

“The nourishing soil of the soul”: The role of horticultural therapy in promoting well-being in community-dwelling people with dementia

Abstract

Two-thirds of people with dementia reside in their own homes; however, support for community-dwelling people with dementia to continue to participate in everyday activities is often lacking, resulting in feelings of depression and isolation among people living with the condition. Engagement in outdoor activities such as gardening can potentially counteract these negative experiences by enabling people with dementia to interact with nature, improve their physical and psychological well-being. Additionally, the collaborative nature of community gardening may encourage the development of a sense of community, thereby enhancing social integration. Despite increasing evidence supporting its therapeutic value for people with dementia in residential care, the benefits of horticultural therapy have yet to be transposed into a community setting. This paper will examine the theoretical support for the application of horticultural therapy in dementia care, before exploring the potential of horticultural therapy as a means of facilitating improved physical and psychological well-being and social integration for people living with dementia within the community.

Introduction

There are currently 850,000 people living with dementia in the UK, and this figure is set to increase to over 1 million by 2025 (Prince et al., 2014). 63.3% of people with dementia are living at home; however, community-based support for those living with the condition is inadequate, with little peer support and limited opportunities for people with dementia to continue to participate in everyday activities such as gardening (Knapp et al., 2007). Over 70% of people with dementia surveyed by the Alzheimer's Society (Kane and Cook, 2013) reported that they had ceased participation in hobbies and activities that they had enjoyed before developing dementia. Public perceptions of dementia further inhibit the ability of people with dementia to participate in activities within the community; almost two-thirds of survey respondents from the general public reported that they did not believe that people with dementia could continue to take part in any activity they enjoyed, and 35% of respondents stated that they would not feel comfortable entering a conversation with a person with dementia (Kane and Cook, 2013). This lack of community involvement and understanding, in addition to insufficient opportunities to participate in activities, has contributed to feelings of depression, anxiety, and isolation amongst people with dementia (Lakey et al., 2012).

Consequently, the focus of dementia research has shifted, with researchers exploring creative, empowering ways of enabling people to live well with dementia through active participation in everyday activities, such as arts, music, and sports (Carone et al., 2014; de Medeiros and Basting, 2014; McDermott et al., 2014). A growing awareness of the importance of access to outdoor environments for people with dementia has developed in recent years, with dementia

researchers and care providers acknowledging that contact with the natural world is an essential component of holistic dementia care (Schwarz and Rodiek, 2007). However, little research has been conducted regarding the impact of nature affiliation and outdoor activity for people with dementia. The small number of studies in existence have primarily focused upon environments such as 'wander gardens' in which people with dementia play only a passive role (Detweiler et al., 2008; Whear et al., 2014).

Active engagement with the outdoors through activities such as horticultural therapy, defined by Simson and Strauss (2008, p.xxiii) as "*a treatment modality that uses plants and plant products to improve the social, cognitive, physical, psychological, and general health and well-being of its participants*", has demonstrated significant benefits across a broad spectrum of medical conditions (Spring et al., 2014; Verra et al., 2012), in addition to promoting psychological well-being (Eriksson et al., 2011) and encouraging social integration (Smith and Parpia, 2014).

Despite slowly increasing support for the concept of transposing the benefits of engagement with the outdoors into dementia care strategies, the utility of horticulture as a therapeutic intervention for people with dementia has remained overlooked, with few researchers exploring the specific impact of gardening upon the well-being of people with dementia. A small handful of studies have explored the benefits of activity-based horticultural therapy for people with dementia (Jarrott et al, 2002; Jarrott and Gigliotti, 2010), with promising results; however, existing research has focused exclusively upon care home environments, with no

analysis of the benefits of horticultural therapy for the substantial number of people who live with dementia in the community.

Although the concept of 'horticultural therapy' has demonstrated validity, the term itself is potentially problematic. As ecopsychologist Steven Harper (1995) observed, the term 'therapy' implies that there is an illness to be cured, and that the intervention in question is finite, ending when the person is 'healed'. Additionally, 'therapy' implies that the activity in question must be delivered by a 'therapist'; however, as Innes (2002) highlighted, creative interventions in dementia care may also be undertaken by non-therapists who wish to empower people with dementia to experience and enjoy creative, holistic activities. . Harper (1995) argued that in biophilic interventions such as gardening, nature is the true teacher, and participants in such interventions should be encouraged to experience their own personal evolution through interaction with nature, as opposed to following the direction of a 'therapist'. For the purposes of this paper, the term 'horticultural therapy' will be applied, as it is currently the accepted terminology. However, it may be pertinent for future researchers and practitioners to explore alternative phraseology when encouraging people with dementia to participate in gardening activities, in search of a term that more appropriately reflects the nature of the activity.

