



AALBORG UNIVERSITY
DENMARK

Aalborg Universitet

A Universal Design Perspective on Care Homes for Elderly People with and without Dementia

Mathiasen, Nanet; Kirkeby, Inge Mette; Sigbrand, Lone

Published in:
Transforming our World Through Design, Diversity and Education

DOI (link to publication from Publisher):
[10.3233/978-1-61499-923-2-336](https://doi.org/10.3233/978-1-61499-923-2-336)

Creative Commons License
CC BY-NC 4.0

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Mathiasen, N., Kirkeby, I. M., & Sigbrand, L. (2018). A Universal Design Perspective on Care Homes for Elderly People with and without Dementia. In G. Craddock, C. Doran, L. McNutt, & D. Rice (Eds.), *Transforming our World Through Design, Diversity and Education: Proceedings of Universal Design and Higher Education in Transformation Congress 2018* (Vol. 256, pp. 336-344). IOS Press. <https://doi.org/10.3233/978-1-61499-923-2-336>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

A Universal Design Perspective on Care Homes for Elderly People with and Without Dementia

Nanet MATHIASSEN ^{a,1}, Inge Mette KIRKEBY ^a and Lone SIGBRAND ^a

^a*Danish Building Research Institute, Aalborg University, Copenhagen, Denmark*

Abstract. Within the coming years considerable resources will be spent on designing assisted living facilities for elderly people with dementia. Traditionally care homes are designed for elderly with physical impairment. However, people with dementia have others and supplementary needs. An important challenge is therefore to identify differences and similarities in what makes supportive, pleasant environments for both groups. As the group of people with Alzheimer's disease is numerous, this paper focuses on characteristics related to Alzheimer's - typically difficulties related to orientation, coping with larger groups of residential units and a lack of ability to handle welfare technology. In these respects, care homes for people with dementia differ from other settings. However, people with dementia are known to be positively sensitive to a wide range of architectural qualities such as sensory experiences, atmosphere and access to green outdoor areas. The paper argues that since these qualities have importance for a wider group of elderly, the design of care homes in this respect can be considered as an example of universal design in general. Pointing out some similarities and differences in demands for elderly with and without dementia the paper raises the question in how far it might be possible to apply some architectural qualities to care homes in general. If possible, it may lift the quality of the physical environment and at the same time make fewer alterations necessary when care homes are changed to house other inhabitants. The analysis is based on existing literature combined with own studies.

Keywords. UD, assisting living facilities, dementia, Alzheimer's, care homes, healthcare

1. Introduction

It is well known that the number of people suffering from dementia is growing in the Western world and that the concern with how to react to this problem is increasing as a consequence. Until now, no cure for the disease has been found and a main challenge is to provide the best possible care and accommodation. Obviously the group of people with dementia has specific needs, some clearly different from other people's needs, others less so. In the course of pinning down and defining the physical properties of importance in care homes for people with dementia, we ended up with a number of qualities, some of which can be characterised as general architectural qualities. In fact, they can be classified as examples of Universal Design. Qualities such as a homely atmosphere, sensory experience and contact to nature concern our presence in the

¹ Corresponding author Nanet Mathiasen, Danish Building Research Institute (SBI), Aalborg University Copenhagen, A.C. Meyers Vænge 15, 2450 Copenhagen SV, Denmark; E-mail: nam@sbi.aau.dk

physical environment. Yet when you read the classical wording of Mace [1], you will find access and activity repeated as core concepts rather than attention paid to the fact that we are sometimes just present and may not be physically active. This aspect is especially relevant in the case of elderly people with dementia. Therefore a critical discussion of the concept Universal Design is needed in order to make sure that the concept opens up for a broader understanding of our interaction with the physical environment than mere physical activity.

The paper is structured into three parts. First, we introduce background, problem and method. In the second part, three different parameters are presented that concern specific needs for people with dementia living in care homes, and finally we discuss some implications for the understanding of our interactions with the physical environment in a Universal Design (UD) perspective.

2. Background

Until recently, the design of most care homes in Denmark focused on the needs of people with physical impairments and providing sufficient space for a safe work environment for caregivers that use assisting devices in their daily work with the residents in a care home [2]. That resulted in larger private individual homes with bathrooms and shared dining and living rooms that could accommodate wheelchairs and hoists. Caregivers, and care homes have moved towards a larger-scaled, more institutional environment.

