



A Virtual Nature Experience Reduces Anxiety and
Agitation in People with

DEMENTIA

A Project Brief on the Impact of Aging at a Memory Care Facility

INSIDE YOU WILL LEARN ABOUT:

The capacity of a virtual nature experience to significantly reduce stress, reduce anxiety, and increase pleasure.

Treatment strategies that provide hope of reducing pharmacologic interventions and of improving quality of life for individuals with dementia and the staff who care for them.

This project brief summarizes the study done by 2016 New Investigator Award Winner, Lori Reynolds, PhD, OTR/L. The full details of her study, funded by The Center for Health Design's Research Coalition, are published in the Journal of Housing for the Elderly.

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A Virtual Nature Experience Reduces Anxiety and Agitation in People with Dementia

THE QUESTION

Can a virtual nature experience reduce anxiety and agitation in people with dementia?

THE GOAL

Identify cost-effective treatment strategies that improve quality of life for individuals with dementia when environmental or financial conditions prevent the creation of therapeutic gardens.

Executive Summary

By 2050, the number of individuals in the United States with dementia is projected to be 16 million, with a current cost of care at \$259 billion. The majority of individuals with dementia experience stressful emotions of agitation along with associated behaviors that are challenging for caregivers. A large body of research has found that viewing nature reduces stress and improves mood, but few studies have examined the potential of viewing nature for reducing the stressful emotions and associated behaviors experienced by individuals with dementia. In this study, 14 memory care residents were exposed three times to a virtual nature experience and an old movie from their generation. Before and after each exposure, stress associated with agitation and anxiety was measured by heart rate, and emotions were measured with the Observed Emotion Rating Scale and the Agitated Behavior Scale. This study found that with as little as 10 minutes of exposure to a virtual nature experience, stress as measured by heart rate was significantly reduced, anxiety was reduced, and pleasurable emotions increased. These findings hold great promise for a cost-effective treatment approach that can potentially improve the quality of life for individuals with dementia and the individuals that care for them.

Background

The number of people with dementia in the U.S. is rapidly increasing, from 5.5 million in 2017 to a projected 16 million by 2050, with the current annual cost of treating and caring for these individuals estimated at \$259 billion (Alzheimer's Association, 2016). More than 90 percent of people with dementia will experience agitation and/or anxiety, accompanied by associated behaviors that can be very difficult for caregivers to manage (Cohen-Mansfield, 2008; Kales, Gitlin, & Lyketsos, 2014). Negative emotions such as anxiety and agitation are common emotions that create stress for individuals with dementia, their caregivers, and healthcare workers (Kales, Gitlin, & Lyketsos, 2014).



IMPLICATIONS FOR PRACTICE

- 1 Cost-effective treatment approach that can be incorporated into existing memory care programs
- 2 An effective approach to managing the stress-related emotions and behaviors associated with dementia that can help reduce pharmacologic intervention
- 3 An effective addition to a care management program that can help reduce staff stress without the need for specialized training
- 4 An adjunct to an outdoor garden space that has the potential to improve the quality of life for individuals with dementia

Care Strategies

A prevalent strategy for managing the negative emotions and behaviors associated with dementia is the use of antipsychotic and benzodiazepine medications, which have limited effectiveness and can be associated with health risks (Alzheimer's Association, 2015; Livingston et al., 2014). A variety of non-pharmacologic, person-centered, behavior management strategies exist to manage the negative emotions and behaviors associated with dementia; however, there is limited evidence-based support for these strategies (Cohen-Mansfield, Thein, Marx, Kakheel-Ali, & Freedman 2012; King, 2012; Lloyd & Stirling, 2015; Maslow, K., 2013). Strategies with some evidence to support their effectiveness include individualized, generation-specific music and the use of massage (Livingston et al., 2005). Other strategies, which lack rigorous research to support their effectiveness, include validation therapy, cognitive stimulation, reminiscence therapy, and multisensory rooms (Snoezelen) (Livingston et al., 2005). A rehabilitative approach, informed by neurologic changes associated with dementia, does have research to support its effectiveness in care management and design of environments (Raia, 2011; Zeisel & Raia, 2000). Effective care strategies are important to the reduction stress (King, 2012) and turnover rates among care staff, which can be as high as 74-100 percent annually (Castle & Engberg, 2005; King, 2012; Livingston et al., 2014). Although there are a variety of care strategies for individuals with dementia, there is lack of consensus or rigorous research to support which are most effective.

