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Geriatric Mental Health Care



Review

Cognitive assistance to support social integration in Alzheimer's disease

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ABSTRACT

Social integration plays a key role in the maintenance of quality of life and health status of people with dementia and their care-givers. Here, we outline a general concept for cognitive assistance and argue for the specific importance of technical support for outdoor mobility to preserve opportunities for social contacts and activities. Based on commercially available devices and systems described in the literature, we provide a conceptual framework for mobility assistance which integrates both technical features and user requirements. The technical development of assistive systems so far was mainly concentrated on static user models. In order to account for the progressive nature of dementia due to Alzheimer's disease, more dynamic approaches need to be pursued to enable optimal assistive effects.

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1. Introduction

The syndrome of dementia is associated with a decline in memory and other cognitive functions. Alzheimer's Disease International (ADI) (2008) reports an estimated total of 30 million people with dementia worldwide, and 4.6 million incident cases per year. According to Alzheimer's Association (2012), in 60–80% the cause for dementia is Alzheimer's disease (AD). The disease leads to progressive cognitive decline, dependence on care and finally to the death of the affected person. The disease poses an enormous burden both on the patient and his care-givers, but also on the health care system. While a cure for AD does not yet exist, knowledge about clinical manifestations and biology has increased (McKhann et al., 2011), enabling an earlier and more reliable diagnosis. This creates room for a spectrum of interventions,

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aiming to delay disease progression, including pharmacological treatments as well as non-pharmacological approaches, such as art-, movement-, or reminiscence therapy. Next to directly treating the symptoms, measures are adopted to enable patients suffering from AD dementia to lead a socially integrated life despite of emerging symptoms. This goal can be achieved by technical assistance to compensate for disabilities. In the following sections, we will define social integration for people with dementia, and argue for the importance of maintained social activities in dementia. We will then describe available technical solutions to support spatial and social mobility and provide a framework how these solutions can be integrated into an overall concept of preserved social participation for people with dementia. Thus, our approach aims to bring together an engineering view on providing technical solutions with a user-driven perspective on needs and requirements for sustainable and efficient support in social activities.

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1.1. Benefit of social integration

Being connected with other people is a substantial factor for perceived quality of live. Social relationships provide emotional support and motivate engagement in different activities, both physical and intellectual. But often elderly people lose social relationships and have reduced potential for preserving existing and making new contacts. To keep up independence, socializing and contacts, a person needs certain cognitive capacities: comprehension of social situations and navigation in complex systems. These capacities are gradually lost in people with dementia.

Several studies underscore the importance of social contacts for the cognitive health in elderly people. Reviewing seven international studies, Fratiglioni et al. (2004) found evidence that an active and socially integrated lifestyle in late live protects against dementia. Ertel et al. (2008) conducted a longitudinal representative study of the US elderly population, comprising data from more than 16 thousand people. Their results indicate that social integration may help to preserve memory by means of several mechanisms. One factor could be the reduction of cerebrovascular risk factors. Social ties may have an effect on behavioral norms such as taking care of oneself. Another possible mechanism refers to cognitive aspects of social interaction. Social interaction entails cognitive challenges, which enhance cognitive reserves to compensate for progressive brain lesions. In addition, having contacts with friends and loved ones provides a greater sense of purpose and emotional validation that carries a neurohormonal benefit.

These studies had investigated the protective effect of social integration on elderly without dementia. Oppikofer et al. (2002) explored if regular visits of volunteers have a positive effect on the well-being and health status of demented (MMS 5-25) residents with low social contact. The study confirmed the positive effect. Also they found evidence that regular visits attenuated the negative effects of mental deterioration on the resident's mental ability. Interestingly, the effect was detectable after an intervention period of only 10 weeks. Oppikofer et al. (2002) hypothesized that this effect can be generalized on other target groups. In a meta-analysis across 15 trials employing different types of cognitive stimulation, such as discussing about past and present events, word games, puzzles, music, baking or indoor gardening in different settings, like hospital, home- or daycare, cognitive stimulation had a significant positive effect on rates of cognitive decline and improved communication and social interaction, quality of live and well-being in people with dementia (Woods et al., 2012). Technical systems can support social interaction and cognitive stimulation. In this way, technology helps to strengthen social ties and reduce the decline of cognitive abilities. These techniques, however, should follow one important guiding principle: technological developments for elderly at risk for or already afflicted with dementia should be used to enhance the potential for social contacts, not as a substitute for human interaction.