A survey documented that up to 75% of residents in care homes are now people with dementia or other mental disorders [3]. People with cognitive disabilities are known to have other needs when it concerns the design of their physical surroundings than people with no dementia, e.g. a simple and clear planning layout and self-explanatory environment are important [4]. However, most people will probably benefit from these design elements and therefore they can be regarded as part of a UD approach.

In the coming 25 years, the number of people with dementia is expected to grow due to rising life expectancy [5]. Focus on people with dementia and their needs is therefore assumed to be necessary for the design of new care homes or for remodelling existing ones.

This paper takes a first step into a critical discussion of UD and the planning of the physical environment of the care homes for people with dementia. It is a question to what extent the concept of UD supports the need of the residents of the care homes and whether it is reasonable to talk about a UD concept in relation to people with dementia.

This paper is based on a limited number of parameters without the intention of exhaustively discussing this comprehensive issue. Furthermore, as 'dementia' covers more than 200 different diseases of the brain, we focus on the most common disease, Alzheimer's disease, as it covers more than 65% of the cases.

We focus on the design qualities of the physical environment without discussing different care philosophies, but we acknowledge their importance for residents in the care homes.

The method used is a literature review.

3. Specific Needs of Elderly People with Dementia

Research shows that elderly people with dementia benefit from an environment designed to support them and the challenge that they face in their everyday life [6, 7, 8]. From these recommendations, four main aspects can be deduced: 1) a homely atmosphere, 2) sensory stimulation through light, 3) contact to nature and 4) living in small-sized groups.

These four focus areas overlap to some extent: the contact to nature also provides the elderly with the sensory stimulation of light and light can provide the surroundings with a cosy domestic atmosphere. Moreover, small groups of residents emphasise a cosy domestic atmosphere. Many of these recommendations are useful for elderly people in general and for the elderly people with dementia in particular; but some are not.

There is often general agreement regarding the fourth aspect: that people with dementia will benefit from living in small-sized groups whereas elderly people without dementia can be more vulnerable in a small group where there are fewer possibilities for choosing your own social circles. The three first aspects are presented and discussed in the following.

3.1. Homeliness and Atmosphere

Homeliness, or in following also homely atmosphere, is beneficial in the sense that residents seem to be less aggressive, less restless, and need less medicine [6,7,9].

The concept of atmosphere is used to describe the overall impression we get when entering a room. It is not a matter of ‘ugly’ or ‘nice’, but about what we sense and feel. In short, how we feel in our physical surroundings. Gernot Böhme states that what we perceive are not *things* as such, but we perceive their *atmosphere*, and the atmosphere of a place interplays with our internal mood [10]. It is an important characteristic of atmosphere that we become especially aware of it when we move into another place with another atmosphere. It is a question of being more or less in harmony with our surroundings. Let us take an example: Imagine that you come home on a winter evening, cold and tired. You decide to take a warm bath. If the water has the absolutely right temperature the moment when you sink your body into the bathtub – then you know what it means to be in harmony with your environment. This also applies to the quality of the air that envelops your body. However, far from everything touches your skin so directly. We get other experiences through our senses - see, hear, smell. Further, the connotations that point back to the meaning behind the directly-experienced, here-and-now atmosphere.

It should be noted that in contrast to other people, people with dementia do not have the same possibilities of changing their surroundings – either by moving away or by changing the outfit. They are to a very high degree dependent on the physical environment that we design and furnish for them, and they are increasingly cut off from many other experiences. Nevertheless, they are just as much or maybe even more, subject to the particular atmosphere in their surroundings. Jan Sonntag who works with music therapy [11] says that it seems that their sensitivity to atmosphere increases when their cognitive abilities fade away. According to Kasper Jørgensen, their emotional memory listens to qualities such as homeliness and atmosphere, and this kind of memory is probably more robust than some other kinds of memory that vanish more quickly in the course of the disease [12]. It means that whereas many experiences drift out of their reach, they may still experience architectural qualities in their immediate surroundings. Other

researchers stress that although people with dementia quickly forget the reason behind their sad or happy mood, the mood lingers on [13].