This paper will explore the theoretical support for the application of horticultural therapy in empowering people to live well with dementia, before examining relevant literature regarding the physical and psychological benefits of the intervention for people with dementia, and discussing the potential impact of horticultural therapy upon social integration and well-being for people living with dementia within the community.

Nature affiliation and the biophilia hypothesis

The concept of nature affiliation as a fundamental component in fostering well-being has long been embraced by environmental theorists and philosophers, from 19th century Transcendentalists such as Henry David Thoreau, who wrote that *“there can be no very black melancholy to him who lives in the midst of Nature, and has his senses still”* (Thoreau, 1995, p.85) to environmentalist John Muir, who observed that *“Thousands of tired, nerve-shaken, over-civilised people are beginning to find out that going to the mountains is going home; that wildness is a necessity”* (Muir, 2006, p. 1). Psychiatrist Carl Jung discussed the connection between nature and well-being in a series of interviews, describing the natural world as *“the nourishing soil of the soul”* (Jung, cited by Sabini, 2008, p.1), and stating that *“human existence should be rooted in the Earth”* (Jung, cited by Sabini, 2008, p.194). Jung believed that humans and the natural world co-exist in a symbiotic relationship that provides humans with emotional and spiritual nourishment, and that psychological degradation results when humans are divorced from nature (Jung, cited by Sabini, 2008). Nollman (1994) asserted that attunement between a person’s inner self and their natural environment is a crucial factor in the establishment of a sense of place, stating that gardening offers individuals an opportunity to cultivate their own relationship to their environment. However, Nollman (1994) argued that if gardening is to effectively provide an individual with a sense of place, the human relationship with the garden must shift from dominance to symbiosis, nurturing and participating with the

natural processes of the garden, rather than asserting control over its development. Frumkin (2001) argued that contact with the environment is a vital component of well-being, suggesting that interaction with the natural environment complements the World Health Organisation's definition of health as *"a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity"* (World Health Organisation, 2006, p.1). Frumkin (2001) concluded that contact with nature should be incorporated into healthcare, with activities such as gardening and animal therapy prescribed as an adjunctive treatment in medicine and rehabilitation.

Modern psychology has become increasingly concerned with the effect of disconnection from nature upon psychological health. Environmental psychologist Rachel Kaplan (1983, p.155) wrote that,

"Nature matters to people. Big trees and small trees, glistening water, chirping birds, budding bushes, colourful flowers – these are the important ingredients in a good life."

The fundamental concept of the ecopsychology subfield is that the separation of human beings from their ecological context is psychologically damaging, affecting interpersonal relationships and emotional well-being (Metzner, 1995). Ecopsychological healing, referred to in practice as ecotherapy, focuses upon therapies that heal the disconnect between humans and the natural world, thereby reducing symptoms such as anxiety, depression, and stress, and encouraging a sense of place and belonging (Buzzell and Chalquist, 2010). Attention Restoration Theory (Kaplan and Kaplan, 1989) asserts that concentration and attention spans can be improved by

interaction with nature, whether through active engagement or exposure to views of natural environments. The theory has been extensively validated in research, with evidence suggesting that natural environments impact more significantly upon attention spans than urban surroundings (Berman et al., 2008), and that Attention Restoration Theory can be applied in the amelioration of a variety of psychological conditions including attention deficit hyperactivity disorder (Faber Taylor and Kuo, 2009), depression (Berman et al., 2012), and stress (Hansmann et al., 2007).

In 1984, biologist Edward O. Wilson introduced the biophilia hypothesis, exploring the human connection to nature, and its impact upon physical, mental, and emotional health (Wilson, 1984). The biophilia hypothesis states that human dependence upon nature extends beyond the material, asserting that human beings are driven by an evolutionary need to interact with nature (Kellert, 1995). Interaction with, or exposure to, nature elicits profound physical, psychological, and emotional responses, highlighting a fundamental interconnectedness between human beings and the natural world (Bossen, 2010). Kellert (2012) suggested that affiliation with nature has shaped human capacity for thought, healing, and health, and that nature performs a crucial role in maintaining physical and mental well-being. A growing body of research has demonstrated the validity of the biophilia hypothesis in practice, with evidence suggesting that interaction with nature can alleviate stress in children (Wells and Evans, 2003), improve mood and self-esteem (Barton et al., 2012), and act as a preventative measure in the development of mental health conditions (Maller et al., 2006).

