

Chapter 9

Assistive Technology for Promoting the Independence and the Quality of Life in Persons With Alzheimer's Disease: A Selective Review

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ABSTRACT

Persons with Alzheimer's disease (AD) may present a loss of cognitive functioning, memory impairments, communication difficulties, obstacles to perform daily activities, disorientation, and challenging behaviours. Currently, there is no cure for AD. However, there are valid treatments to alleviate AD-related symptoms and to reduce the burden on carers; for example, the effectiveness of the use of assistive technology (AT) has been seen. The aim was to provide, in this chapter, an overview of the newest empirical evidences available on the use of AT-based programs to improve the independence and the quality of life of patients with Alzheimer's disease and their caregivers. A selective literature review was carried out considering Alzheimer's, assistive technologies, dementia, quality of life, and caregivers. Empirical data demonstrated the effectiveness and the suitability of the AT interventions allowing participants to improve their quality of life, as well as to mitigate the mental and physical burden of their caregivers.

INTRODUCTION

Alzheimer's disease (AD) is the most common form of dementia and accounts for 50–80% of dementia cases. It is characterized by memory loss and rapidly progresses to symptoms such as personality modifications and language difficulties, leading to a loss of the ability to perform routine activities and

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eventual death for AD. Less than 1% of AD cases are related to genetic mutations; these cases generally occur in younger adults (approximately 45 years old) (Stoccoro & Coppedè, 2018). Alzheimer's disease is characterized by a progressive loss of cognitive functions. It is considered that neuroinflammation plays a fundamental role in its onset and progression (Carrillo-Avila, Melgar-Rodriguez, Díaz-Zuñiga & Martínez-Aguilar, 2020). The development and progression of AD are linked to the dysfunction and death of neurons, which generally appear to originate in the hippocampus, frontal, temporal lobes, and the limbic system, extending to neocortex regions as the disease progresses (Li et al., 2004). Currently, AD can be diagnosed in living patients by positron emission tomography (PET) and cerebrospinal fluid (CSF) techniques (Stoccoro & Coppedè, 2018). Additionally, AD may have social-emotional negative outcomes such as depression, withdrawal, and passivity (i.e., physical inactivity) (Ciro, Park, Burkhard, Yan & Geula, 2013). Accordingly, persons with AD may experience a growing negative impact on their quality of life (LoPresti, Bodine, & Lewis, 2008; Westphal, Dingjan, & Attoe, 2010).

Actually, there is no cure for AD, but some medication and therapies have been shown to reduce the behavioural and psychological symptoms, alleviating pressures and improving quality of life for individuals as well as their caregivers. Two basic categories of interventions have been up to date assessed for reducing the decline deterioration of AD, namely (a) pharmacological treatments, and (b) behavioral strategies (LoPresti, et al., 2008).

Five medications are currently used to treat the cognitive problems of AD: four are acetylcholinesterase inhibitors (tacrine, rivastigmine, galantamine and donepezil) and the other (memantine) is an NMDA receptor antagonist. The benefit from their use is small (Birks & Harvey, 2018). Any medication has been clearly shown to delay or halt the progression of the disease. Psychosocial interventions are used as an adjunct to pharmaceutical treatment and can be classified within behaviour, emotion, cognition, or stimulation-oriented approaches (Rabins, Blacker, & Rovner, 2007). The behavioral strategies or psychosocial interventions used for AD are: (a) Behavioural interventions attempt to identify and reduce the antecedents and consequences of target behaviors, to help reduce some specific problem behaviors, such as incontinence (Doody, Stevens, & Beck, 2001); (b) Stimulation-oriented treatments include art, music and pet therapies, exercise, and any other kind of recreational activities; (c) Emotion-oriented interventions include reminiscence therapy, validation therapy, supportive psychotherapy and sensory integration, and (d) cognition-oriented treatments, which include reality orientation and cognitive re-training, is the reduction of cognitive deficits ((Bottino, Carvalho, & Alvarez, 2005; Doody, Stevens, & Beck, 2001, Rabins, Blacker, & Rovner, 2007; Chung, Lai, Chung, & French, 2002; Spector et al., 2003).

The number of older affected by Alzheimer disease and related dementias will triple to 13 million persons by 2050, consequently increasing healthcare is needed. An approach to this emerging crisis is the development and deployment of intelligent assistive technologies that compensate for the specific physical and cognitive deficits of older adults with dementia, and thereby also reduce caregiver burden (Ashok et al., 2009).

Assistive Technology (AT) has been suggested as means by which people with dementia can be helped to live independently, while also leading to greater efficiencies in care. However, little is known about how AT is being used by people with dementia and their caregivers in their daily routines (Gibson, Dickinson, & Brittain, 2015). Assistive technology (AT) has been identified as one area in which both improvements and possible cost savings, in care delivery can be made (Duff & Dolphin, 2007). The term assistive technology incorporates a wide range of devices, ranging from simple, low-cost devices to complex home monitoring systems using electronic information and communication technology (ICT). In addition, technology use in everyday dementia care also includes the use of a range of everyday or

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