Research in Developmental Disabilities 34 (2013) 2351–2359

Contents lists available at SciVerse ScienceDirect

Research in Developmental Disabilities

Supporting daily activities and indoor travel of persons with moderate Alzheimer's disease through standard technology resources

Giulio E. Lancioni [a,*], Nirbhay N. Singh [b], Mark F. O'Reilly [c], Jeff Sigafoos [d], Caterina Renna [e], Marilisa Ventrella [e], Katia Pinto [f], Mauro G. Minervini [f], Doretta Oliva [g], Jop Groeneweg [h]

[a] University of Bari, Italy
[b] Medical College of Georgia, Georgia Regents University, Augusta, GA, USA
[c] Meadows Center for Preventing Educational Risk, University of Texas at Austin, TX, USA
[d] Victoria University of Wellington, New Zealand
[e] Domus Maxima Care Center, Casamassima (BA), Italy
[f] Alzheimer Rehabilitation Center, Bisceglie, Italy
[g] Lega F. D'Oro Research Center, Osimo, Italy
[h] University of Leiden, The Netherlands

ARTICLE INFO

Article history:
Received 21 April 2013
Accepted 22 April 2013
Available online 25 May 2013

Keywords:
Alzheimer's disease
Daily activities
Indoor travel
Standard technology

ABSTRACT

These two studies were aimed at evaluating standard technology resources for supporting activity and travel among patients with moderate Alzheimer's disease. Specifically, Study I assessed a pictorial instruction program relying on the use of a portable computer and a commercially available and inexpensive video editing software for supporting the performance of daily activities with three patients. Study II assessed the indoor travel performance of four patients (i.e., the three involved in Study I and a fourth patient with no previous research exposure) using a commercially available, basic doorbell system with sound and light cues. The percentages of correct activity steps obtained with the instruction program used in Study I were relatively high and largely similar to the percentages reported in previous studies using more sophisticated technology. During Study II, the percentages of correct travels of two patients matched the data of the most successful patients involved in previous studies with more sophisticated technology. The percentages of the other two patients tended to be lower than those obtained previously, but were still practically relevant. The implications of the results of the two studies and a number of issues for new research are discussed.

1. Introduction

Alzheimer's disease is an irreversible neurodegenerative condition characterized by a progressive and significant decline in all areas of the patient's functioning with wide-ranging, negative implications for his or her efficiency, independence, and social status (Arkin, 2007; Fernandez, Mainoiloff, & Monti, 2006; Giovannetti et al., 2007; Gitlin et al., 2008; Graff et al., 2008; Gure, Kabeto, Plassman, Piette, & Langa, 2010; Marshall et al., 2011; Martyr & Clare, 2012; Nadkarni, Levy-Cooperman, &

* Corresponding author at: Department of Neuroscience and Sense Organs, University of Bari, Via Quintino Sella 268, 70100 Bari, Italy. Tel.: +39 0805521410.
E-mail address: giulio.lancioni@uniba.it (G.E. Lancioni).

0891-4222/$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.ridd.2013.04.020

Black, 2012; Raggi et al., 2007). Withdrawal and depression can further complicate the patient's situation and make intervention attempts more difficult as the disease advances (Appleby, Roy, Valenti, & Lee, 2007; Onor et al., 2007; Tsuno & Homma, 2009; Williams & Tappen, 2007, 2008; Wood, Womack, & Hooper, 2009).

In practice, the patient shows a progressive loss of his or her ability to, among others, handle finances (Marson et al., 2000), manage medication (Cotrell, Wild, & Bader, 2006), make use of common communication means, such as the telephone (Nygård & Starkhammar, 2003, 2007; Perilli et al., 2012; Selwyn, 2003; Selwyn, Gorard, Furlong, & Madden, 2003), perform basic daily activities, such as preparing food (Baum & Edwards, 1993; Lancioni, La Martire et al., 2009; Lancioni et al., 2010; Melrose et al., 2011; Mihailidis, Boger, Canido, & Hoey, 2007), and manage orientation and travel even within familiar indoor areas, such as the home or day center (Caffò et al., 2012; Lancioni et al., 2011, 2013; Provencher, Bier, Audet, & Gagnon, 2008).