Therefore, it is important to consider how to design and outfit homes for people with dementia in a way that may influence their mood positively. The fact that we feel the necessity to discuss how to create homeliness documents the dilemma that a care home is a home and at the same time part of an institution. A significant difference is that our 'own' home contains well-known objects that we have purchased and placed in accordance with own wishes. In own home you find traces from own activities – a significant testimony of inhabitancy [14]. A home is a space that the residents' control, Douglas said [15]. However – the move from own home to care home is characterised by loss of control. The first step is derived from the illness – and the reason for moving. The next step comes from the fact that the institution, the care home, has to consider many other demands, and it is to a lesser degree possible to show individual considerations. Further, it is a working place that is also considers the working place in relation to the caregivers.

In order to make a care home as homely as possible, space should be made for the residents' personal belongings in their room/flat. In common rooms, there must be space for well-known kinds of furniture and outfitting. It is a matter of recognising objects as belonging to their life and lifestyle as known from previous dwellings, considering lifestyles (The Hogewijk care home in Holland) or cultural background [16]. However, it is just as important as avoiding things that refer to 'home' as it is to avoid things that symbolise 'institution'. It is a matter of the overall impression and this total of impressions also contains components like light and contact to nature.

Yet, a homely atmosphere is also important for people without dementia. For people with dementia even more so, because they are cut off from so many other aspects of life and experiences due to their loss of mental ability.

3.2. Sensory Stimulation through Light

As human beings, we perceive the world through our senses. Recollection, memory and experience is linked to the senses and thereby makes us interpret our everyday lives. Elderly people with dementia are often challenged by the reduction of their cognitive ability. Therefore, it is even more important to ensure stimulation of the various senses. Both sensory overstimulation and sensory deprivation can be unfavourable for elderly people with dementia [6]. Consequently, it is important to establish a careful balance where the sensory stimulation supports the elderly people in a satisfactory way. Through the stimulation of the senses, elderly people with dementia might remember and recognise various activities that can give them a feeling of being present and having a meaningful life.

Humans have five basic senses: vision, hearing, smell, taste and touch. The most important of these senses is vision, and vision is stimulated by light.

When light enters the eye, it has two effects: the visual effect and the non-visual effect. The visual effect is related to seeing, and the non-visual effect is related to our circadian rhythm. The circadian rhythm refers to our daily activity cycles based on a 24-hour pattern. Both effects are important for the quality of life of elderly people and in particular elderly people with dementia.

As people with dementia are often elderly, it is important to recognise limitations of an aging eye. The eye changes with age as the lens becomes less transparent, the ability to focus diminishes, the retinal function declines and cataract changes of the lens become

frequent. This also means that with age the eye becomes less efficient. These changes in the older eye require a higher light intensity to obtain the same effect as that of a younger eye.

The non-visual effect of the light in the eye relates to our ability to stay awake and active during the day and calm and relaxed during the night so that we can have a good night's sleep. This ability controls the hormones and the hormones are affected by light. To maintain the circadian rhythm, it is therefore important to be exposed to light. The exposure to light affects all elderly people and in general, they benefit from it. However, when it comes to people with dementia, it is even more important as they have difficulties in orienting themselves in both space and time [17].

The exposure to light has the best effect when it takes place during the morning. To take a walk outdoors during the morning in order to be exposed to daylight is a very good and efficient way of exposing elderly people to light. Physical environments like atriums, conservatories or sunrooms are good alternatives to exterior spaces that provide elderly people with dementia with the possibility of being exposed to a high light intensity.

The visual effect is related to vision. Both daylight and artificial light illuminates the surroundings and thereby support the elderly people so that they are able to see and understand their surroundings. The daylight indicates the time of day and the season, for which reason it is important to have windows with a view that allows elderly people to see the variation of the day and the outdoor activities.

Artificial light can be supportive by targeting a specific purpose. In that sense, it can support the ability to recognise people and places, to see steps, door handles, light switches etc. Light can also underline the use of a table, the purpose of an armchair etc. and in that way guide elderly people with dementia to perform an action. Therefore, it is important that the light has an appropriate direction, a good colour rendering, good contrast without glare so that the vision is supported in the best possible way [18, 19]. Especially when the cognitive performance is challenged, it is important that the experience of the light is straightforward which means that traditional ways of lighting up spaces and functions should be recognised.

