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Feature Article

A personalized multimedia device to treat agitated behavior and improve mood in people with dementia: A pilot study



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ABSTRACT

Agitated behaviors and dysphoric moods in nursing home residents with dementia may be a response to a lack of personalized, meaningful activity and stimulation. To address this deficiency, a personal computer was adapted to play favorite music and display photographs, movies and messages that were selected or made by family members. The system (called Memory Box) is accompanied by a simplified interface to help people with dementia access material independently. The system's ability to reduce agitation, and improve symptoms of depression and anxiety, was tested by means of an eight-week randomized, single-blinded, cross-over trial comparing Memory Box with a control condition that offered equivalent contact with research staff. Eleven nursing home residents with mild to severe dementia and persistent, daily agitated behaviors completed the study. Outcome measures included ratings of anxiety, depression and agitated behavior made by knowledgeable staff members in collaboration with researchers. Memory Box was well utilized and highly rated by residents, families and staff members. There were significant reductions in depressive and anxiety symptoms during the course of the intervention. The system shows promise as a tool to assist families and nursing home staff to improve the wellbeing of cognitively impaired older people with agitated behaviors.

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Introduction

The behavioral symptoms of dementia which include calling out, restlessness and aggression are thought to reflect in part people's unmet, unexpressed needs for company, meaningful activity and a sense of engagement in life.¹ Medical treatments of these agitated behaviors have limited effectiveness and sometimes onerous side effects.² There is a growing pressure, therefore, to develop alternative strategies to meet these needs more effectively while preserving people's dignity and independence. We also require innovative approaches to improve symptoms of depression and anxiety, which remain high among people with dementia residing in nursing homes,³ with few treatment advances in recent years.

In two systematic reviews, the most effective non-pharmacological treatments of agitated behaviors and mood combined one-to-one attention with activities that were tailored to individuals' backgrounds, preferences and residual skills.^{1,4} Strategies that incorporated both these qualities (for example, personalized music and family-made videotapes) had treatment effect sizes of up to 0.7, in excess of the benefits of antipsychotic medications,^{1,5,6} but few such treatments are applied consistently in nursing homes. The reasons are obvious. Residents with moderate or severe dementia need support to initiate meaningful, pleasurable activities but this support is not always forthcoming.⁷

This prompted the search for an intervention that: (i) would prove so engrossing that agitated behaviors were reduced both in frequency and severity; (ii) would address high levels of depressive and anxious symptoms exhibited by people with dementia; (iii) could be personalized by family members, and (iv) required minimal support, even for residents with moderate degrees of dementia. By way of solution, mental health clinicians and researchers teamed with industrial designers to program a personal computer

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to offer digitalized music, photographs, movies and messages chosen or made by family members to reflect residents' backgrounds and preferences. The resulting product, 'Memory Box,' comes with a simple touch sensitive screen (interface) to facilitate switching from one modality to another (for example, from photographs to music). A touch sensitive interface was chosen in the light of previous reports of their successful use by people with dementia.^{8,9}

Our approach builds upon a growing trend toward the application of technology to assist this population. Many computer and tablet applications have been developed to remind people with dementia of daily tasks, detect falls and other hazards, check vital functions and monitor their physical environment.¹⁰ Yet others prompt cognition, encourage reminiscence and offer age-appropriate visual and musical stimuli (for examples see <http://www.arts4dementia.org.uk/memory-aids>). The material on offer is largely generic in nature. It is selected to appeal to as wide an audience as possible, usually by sourcing images or music from earlier decades.

Two other computer systems share Memory Box's features of personalization and simplified interface. A product called 'Companion' displays personal music and photos if available, together with generic material from a media library, in the form of audio-visual 'shows' that are crafted beforehand by technicians in discussion with family members. The device can display the time and date when inactive and prompt behaviors if desired, for example to drink a glass of water. In a pilot study with seven community-resident people with dementia (MMSE scores 11–27), the technology proved easy to use and was rated positively by caregivers who felt it made their lives easier.⁹ Only two participants could not use the device independently.

The second system, called Computer Interactive Reminiscence and Communication Aid (CIRCA), plays 'shows' with themes of entertainment, recreation, local life comprising generically sourced text, graphics, photographs and music. Themes are color-coded to match touch sensitive icons on a laptop computer screen. The developers' goal was to generate discussion and collaboration between people with dementia and their carers as they watch together. In a small controlled trial with 11 participants (MMSE scores 9–23) from day care centers or residential facilities, CIRCA proved more effective than traditional reminiscence therapy in capturing attention and promoting interaction with carers.⁸

Memory Box differs from both Companion and CIRCA in key respects. Firstly, material is sourced entirely from the person with dementia and their family members and is therefore fully personalized, in line with the well-documented finding that personalized activities reduce agitation and promote positive affect more successfully than generic ones.^{1,4–6} Secondly, Memory Box draws upon the literature on the positive effects of simulated family presence,⁹ by enabling people with dementia access to recordings of video messages made by family members. Thirdly, in preliminary field testing, some participants had difficulty understanding and manipulating touch sensitive icons. Memory Box therefore offers the option of traditional buttons affixed to the screen for those who prefer them.¹¹ Finally, Memory Box can be customized to the level of cognitive impairment. The goal was to maximize nursing home residents' capacity to operate the device to its fullest potential. The development of a device that provides residents with dementia with access to meaningful and interesting activities with minimal assistance from staff is both cost-effective and offers potential to significantly improve their wellbeing.

This report describes the results of a pilot trial of Memory Box as a treatment of anxiety, depression and agitated behaviors. This is the first evaluation of the impact of a personalized device on the behavioral and psychological symptoms of dementia, and so data were collected on the feasibility of this intervention for use in

nursing homes, including ratings of participant enjoyment using Memory Box and usage data.

We have shown previously that behavioral and psychological symptoms of dementia respond so positively to one-to-one attention that a social control condition is mandatory when testing new psychosocial interventions.^{5,6} Responses to Memory Box were therefore compared with a control condition that provided equivalent amounts of social interaction between participants and researchers. It was hypothesized that Memory Box would lead to a greater reduction than the control condition in agitated behavior counts and both anxiety and depressive symptoms.

Methods

Design

The trial employed an eight-week randomized, single-blinded, cross-over design to compare responses to Memory Box with the social control condition of weekly 30-min visits by a trained research assistant who read from a newspaper and discussed local current events. This non-personalized control condition proved highly effective in previous studies.^{5,6}

Materials

The system is based on a standard personal computer (i3 processor, 500 GB hard drive, 2 GB RAM) and monitor (58 cm, 1920 × 1200 pixels). The computer's touch sensitive screen displays brightly colored icons for 'music,' 'movies,' 'messages' and 'photos' (Fig. 1). Tapping an icon prompts the cycling of materials previously selected by family members: favorite music tracks, movies, recorded video messages and family photographs. The device can function at two levels of complexity. The simplest level allows viewers to start and stop data streams and to change from one stream to another. An advanced level offers more options (for example, to select an individual track from a list of musical pieces). Materials for the trial were loaded by research staff in this trial, although the interface was designed to be suitable for family and staff carers to load materials via a secure online link.

Prototype designs, colors, fonts and touch characteristics were pre-tested in a series of small focus groups by 10 competent, volunteer nursing home residents with mild to moderate degrees of dementia. As a result of informal feedback, the interface was adapted to give a choice of touch sensitive icons and identically colored, traditional-style plastic buttons implanted on the screen (Fig. 1). A standard personal computer with pre-loaded, individually selected digitalized material was set up in each participant's bedroom. No internet connection was required for this trial. For



Fig. 1. Memory Box.

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