The importance of nature in promoting well-being has been increasingly recognised in national policy: in 2011, the United Kingdom Department of Health published a white paper highlighting the importance of encouraging reconnection between people and the natural world, stating that increased engagement with the outdoors impacted positively upon physical and mental health, and social integration, in addition to reducing crime and providing opportunities for learning (Department of Health, 2011). In 2012, Natural England released a complementary strategy to improve access to, and engagement with, the natural world in the United Kingdom, further emphasising the health and social benefits of interaction with nature, in addition to the sense of enjoyment obtained from being outdoors (Natural England, 2012). In 2014, the United Kingdom Wildlife Trusts, in partnership with the Royal Society for the Protection of Birds, launched a campaign to introduce a Nature and Wellbeing Act, producing a green paper proposal for the Government (Benwell et al., 2014) which presented engagement with the natural environment as a potential solution to a variety of social, economic, and environmental issues, and suggested that the Government encourage interaction with nature as a method of preventative and treatment-based healthcare, in addition to harnessing the social and community benefits of the outdoors. The importance of encouraging interaction with nature as a means of restoring and maintaining well-being has been acknowledged as an international health promotion policy concern, with professionals acknowledging that encouraging individuals to engage with the natural world can lead to improvements in physical, psychological, and emotional well-being which are often equal or superior to conventional medical treatment (St Leger, 2003; Pryor et al., 2006).

Despite a growing acceptance of the importance of interaction with the natural world in maintaining and improving well-being, a significant proportion of people with dementia

remain deprived of regular contact with nature. Gilliard and Marshall (2012) reported that 50% of care home residents with dementia never go outside, with a further 25% going outdoors only rarely. More than two-thirds of community-dwelling people with dementia reported that they have ceased participation in activities they formerly enjoyed, due to a loss of confidence, and a fear of becoming lost or confused. Consequently, 50% of people with dementia leave the house only once a week or less, resulting in reduced opportunities to benefit from interaction with the outdoors (Kane and Cook, 2013).

In its 2013 report, *Greening Dementia* (Clark et al., 2013), Natural England explored the benefits of outdoor engagement for people with dementia, concluding that access to the natural environment facilitated improved emotional and physical health; increased verbal expression, memory, and awareness; a greater sense of general well-being, self-esteem, and autonomy; and a sense of belonging and increased social integration. However, the report noted that the available evidence of the benefits of outdoor interaction for people with dementia was limited, and too focused on the short term, with little research exploring the long-term impact of specific outdoor activities. Furthermore, the report highlighted that all of the existing research regarding the benefits of interaction with nature for people with dementia had been conducted in a care home setting. The report consequently recommended that, as two-thirds of people with dementia live in their own homes, the focus of future research investigating the benefits of outdoor engagement for people with dementia should shift to people who live with dementia in the community.

Although outdoor activity for people with dementia exists in many forms, active engagement through horticultural therapy possesses unique benefits for people living with the condition. A productive garden space, such as an allotment, could be particularly beneficial for people with dementia; the physical activity associated with allotment tasks, in addition to the sense of achievement attained from growing one's own food, and the social interaction enjoyed during gardening sessions, can create an empowering experience for people with dementia, resulting in an increased sense of self-esteem, and relief from stress (Robertson, 2012). Hernandez (2007) compared both active and passive forms of interaction with outdoor space in a residential home for people with dementia, and concluded that active participation in horticultural therapy activities represented the most effective form of garden-based therapy, offering a means of physical therapy in addition to improved cognitive function and emotional well-being. Additionally, Hernandez (2007) observed that participation in gardening activities interventions can aid the well-being of carers of people with dementia and care home staff members, by providing an opportunity to alleviate stress and share the sense of achievement experienced by participants.

Although the cognitive changes experienced by people with dementia, in addition to age-related physical impairments, may impact upon their ability to participate in gardening activities, a garden designed in a manner conducive to the needs of people with dementia can provide an enriching therapeutic experience. Participants in horticultural therapy interventions within residential care settings have reported a sense of achievement from growing their own food, and undertaking the physical labour associated with gardening. The olfactory associations related to certain plants and flowers enabled some group members to recall particular memories, and others reflected upon the enjoyment associated with returning to an

activity in which they had previously felt unable to participate since being diagnosed with dementia (Litherland, 2012). D'Andrea et al (2007) found that horticultural therapy delayed cognitive decline in care home residents with Alzheimer's disease; Hewitt et al (2013) observed that weekly engagement in horticultural therapy improved well-being and afforded a sense of purpose to people with young-onset dementia; and in a comparative study of horticultural therapy and traditional activities, Jarrott and Gigliotti (2010) noted that levels of engagement and affect were significantly increased in the horticultural therapy group. Such findings suggest that people with dementia can benefit substantially from active outdoor engagement through horticultural therapy, an observation echoed by Hernandez (2007), who asserted that therapeutic gardens should be introduced as standard in residential care facilities for people with dementia, due to their capacity to improve quality of life for people living with the condition.