The requirements and guidelines mentioned in the above support the everyday lives of people with dementia, but in general they suit for elderly people very well. The aspects presented here typically do not disturb elderly people. On the contrary, elderly people are in general in favour of the aspects presented. Moreover, they are crucial for elderly people with dementia in order to support their wellbeing.

3.3. Contact to Nature

During recent years, research has shown interest in how contact with nature influences the quality of life among people including people with dementia. Though it is a new research field, various results show beneficial health effects for wellbeing and mood, behaviour, the use of medication, improved physical state causing fewer falls and better sleep rhythm among people with dementia [20, 21, 22].

In this context, 'nature' should be understood broadly: it covers not only plants and animals, but also includes the terrain and landscape, water, rocks and stones, light, wind and weather.

People with dementia can achieve benefits from the contact with nature by just being outdoors and enjoying the sensory stimulation e.g. through the sight of colours and shapes of plants, the sounds of rippling water, the scents of flowers and the sensation of the warmth from the sun or the taste of a freshly picked berry. Though access to perform

garden-related activities like watering, planting, hatching, picking and collecting might support and maintain the physical abilities of a person with dementia, it is not necessary to practice these activities in order to benefit from the contact with nature.

Indoor gardens or conservatories with a high level of daylight, or just the view of green areas outside a large window that you can get close to are ways to make nature accessible for people who have difficulties getting outdoors. Especially in climates, where it is too dark, too cold or too hot for being outdoors a large part of the year. A study by Lee and Kim [23] showed positive effects of indoor access to nature concerning sleep, agitation and cognition among people with dementia.

However, other research has shown [24] that there are more benefits in outdoor contact with nature. Mainly due to the access to daylight which is important for the circadian rhythm, more diverse stimulation of the senses, better options for physical activities and social interactions. For people with dementia, elements and activities related to nature might evoke memories from their past and support their quality of life. But in many cases, an indoor green area may supplement outdoor green spaces and create easy access to many of the benefits of nature all year round, in all climates for people with dementia in a care home.

To obtain the health benefits from contact with nature, research has shown that certain elements have to be in focus in the design of both outdoor and an indoor green spaces in care homes [25, 26, 27, 28]:

There must be a close connection between indoor rooms and the outdoor green spaces, physically and visually. Most people with dementia have to be able to see a facility in order to use it due to the characteristics of the disease. Secondly, outdoor green spaces should be a secure and safe area, possible to overlook. It should offer options both for just being present and for doing garden-related activities, as both aspects are important for the quality of life of people with dementia. Finally, outdoor green spaces should have good light conditions as that is important for an elderly person to see properly and for the circadian system.

4. Discussion

Research emphasises that homeliness, light and contact with nature are beneficial for people with dementia. These qualities are not 'specialised design' targeted at people with dementia, but general qualities. However, they are highly important for the well-being of people with or without dementia in a care home. We see a clear example of Universal Design, which provides a care home with a certain flexibility in case of future adaptation from housing people with dementia to people without dementia or the other way round. We cannot argue that high quality architecture can be built at the same cost as poor architecture – although many qualities may, in fact, be reached without extra costs by care shown at the design stage. But it may be an economic advantage if it makes it easier to convert care homes from housing one group to another. In the well-known definition of Universal Design by Mace: "Universal Design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" [1]. The term "Universal Design" deals with the notion that we can find universal solutions – which ideally suit all or at least as many as possible and architectural qualities such as atmosphere, light and contact to nature seem easy to include in the definition. However, when you read Mace's seven principles that outline the concept Universal Design – you meet the words use, access, action and

approach in each principle – technical practical issues which are necessary for being able to participate in society, which we in no way belittle. Yet, in care homes there are other aspects of life for the residents than mere access. The care home is now their home – they spend their time being there, not on the move, not engaged in any functional rational activity. They dwell - and we realise the literal meaning of the word a dwelling. This paper questions the quality of *dwelling* in the double sense of the word. For people with dementia the care home, as often as not, is their final home. They still need physical access to moving around, but by taking it for granted that this kind of accessibility is available, you have to recognise that “the quality of dwelling” ought to have a high standard to fulfil a serious wish for quality of life. The residents in care homes spend the major part of their life there – and they are completely dependent on of their immediate environment.

