimize the AI-assisted BA intervention using Experience-Based Co-Design (EBCD). This process involves collaboration with PLWD and MCI, and their informal caregivers to tailor the existing Iona Mind AI intervention.

EBCD Stage 1: Setting Up
We will recruit 5 people living with dementia, 5 individuals with MCI, 5 informal carers, and 10 practitioners with lived experience (PWLE) through our partnerships with Join Dementia Research, TIDE, Dementia UK, and the Alzheimer’s Society. 90-minute filmed interviews of participants to share their experiences and reflect on their key needs and support.

EBCD Stage 2: Gathering PWLE Experiences
PWLE will view selected Iona resources in filmed sessions and discuss their resonances and potential modifications. They will also consider how to implement these resources within current care pathways.

EBCD Stage 3: Gathering Patient/Informal Carer Experiences
PWLD or MCI and informal carers will view Iona BA materials in filmed interviews, discuss their experiences, and suggest modifications. They will explore resource accessibility, IT options, and design features.

EBCD Stage 4: Co-designing Events
Co-design will begin with separate focus groups for PWLE, informal carers, PLWD, and individuals with MCI, followed by a joint focus group. At these events, an overview of findings from Stage 2 and Stage 3 interviews will be presented alongside the film. A facilitated discussion will follow, which will be audio recorded and documented with field notes.

Data will be analyzed using open coding techniques to develop robust thematic descriptions. Normalisation Process Theory will inform data interpretation, facilitating a comparative analysis of practice issues for participants that may inform adoption, implementation, and integration.

EBCD Stage 5: BA Content Adjustment
The Iona BA intervention content will be adjusted based on the findings from the previous stages. These adaptations will inform the development of training materials for PWLE. The student will work with Iona Mind to make the necessary content and technical adaptations.

Phase 3 (Months 18-28): Pilot Study for Usability and Health Outcomes

	<p>The adapted Iona app will be deployed for 6 months with a PWP, 5 PLWD, 5 with MCI, informal carers, and wider service staff (PWLE). Acceptability, usability, and utility will be measured using the MHealth App Usability Questionnaire (doi: 10.2196/11500). Additionally, the potential effects on mental and physical health outcomes and quality of life will be assessed. The SIDECAR(https://www.bradford.ac.uk/dementia/research/current-projects/sidecar/) measure will be administered to evaluate quality of life, and the CSRI will be used to explore basic costs.</p>
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