1.2. Social inclusion

According to Schütte (2012), social inclusion can be described by the modes of societal affiliation, being *interdependence* and *participation*. Referencing further literature, the author outlines *interdependence* by the principle of give-and-take. Individuals receive goods and services by the society and give something back, for example by going to work. Impairment can hinder an individual to give something back, leading to a one-sided relation between individual and society and thereby to exclusion. *Participation* describes the way an individual can receive something by the society in a material, cultural or institutional manner. An individuals' *participation* could also be limited through impairments, which may prevent him or her from reaching institutions, accessing public buildings or making use of leisure facilities. Inclusion and exclusion are products of an individuals' interaction with his/her social environment. Illness or impairment disturbs the ability to interact with the environment and confines possibilities for integration and self-actualization, leading to exclusion. The degree to which disorders impair inclusion depends on both individual and social factors. As one key resource, the health system helps to delay or attenuate exclusion or to limit it temporarily by healing or alleviating symptoms (Hartmann, 2010).

The term inclusion describes the comprehension that impaired people have rights to take part in social activities based on their own decisions (Graumann, 2012). A stable network of positive social relationships is essential for social inclusion of elderly people, especially relationships that existed before the impairment arose. Thus, technical assistance to keep up spatial and social mobility can support social integration and inclusion (Theobald, 2008). According to Morgan et al. (2007) only a small number of studies addresses the interdependence between mental health problems and social exclusion. This limited evidence suggests that social exclusion has more explanatory power for mental health problems than poverty or other material disadvantages or illness. In turn, the behavioral effects of mental health problems cause exclusion by other people and institutions (Morgan et al., 2007). There are many environmental conditions which increase exclusion due to impaired cognitive capacities. For example, a lot of people are using public transport-systems to live independently and socialize. To be socially included, people have to be able to understand and navigate within this cognitively demanding systems. But people with cognitive impairments are no more able to make use of the transportation systems without help (Carmien et al., 2005). Thus, technical assistance to aid the use of this and other systems can help to overcome some barriers of inclusion.

2. Cognitive assistance

The health state of a person comprises more than the mere functionality of the bodily systems, it is also affected by the ability to perform basic activities and the extent of involvement in daily routines. While a disease or impairment may be the cause for limitations and restrictions, environmental factors, such as support from family members or access to public institutions and services, have also an influence. A framework for the description of a person's health status is provided by the World Health Organization (2001) with the International Classification of Functioning, Disability and Health (ICF). The common ontology and information structure given by the ICF facilitates the comprehension of health states and can be a valuable tool in needsassessment and evaluation of assistive technologies (AT). According to World Health Organization (2001, p. 10), the ICF consists of the components: Body Functions and Structures, Activities and Participation, Environmental Factors, and Personal Factors. Each component, except for Personal Factors, is subdivided into domains of related "physiological functions, anatomical structures, actions, tasks or areas of life" World Health Organization (2001, p. 3); comprising category structures. Categories are assigned a unique code and qualifiers can be added to describe the magnitude of functioning or disability of a specific person in a category. In this context, assistive technologies can be regarded as environmental factors, enhancing the health status of persons with impaired Body Functions and Structures, and related limitations in Activities and Participation. While each category of body function or activity could be addressed in the development of health-supporting technology, assistance systems tailored to a target-group specific model of disability would promise the biggest impact.

Muò et al. (2005) assessed the disabilities of 26 patients with AD by applying the ICF. As reported, impairments in *Body Functions*

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