Physical and psychological well-being

The physical activity associated with gardening can contribute to the therapeutic value of horticulture for people with dementia. Dan et al (2012) observed that participation in a physical activity program improved quality of life for people with dementia through increasing functional independence and encouraging social interaction; Potter et al (2011) found that exercise improved physical function in people with dementia; and Brown et al (2015) noted that regular participation in exercise classes may help to improve cognitive function. Stubbs et al (2014) reported a variety of positive effects of participation in physical activity programs for

people with dementia, including increased energy levels, improved motor function, increased general quality of life, and higher levels of social interaction.

“Green exercise” has proven particularly beneficial for people with dementia. Hughes (2012) highlighted the benefits of a hiking group for people with dementia, expressing the empowering and equalising nature of the activity, and praising the ability of the outdoors to promote conversation and encourage reminiscence. Chalfont (2007) stated that engagement in outdoor activity can contribute to improved mood, behaviour, and cognition, increased motor function, and stimulation of senses, and may even assist people with dementia in creating new memories through exposure to sensory stimuli. McKillop (2012) discussed the catharsis of outdoor activity, crediting a love of the outdoors with an increase in confidence, improved relaxation, and the provision of a restorative environment following his diagnosis with dementia. The unique benefits arising from a combination of physical activity and outdoor interaction suggest that exercise undertaken in an outdoor setting, such as a community garden project, may offer enhanced positive impacts for people with dementia when compared to indoor physical activity.

Studies conducted within long-term residential care environments have demonstrated that horticultural therapy can positively impact upon the psychological well-being of older people. Barnicle and Midden (2003) determined that horticultural therapy significantly improved the psychological well-being of older people in long-term care, a finding supported by Rappe (2005), who found that participation in horticultural activities improved mood and sleep pattern, reduced depression, and alleviated physical pain for older people in long-term care.

Tse (2010) also observed that the introduction of a horticultural therapy programme reduced loneliness and improved life satisfaction and social integration for older people in care homes. The introduction of horticultural therapy into a community setting may therefore contribute to the amelioration of physical discomfort, emotional distress, and social isolation for people living with dementia.

Despite the positive effects of outdoor engagement for people with dementia, living with the condition can impact upon a person's ability to access and enjoy outdoor space. Duggan et al (2008) found that the confusion, anxiety, and social isolation experienced by people with dementia led them to avoid going outdoors, or to limit their activity to short walks in familiar areas, which in turn negatively impacted upon their emotional well-being. Diminished outdoor activity may hasten the progression of dementia, and increase the use of external care services by people living with the condition (Blackman et al., 2007; Duggan et al., 2008). Encouraging ongoing physical activity through engagement in horticultural therapy may therefore offer significant physical, psychological, and social benefits for people living with dementia, in addition to reducing the substantial impact of dementia upon healthcare services.

Community

Harnessing the social integration capacity of horticultural therapy is crucial to its success as an intervention in community dementia care. Loneliness and isolation are prevalent among

people with dementia, and though specific research into the influence of loneliness upon people with dementia is limited (Moyle et al., 2011a), several studies have identified negative impacts of isolation upon people living with the condition. Tilvis et al (2004) observed that loneliness was associated with increased cognitive decline in people with dementia, and Fratiglioni et al (2000) reported that people with dementia were more likely to experience feelings of loneliness and isolation than other older adults. Interpersonal relationships, and opportunities for social integration, have been identified as key factors in ensuring a good quality of life for people with dementia (Moyle et al., 2011b), and reduced interaction with others can therefore impact negatively upon the quality of life of people living with the condition.