In this paper, we deal with the relationship between people and environment in a broader understanding – asking for more than rational functional utility. Rather, it concerns a part of our relationship, which is decisive for whether we feel in harmony with our immediate surroundings, or not. In his article “Universalism, universal design and equitable access to the built environment”, Rob Imrie criticises the concept of Universal Design as too limited. Universal Design provides, he says, “a useful, yet partial, understanding of the interrelationships between disability and design that may limit how far inequalities of access to the built environment can overcome” [29]. We share the criticism of the concept as being incomplete and point out another lacking perspective: Although access to a place is a precondition for getting there, and usability a precondition for taking part in many activities, on our own or together, a big part of our time is spent *being, dwelling* in a place, and depending on how the space is - cold, warm, pleasant, unpleasant, homely or institutional. The above discussed qualities like atmosphere, contact to nature and light are examples of such qualities, and they are living conditions for all of us, including and even more for people with dementia - in the same way that the good door handle may be pleasant for ‘all’ – and crucial for people with weak hands.

5. Conclusion

Dementia challenges design of care homes. Because people with dementia are found to be sensitive to the architectural parameters: sensory stimulation through light, contact to nature, and homely atmosphere, the design of care homes for people with dementia ought to respond to it.

Yet, the mentioned qualities are general qualities from which many people may benefit – and care homes designed with respect for them also improve living environments for other people than those who suffer from dementia. In other words: the mentioned design parameters are clear examples of Universal Design. They are crucial for the life quality of the group of people with impairment caused by Alzheimer’s and at the same time an improvement for a wider group of people.

However, in this respect the concept of Universal Design was found to be too restrictive because it primarily seems to focus on access, use and functionality in a technical-functional meaning. Renewed studies are needed to support a discourse on Universal Design that also includes other aspects. Previous research has already criticised Universal Design for being too narrow and taking only technical-functional aspects into consideration, thus neglecting a human-rights perspective and the democratic right to be part of society. In addition to this criticism, we want to add a

further critical perspective and point out that a one-sided emphasis on access, use and activity may neglect that respect is paid to an existential part of living in a care home – being there - dwelling!