Therapeutic Use of Nature

A great deal of research exists to support the health benefits of direct contact with nature, with additional benefits for individuals in dementia care settings (Beute & de Kort, 2014; de Kort, Meijnders, Sponselee, & Ijsselsteijn, 2006; Van Den Berg et al., 2007). Individuals with dementia derive benefits from outdoor gardens with walking paths to expend energy that is otherwise exhibited indoors as pacing. These outdoor gardens have been shown to reduce the need for psychotropic medications and improve resident quality of life (Detweiler, Murphy, Myers, & Kim, 2008; Detweiler, Murphy, Kim, Myers, & Ashai, 2009; Murphy, Miyazaki, Detweiler, & Kim, 2010). Unfortunately, despite abundant evidence supporting the health benefits of nature, outdoor spaces are not often



available in senior living (Brawley, 2006), and when available they are not therapeutically designed (Rodiek, 2006) or their autonomous use is restricted.

Among the general population, many of the benefits derived from nature also have been found with simply viewing nature, indicating this could be an effective care strategy for individuals with dementia. Viewing video or photographic images of nature reduces stress, improves mood, and reduces negative emotions (e.g., de Kort, Meijnders, Sponselee, & Ijsselsteijn, 2006; Brown, Barton, & Gladwell, 2013), and when nature sounds are included it has been shown to enhance stress recovery (Annerstedt et al., 2013). In healthcare settings, when patients have window views of nature they have shorter lengths of stay and require less pain medication compared to patients without nature views (Ulrich, 1984). In assisted living settings, one study found that when individuals have window views of an outdoor garden or spent time viewing nature in a garden, they have reduced stress and negative emotions when compared to views of urban scenes or the indoor environment (Rodiek, 2002; Tang & Brown, 2005). One study found that after 15 minutes of direct contact with nature, individuals with dementia were more alert and active and had reduced stress, agitation, and aggression (Goto, Kamal, Puzio, Kobylarz & Herrup, 2014; Whear et. al., 2014).

Methods

Informed by the body of research on the benefits of nature, the purpose of this pilot study was to test the hypothesis that a virtual nature experience within a memory care unit could reduce stressful emotions of agitation and anxiety among individuals with dementia. Fourteen individuals with dementia, eight females (age: 85.5 ± 2.1 years) and six males (age: 84.7 ± 5.8 years), living in a memory care facility participated in this study. Participants were exposed three times to the virtual nature experience (treatment) and a generational movie (control). Each of the interventions took place in a 9' x 12' windowless room, set up like a living room on a memory care unit. For the nature experience, plants and two large photographs of landscapes were added. The room had a 65" high definition television encased by a window frame to simulate looking out a window (Figure 1). The arrangement of the room with the television placed in close proximity (8-9 feet) to where participants sat was done to create a feeling of immersion in the scene, which previous studies have shown enhances restoration from stress (de Kort & Ijsselsteijn, 2006; de Kort, Meijnders,



Sponselee, & IJsselsteijn, 2006; Valtchanov, Barton, & Ellard, 2010). The same room was used for the generational movie (“Marty” with Ernest Borgnine), with most of the nature elements removed (Figure 2).

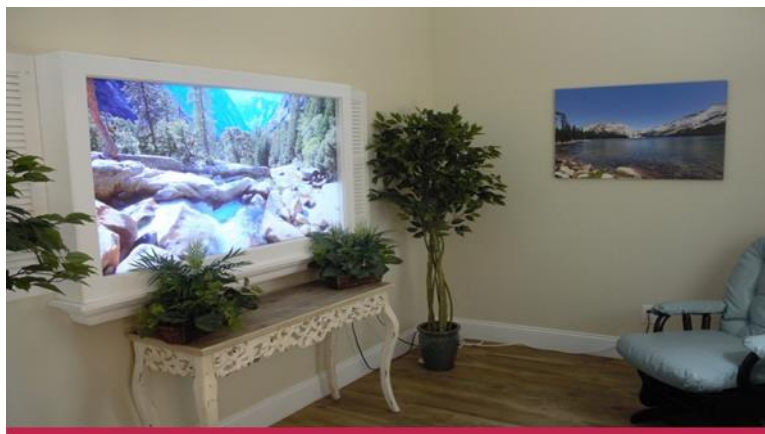


Figure 1: Nature Intervention (Treatment)

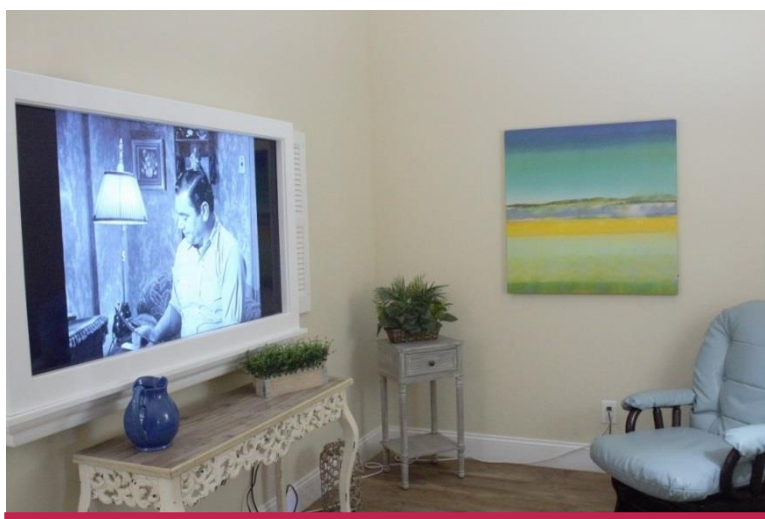


Figure 2: Generational Movie (Control)