The Alzheimer's Society (Kane and Cook, 2013) found that almost 40% of people with dementia regularly feel lonely, compared to 24% of the general older population, indicating that dementia compounds feelings of loneliness in older people. Although many people with dementia retain a strong social network, their connections diminish in number over time, as friends and relatives detach themselves from the person following their diagnosis (Duane et al., 2013). 33% of people with dementia surveyed reported that they had lost friends following their diagnosis (Kane and Cook, 2013). The gradual decline in cognitive function and communicative ability associated with the condition can cause some people with dementia to purposely remove themselves from personal relationships, due to a fear of being misunderstood and being unable to communicate effectively. Isolation and loneliness also impact upon carers of people with dementia, with carers reporting a sense of embarrassment and fear of being shunned by people who lack understanding regarding the condition. The creation of a safe environment in which people with dementia and their carers can engage in

social activities without fear or embarrassment is therefore essential to encouraging social integration among people affected by the condition (Moyle et al., 2011a).

The provision of a safe and empowering environment in which to participate in physical and social activities is a benefit commonly attributed to horticultural therapy initiatives. Lun (2013) noted that horticultural therapy activities are highly adaptable to the needs of a particular group, enabling participants to develop skills and regain lost confidence within a secure environment in which their fears and insecurities are alleviated. Chen and Ji (2014) observed that engagement in horticultural therapy significantly reduced feelings of loneliness among older adults in residential care by facilitating social interaction within a purpose-built environment. Adevi and Martensson (2013) identified that horticultural therapy interventions offer a safe environment in which to slowly build community and regain lost confidence, empowering participants to form a fellowship with others facing similar situations, and thereby alleviating the loneliness and embarrassment reported by those who experience isolation due to a medical condition.

The Alzheimer's Society's dementia-friendly communities report (Green and Lakey, 2013) states that encouraging and supporting people with dementia to continue to access and enjoy outdoor spaces is a key element in the creation of dementia-friendly public spaces. The inclusion of people with dementia in their communities is essential to ensuring a high standard of quality of life; however, the level of inclusion of people living with the condition is low, with 59% of the general public agreeing that opportunities for people with dementia to feel included in their community are poor (Kane and Cook, 2013). The dementia-friendly

communities agenda (Green and Lakey, 2013) asserted that the creation of accessible outdoor environments for people with dementia holds significant potential for improving quality of life for people living with the condition, by providing opportunities for social interaction, encouraging a sense of community, and cultivating a sense of purpose and enjoyment in the daily lives of people with dementia. By engaging people with dementia in outdoor activities such as horticultural therapy, and enabling people with dementia to contribute to their community in a meaningful manner, the isolation, anxiety, and fear reported by people living with the condition can therefore be alleviated, significantly improving quality of life for people living with dementia.

Conclusion

Although the theoretical and policy support for the application of horticultural therapy in the holistic care of people with dementia is arguably strong, it remains a relatively overlooked element in dementia care and research, particularly within a community context. Horticultural therapy has demonstrated its validity as an intervention in a variety of contexts, and has indicated its capacity to improve physical and psychological well-being, reduce social isolation, and alleviate depression and anxiety. For people living with dementia in the home, few such opportunities to improve their well-being in a holistic and productive manner are currently available, and the isolation, anxiety, and depression experienced by this population is likely to increase as the number of people living with dementia grows. Consequently, it may be timely to consider the application of horticultural therapy as a means of improving well-being for

people living with dementia within the community. The widespread introduction of horticultural therapy in community dementia care would complement both government policy and charitable agendas, by providing an opportunity to enhance the well-being of people with dementia through engagement with the outdoors and involvement with their community. Evidence concerning the general benefits of horticultural therapy, and its applications in dementia care, suggests that horticultural therapy may offer a practical and effective solution to alleviating social isolation and improving well-being for community-dwelling people with dementia.

References

Adevi, A.A., Martensson, F. (2013). Stress rehabilitation through garden therapy: The garden as a place in the recovery from stress. *Urban Forestry & Urban Greening*, 12(2), 230-237.

Barnicle, T., Midden, K.S. (2003). The effects of a horticulture activity program on the psychological well-being of older people in a long-term care facility. *HortTechnology*, 13(1), 81-5.

Barton, J., Griffin, M., Pretty, J. (2012). Exercise-, nature- and socially interactive-based initiatives improve mood and self-esteem in the clinical population. *Perspectives in Public Health*, 132(2), 89-96.

Benwell, R., Burfield, P., Hardiman, A., McCarthy, D., Marsh, S., Middleton, J., Morling, P., Wilkinson, P., Wynde, R. (2014). A Nature and Wellbeing Act: A green paper from the Wildlife Trusts and the RSPB. Retrieved from http://www.wildlifetrusts.org/sites/default/files/green_paper_nature_and_wellbeing_act_full_final.pdf

Berman, M.G., Jonides, J., Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science*, 19(12), 1207-12.