References

- [1] Mace, R., (1988). *Universal design: housing for the lifespan of all people*. Rockville, MD: Department of Housing and Urban Development.
- [2] Arbejdstilsynet, Bygge- og Boligstyrelsen, Socialministeriet, Kommunernes Landsforening, Københavns Kommune, Frederiksberg Kommune. (1997). *Vejledning om indretning af ældreboliger for fysisk plejekrævende m.fl.* (At-cirkulæreskrivelse nr. 3 – 1997). København: Forlaget Kommuneinformation.
- [3] Hjelmar, U., Bhatti, Y., Rostgaard, T., Petersen, O.H., Vrangbæk, K., Larsen, P. T. & Jacobsen, L.M.M. (2016) *Kvalitet på offentlige og private plejecentre i Danmark*. Roskilde: Roskilde Universitet.
- [4] Dansk Standard (2012) *Bygningskonstruktion - Tilgængelighed til og anvendelighed af de byggede miljø DS/ISO 21542*. Charlottenlund: Dansk Standard.
- [5] Nationalt Videnscenter for Demens (2018): downloaded 16.05.2018:
<http://www.videnscenterfordemens.dk/forskning/forskningsnyheder/2018/05/nye-landsdaekkende-tal-for-demens-i-danmark/>
- [6] Day, K., Carreon, D., & Stump, C. (2000). The therapeutic design of environments for people with dementia a review of the empirical research. *The Gerontologist*, 40(4), 397-416.
- [7] Marquardt, G., Büter, K., Motzek, T. (2014). Architektur für Menschen mit Demenz in stationären Altenpflegeeinrichtungen - Eine evidenzbasierte Übersichtsarbeit. I: Marquardt, G., & Viehweger, A. (red.). *Architektur für Menschen mit Demenz: Planungsgrundlagen, Praxisbeispiele und zukünftige Herausforderungen*. Dresden: Sächsische Landesbibliothek – Staats- und Universitätsbibliothek Dresden. Retrieved from: <http://www.openminded.ag/Downloads/tagungsband-architektur---demenz.pdf>
- [8] Sigbrand, S.; Bredsmose, A.; Jensen, P.H.; Kirkeby, I.; Lygum, L.V.; Mathiasen, N. (2016). *Plejeboliger for personer med demens – detaljer og eksempler* (SBI-anvisning 263). København: Statens Byggeforskningsinstitut, Aalborg Universitet.
- [9] Høyland, K., Kirkevold, Ø, Woods, R., & Haugan, G. (2015). *Er smått alltid godt i demensomsorgen? Om bo- og tjenestetilbud for personer med demens*. Oslo: SINTEF akademisk forlag.
- [10] Böhme, G. (1995). *Atmosphäre*. Frankfurt: Main, Suhrkamp.
- [11] Sonntag, J. (2013). *Demenz und Atmosphäre: Musiktherapie als ästhetische Arbeit*. Frankfurt: Mabuse-Verlag.
- [12] Jørgensen, K., Danish Dementia Research Centre, mail 12.12.2016
- [13] Guzmán-Vélez et al., 2014. Feelings without memory in Alzheimer disease. *Cognitive and Behavioral Neurology*, 27(3), 117-129.
- [14] Bollnow, O.F. (1963). *Mensch Und Raum*. Stuttgart: W. Kohlhammer.
- [15] Douglas, M. (1991). The idea of a home: A kind of space. *Social Research* 58(1), 287-307.
- [16] Day, K., & Cohen, U. (2000). The Role of Culture in Designing Environments for People with Dementia, A Study of Russian Jewish Immigrants. *Environment and Behavior*, 32(3), 361-399. London: SAGE Publications Ltd.
- [17] Torrington, J.M.; Tregenza, P.R. (2006). Lighting for people with dementia. In: *Lighting Res. Technol.* 39, 1 81-87.
- [18] Boyce, P.R. (2003). *Human Factors in Lighting* (2. Udgave). London: Taylor & Francis Group.
- [19] Sørensen, S.; Brunnström, G. (1994). Quality of light and quality of life: An intervention study among older people. In: *Lighting Res. Technol.* 27 (2), 113-118.
- [20] Detweiler, M.B., Sharma, T., Detweiler, J.G., Murphy, P.F., Lane, S., Carman, J., Chudhary, A.S., Halling, M.H. & Kim, K.Y. (2012). What is the evidence to support the use of therapeutic gardens for the elderly? *Psychiatry investigation*, 9(2), 100-110.
- [21] Gonzalez, M. T., & Kirkevold, M. (2014). Benefits of sensory garden and horticultural activities in dementia care: A modified scoping review. *Journal of Clinical Nursing*, 23(19-20), 2698-2715.
- [22] Whear, R., Coon, J.T., Bethel, A., Abbott, R., Stein, K., & Garside, R. (2014). What is the impact of using outdoor spaces such as gardens on the physical and mental well-being of those with dementia? A systematic review of quantitative and qualitative evidence. *Journal of the American Medical Directors Association*, 15(10), 697-705.
- [23] Lee, Y., & Kim, S. (2008). Effects of indoor gardening on sleep, agitation, and cognition in dementia patients – a pilot study. *International Journal of Geriatric Psychiatry*, 23(5), 485-489.

- [24] Connell, B.R., Sanford, J.A., & Lewis, D. (2007). Therapeutic effects of an outdoor activity program on nursing home residents with dementia. *Journal of Housing for the Elderly*, 21(3-4), 194-209.
- [25] Marcus, C.C., & Sachs, N.A. (2013). Therapeutic landscapes: An evidence-based approach to designing healing gardens and restorative outdoor spaces. New York: John Wiley & Sons Inc.
- [26] Marshall, M. (2010). *Designing balconies, roof terraces and roof gardens for people with dementia*. Stirling: Dementia Services Development Centre, University of Stirling.
- [27] Pollock, A., & Marshall, M. red.). (2012). *Designing outdoor spaces for people with dementia*. Sydney, Australia: HammondCare.
- [28] Zeisel, J., & Tyson, M.M. (1999). Alzheimer's treatment gardens. I: Marcus, C.C., & Barnes, Marni (red.). *Healing Gardens: Therapeutic Benefits and Design Recommendations*, 437-504. New York: John Wiley & Sons.
- [29] Imrie, R., (2012). Universalism, universal design and equitable access to the built environment. IN: *Disability & Rehabilitation*, 2012; 34(10), 873-882.