In an attempt to slow down the patient's deterioration and maintain his or her basic adaptive skills for a longer time, professionals have resorted to (a) pharmacological intervention, such as the use of memantine and acetylcholinesterase inhibitors (Darreh-Shori & Soininen, 2010; Kurz & Perneczky, 2011; Levy, Lanctôt, Farber, Li, & Hermann, 2012; Massoud & Gauthier, 2010; Massoud & Léger, 2011; Popp & Arlt, 2011; Rive et al., 2012) and (b) behavioral intervention, such as the use of reality orientation exercises, memory training, and stimulation enrichment (Bier et al., 2008; Boller, Jennings, Dieudonné, Verny, & Ergis, 2012; Silverstein & Sherman, 2010; Small, 2012; Takeda, Tanaka, Okochi, & Kazui, 2012; Zanetti et al., 2001).

Recently, intervention procedures have also been devised to support the patient's constructive occupation as well as orientation and travel within familiar indoor areas (Caffò et al., 2012; Lancioni et al., 2010, 2011, 2012). For example, technology-aided strategies have been reported to help patients with moderate and mild levels of the disease (a) recapture daily activities such as food and drinks preparation and (b) move from one room to another in their daily contexts successfully (Lancioni, Pinto et al., 2009; Lancioni et al., 2010, 2012, 2013). The strategies developed for the daily activities involved verbal or pictorial instructions presented for the single steps of the activities via a computer system that was connected to monitoring sensors. The computer waited for the activation of the sensors (i.e., for the patient to take a specific object) before presenting the instruction related to the use of that object. The instruction about taking a new object followed pre-programmed time intervals from the previous instruction. The strategies developed for orientation and travel relied on the use of (a) sound or light sources, which were at the destinations that the patient was to reach, and emitted verbal calls or light cues to orient him or her to those destinations, and (b) a portable control device that the research assistant used to activate and deactivate those sources. Totals of 35 and 8 patients were exposed to the activity and travel intervention strategies, respectively, and the results were widely encouraging (Lancioni, La Martire et al., 2009; Lancioni, Pinto et al., 2009; Lancioni, Singh, O'Reilly, Sigafoos et al., 2009; Lancioni, Singh, O'Reilly, Zonno et al., 2009; Lancioni et al., 2010, 2011, 2012, 2013).

In light of the results obtained with the aforementioned intervention strategies and the technology used for them, two basic questions could be considered relevant for new research in this context, that is, (a) extending the assessment of the intervention/technology packages available through replication efforts, and (b) assessing the usability of simplified (standard) technology resources for supporting both activities and travel. The two studies reported here were aimed at the latter question, that is, at evaluating standard technology resources for activity and travel with patients with moderate Alzheimer's disease. Specifically, Study I assessed a pictorial instruction program relying on the use of a portable computer and a commercially available and inexpensive video editing software (Pinnacle Studio, version 14, by COREL; www.pinnaclesys.com) to support the activity of three patients. Study II assessed a commercially available, basic doorbell system with sound and light cues (JKB310P by JEIKO; www.jeiko.eu) to support the indoor travel of four patients.

2. Study I

2.1. Method

2.1.1. Participants

The participants (Jasmine, Amy, and Irving) were 83, 89, and 75 years of age, respectively. They were considered to function at a moderate level of Alzheimer's disease with scores of 16, 18, and 14, respectively, on the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975). Pharmacological treatment for the Alzheimer's condition, at the time of the study, was available only for Jasmine and Irving in the form of memantine. They were unable to perform simple and relevant daily activities, such as making coffee and preparing or serving fruit salad. This inability reduced any opportunity of occupational engagement within the day center for people with Alzheimer's disease and other dementias that they attended. In spite of such inability (closely linked to their difficulties to remember response sequences, as required for multistep activities), they seemed to discriminate brief verbal instructions as well as photographs and drawings of step-related material. Any initiative directed at supporting their performance of daily activities was considered highly desirable by their families and by staff personnel of the day center. Their families had also provided informed consent for their participation in this study, which was approved by a scientific and ethics committee.

2.1.2. Setting, activities, and data recording

The study was carried out in a quiet room of the day center that the patients attended. Two activities were available for each of them (i.e., making a fruit salad and preparing it to be served for Jasmine and Amy, and making coffee and arranging fruit for Irving). These activities were similar to those described in previous studies in this context (e.g., Lancioni et al., 2010,