Berman, M.G., Kross, E., Krpan, K.M., Askren, M.K., Burson, A., Deldin, P.J., Kaplan, S., Sherdell, L., Gotlib, I.H., Jonides, J. (2012). Interacting with nature improves cognition and affect for individuals with depression. *Journal of Affective Disorders*, 140(3), 300-305.

Blackman, T., Van Schaik, P., Martyr, A. (2007). Outdoor environments for people with dementia: An exploratory study using virtual reality. *Ageing and Society*, 27(6), 811-825.

Bossen, A. (2010). The importance of getting back to nature for people with dementia. *Journal of Gerontological Nursing*, 1(36), 17-22.

Brown, D., Spanjers, K., Atherton, N., Lowe, J., Stonehewer, L., Bridle, C., Sheehan, B., Lamb, S.E. (2015). Development of an exercise intervention to improve cognition in people with mild to moderate dementia: Dementia and Physical Activity (DAPA) Trial, registration ISRCTN32612072. *Physiotherapy*, epub January 2015.

Buzzell, L., Chalquist, C. (2010). Psyche and Nature in a Circle of Healing. In L. Buzzell and C. Chalquist (Eds.), *Ecotherapy: Healing with Nature in Mind*. San Francisco: Sierra Club Books

Carone, L., Tischler, V., Dening, T. (2014). Football and dementia: A qualitative investigation of a community based sports group for men with early onset dementia. *Dementia*, epub only

Chalfont, G. (2007). *Design for Nature in Dementia Care*. London: Jessica Kingsley

Chen, Y., Ji, J. (2014). Effects of horticultural therapy on psychosocial health in older nursing home residents: a preliminary study. *The Journal Of Nursing Research*, epub only

Clark, P., Mapes, N., Burt, J., Preston, S. (2013). Greening Dementia - a literature review of the benefits and barriers facing individuals living with dementia in accessing the natural environment and local greenspace- Natural England Commissioned Reports, Number 137. Retrieved from <http://publications.naturalengland.org.uk/publication/6578292471627776>

D'Andrea, S.J., Batavia, M., Sasson, N. (2007). Effect of horticultural therapy on preventing the decline of mental abilities of patients with Alzheimer's type dementia. *Journal of Therapeutic Horticulture*, 18(2007-2008), 8-17.

Dan, M., Boca, I.C., Sere, C.R. (2012). Enhancing quality of life in Alzheimer's dementia by adapted physical activities. *Sport & Society*, 12(1), 12-19.

De Medeiros, K., Basting, A. (2014). "Shall I compare thee to a dose of Donepezil?": Cultural arts interventions in dementia care research. *The Gerontologist*, 54(3), 344-53.

Department of Health (2011). Healthy Lives, Healthy People: Our strategy for public health in England. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216096/dh_127424.pdf

Detweiler, M.B., Murphy, P.F., Myers, L.C., Kim, K.Y. (2008). Does a wander garden influence inappropriate behaviours in dementia residents?. *American Journal of Alzheimer's Disease & Other Dementias*, 23(1), 31-45.

Duane, F., Brasher, K., Koch, S. (2013). Living alone with dementia. *Dementia*, 12(1), 123-136.

Duggan, S., Blackman, T., Martyr, A., Van Schaik, P. (2008). The impact of early dementia on outdoor life: A shrinking world? *Dementia*, 7(2), 191-204.

Eriksson, T., Westerberg, Y., Jonsson, H. (2011). Experiences of women with stress-related ill health in a therapeutic gardening program. *Canadian Journal of Occupational Therapy*, 78(5), 273-281.

Faber Taylor, A., Kuo, F.E. (2009). Children with attention defecits concentrate better after walk in the park. *Journal of Attention Disorders*, 12(5), 402-409.

Fratiglioni, L., Wang, H.X., Ericsson, K., Maytan, M., Winbald, B. (2000). Influence of social network on occurrence of dementia: a community-based intervention study. *The Lancet*, 355(9212), 1315-1319.

Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine*, 20(3), 234-240.

Gilliard, J., Marshall, M. (2012). Introduction. In J. Gilliard and M. Marshall (Eds.), *Transforming the Quality of Life for People with Dementia through Contact with the Natural World: Fresh Air on My Face*. London: Jessica Kingsley

Green, G., Lakey, L. (2013). Building dementia-friendly communities: A priority for everyone. Retrieved from http://www.alzheimers.org.uk/site/scripts/download_info.php?fileID=1916

Hansmann, R., Hug, S-M., Seeland, K. (2007). Restoration and stress relief through physical activities in forests and parks. *Urban Forestry & Urban Greening*, 6(4), 213-25.

Harper, S. (1995). The Way of Wilderness. In T. Roszak, M.E. Gomes, and A.D. Kanner (Eds.), *Ecopsychology: Restoring the Earth, Healing the Mind*. San Francisco: Sierra Club Books

Hernandez, R.O. (2007). Effects of therapeutic gardens in special care units for people with dementia: Two case studies. *Journal of Housing for the Elderly*, 21(1-2), 117-152.

Hewitt, P., Watts, C., Hussey, J., Power, K., Williams, T. (2013). Does a structured gardening programme improve well-being in young-onset dementia? A preliminary study. *British Journal of Occupational Therapy*, 76(8), 355-361.

Hughes, L. (2012). The Forget Me Not Centre. In J. Gilliard and M. Marshall (Eds), *Transforming the Quality of Life for People with Dementia through Contact with the Natural World: Fresh Air on My Face*. London: Jessica Kingsley

Innes, A. (2002). Preface. In A. Innes & K. Hatfield (Eds.), *Healing Arts Therapies and Person-Centred Dementia Care*. London: Jessica Kingsley

Jarrott, S.E., Kwack, H.R., Relf, D. (2002). An Observational Assessment of a Dementia-Specific Horticultural Therapy Program. *HortTechnology*, 12(3), 403-410.

Jarrott, S.E., Gigliotti, C.M. (2010). Comparing responses to horticultural-based and traditional activities in dementia care programs. *American Journal of Alzheimer's Disease & Other Dementias*, 25(8), 657-665.

Kane, M., Cook, L. (2013). Dementia 2013: The hidden voice of loneliness. Retrieved from http://www.alzheimers.org.uk/site/scripts/download_info.php?fileID=1677

Kaplan, R. (1983). The role of nature in the urban context. In I. Altham and J. Wohlwill (Eds.), *Behaviour and the Natural Environment*, vol. 6. New York: Plenum

Kaplan, R., Kaplan, S. (1989). *The Experience of Nature: A Psychological Perspective*. Cambridge: Cambridge University Press

Kellert, S.R. (1995). The Biological Basis for Human Values of Nature. In S.R. Kellert and E.O. Wilson (Eds.), *The Biophilia Hypothesis*. Washington D.C.: Island Press

Kellert, S.R. (2012). *Birthright: People and Nature in the Modern World*. London: Yale University Press

Knapp, M., Prince, M. et al. (2007). Dementia UK: A report to the Alzheimer's Society on the prevalence and economic cost of dementia in the UK produced by King's College London and London School of Economics. Retrieved from http://www.alzheimers.org.uk/site/scripts/document_pdf.php?documentID=342

Lahey, L., Chandaria, K., Quince, C., Kane, M., Saunders, T. (2012). Dementia 2012: A National Challenge. Retrieved from http://www.alzheimers.org.uk/site/scripts/download_info.php?downloadID=821

Litherland, R. (2012). Gardening and Dementia. In J. Gilliard and M. Marshall (Eds.), *Transforming the Quality of Life for People with Dementia through Contact with the Natural World: Fresh Air on My Face*. London: Jessica Kingsley

Lun, C-H. (2013). A review of horticultural therapy and caregiver's burden. *International Journal of Organisational Innovation*, 5(4), 138-146.

Maller, C., Townsend, M., Pryor, A., Brown, P., St. Leger, L. (2006). Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International*, 21(1), 45-54.

McDermott, O., Orrell, M., Ridder, H.M. (2014). The importance of music for people with dementia: the perspectives of people with dementia, family carers, staff and music therapists. *Aging & Mental Health*, 18(6), 706-16.

McKillop, J. (2012). No Roof but the Sky Above My Head. In J. Gilliard and M. Marshall (Eds.), *Transforming the Quality of Life for People with Dementia through Contact with the Natural World: Fresh Air on My Face*. London: Jessica Kingsley

Metzner, R. (1995). The Psychopathology of the Human-Nature Relationship. In T. Roszak, M.E. Gomes, and A.D. Kanner (Eds.), *Ecopsychology: Restoring the Earth, Healing the Mind*. San Francisco: Sierra Club Books

Moyle, W., Kellett, U., Ballantyne, A., Gracia, N. (2011a). Dementia and loneliness: an Australian perspective. *Journal of Clinical Nursing*, 20(9-10), 1445-53.

Moyle, W., Venturto, L., Griffiths, S., Grimbeek, P., McAllister, M., Oxlade, D., Murfield, J. (2011b). Factors influencing quality of life for people with dementia: A qualitative perspective. *Aging & Mental Health*, 15(8), 970-77.

Muir, J. (2006). *Our National Parks*. New York: Cosimo

Natural England (2012). The access and natural management strategy for Natural England. Retrieved from <http://publications.naturalengland.org.uk/publication/2776293>

Nollman, J. (1994). *Why We Garden: Cultivating a Sense of Place*. Colorado: Sentient Publications

Potter, R., Ellard, D., Rees, K., Thorogood, M. (2011). A systematic review of the effects of physical activity on physical functioning, quality of life and depression in older people with dementia. *International Journal of Geriatric Psychology*, 26(10), 1000-11.

Prince, M., Knapp, M., Guerchet, M., McCrone, P., Prina, M., Comas-Herrera, A., Wittenberg, R., Adelaja, B., Hu, B., King, D., Rehill, A., Salimkumar, D. (2014). Dementia UK: Update. Retrieved from <http://www.alzheimers.org.uk/dementiauk>

Pryor, A., Townsend, M., Maller, C., Field, K. (2006). Health and well-being naturally: 'contact with nature' in health promotion for targeted individuals, communities and populations. *Health Promotion Journal of Australia*, 17(2), 114-23

Rappe, E. (2005). The influence of a green environment and horticultural activities on the subjective well-being of the elderly living in long-term care. *University of Helsinki thesis database*. Retrieved from <http://ethesis.helsinki.fi/julkaisut/maa/sbiol/vk/rappe/>

Robertson, L. (2012). Allotments. In J. Gilliard and M. Marshall (Eds.), *Transforming the Quality of Life for People with Dementia through Contact with the Natural World: Fresh Air on My Face*. London: Jessica Kingsley

Sabini, M. (2008). *The Earth Has a Soul: C.G. Jung on Nature, Technology & Modern Life*. Berkeley: North Atlantic Books

Schwarz, B., Rodiek, S. (2007). Introduction: Outdoor environments for people with dementia. *Journal of Housing for the Elderly*, 21(1-2), 3-11.

Simson, S., Straus, M. (2008). *Horticulture as Therapy: Principles and Practice*. Florida: CRC Press

Smith, T., Parpia, R. (2014). Community gardens yield community benefits. *Parks & Recreation*, 49(10), 80.

Spring, J.A., Viera, M., Bowen, C., Marsh, N. (2014). Is gardening a stimulating activity for people with advanced Huntington's disease? *Dementia*, 13(6), 819-833.

St Leger, L. (2003). Health and nature – new challenges for health promotion. *Health Promotion International*, 18(3), 173-75

Stubbs, B., Eggermont, L., Soundy, A., Probst, M., Vandenbulcke, M., Vancampfort, D. (2014). What are the factors associated with physical activity (PA) participation in community dwelling

adults with dementia? A systematic review of PA correlates. *Archives of Gerontology and Geriatrics*, 59(2), 195-203.

Thoreau, H.D. (1995). *Walden: Or, Life in the Woods*. New York: Dover Publications

Tilvis, R.S., Kähönen-Väre, M.H., Jolkkonen, J., Valvanne, J., Pitkala, K.H., Strandberg, T.E. (2004). Predictors of cognitive decline and mortality of aged people over a 10-year period. *Journal of Gerontology*, 59a(3), 268-274.

Tse, M.M.Y. (2010). Therapeutic effects of an indoor gardening programme for older people living in nursing homes. *Journal of Clinical Nursing*, 19(7-8), 949-58.

Verra, M.L., Angst, F., Beck, T., Lehmann, S., Brioschi, R., Schneiter, R., Aeschlimann, A. (2012). Horticultural therapy for patients with chronic musculoskeletal pain: Results of a pilot study. *Alternative Therapies*, 18(2), 44-50.

Wells, N.M., Evans, G.W. (2003). Nearby Nature: A buffer of life stress among rural children. *Environment and Behaviour*, 35(3), 311-330.

Whear, R., Thompson Coon, J., 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.

Wilson, E.O. (1984). *Biophilia: The Human Bond with Other Species*. London: Harvard University Press

World Health Organisation (2006). Constitution of the World Health Organisation. Retrieved from http://www.who.int/governance/eb/who_constitution_en.pdf