To measure participants' response to each of the treatments, heart rate was measured and emotions observed, using two observation scales (Observed Emotion Rating Scale & Agitated Behavior Scale), before entering the room and after 10 minutes of being in the room. Data were analyzed to see differences between the treatment and control interventions for heart rate, agitation, pleasure, anger, anxiety, sadness, and alertness, as measured before and after each intervention.



Results

Key findings are that within only 10 minutes of exposure the nature intervention significantly reduced heart rate, decreased anxiety, and increased pleasure. Heart rate as a physiologic response to stress was statistically lowered, by an average of 8.5 beats per minute, after 10 minutes of the nature intervention compared to the movie intervention (Figure 3).

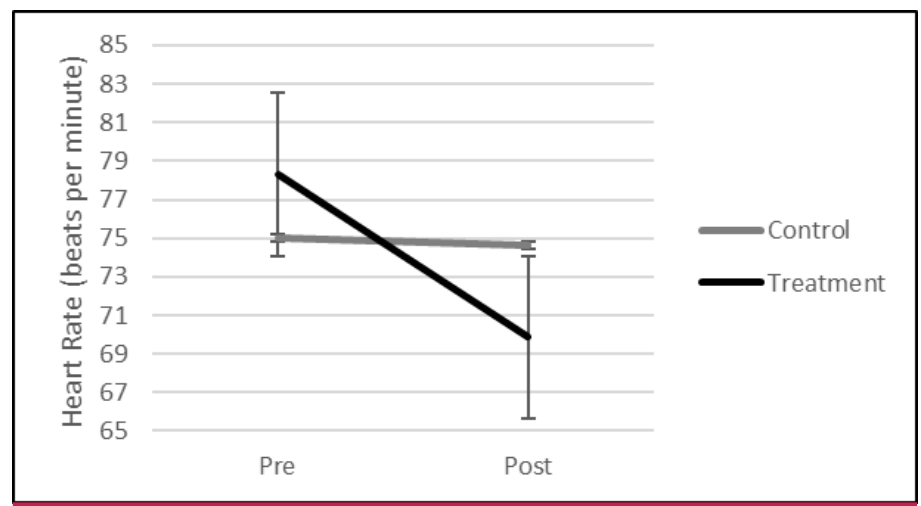


Figure 3: Heart Rate

After 10 minutes, anxiety decreased more in the nature intervention from a mean score of 1.9 to 1.5 on a 5-point scale, compared to a decrease in mean scores from 1.5 to 1.4 in the movie intervention (Figure 4).

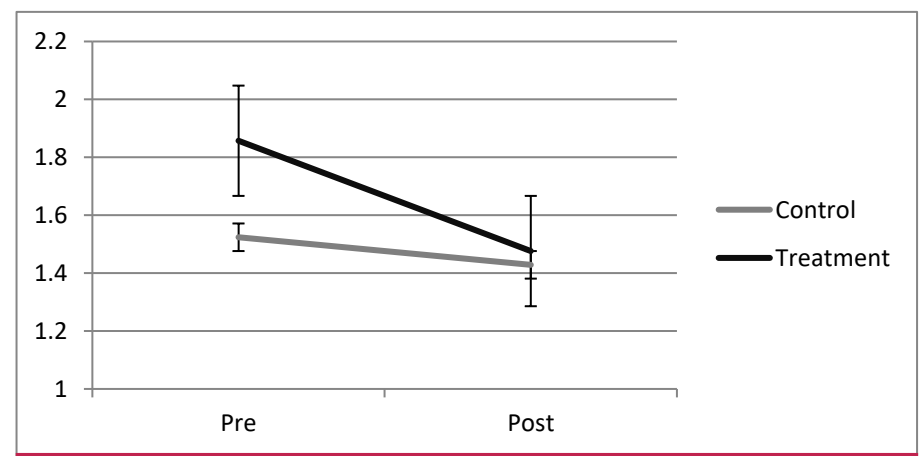


Figure 4: Anxiety

Note: Emotions measured with OERS for 10-minute period based upon length of time present: 1=never; 2=<16 seconds; 3=16-59 seconds; 4=1-5 minutes; 5=> 5 minutes.



Pleasure increased from 3.5 to 3.7 points on a 5-point scale after 10 minutes of the nature intervention, compared to statistically decreased pleasure, indicating less pleasure, with the movie intervention (Figure 5). In both the nature and movie interventions, agitation and anger significantly decreased.

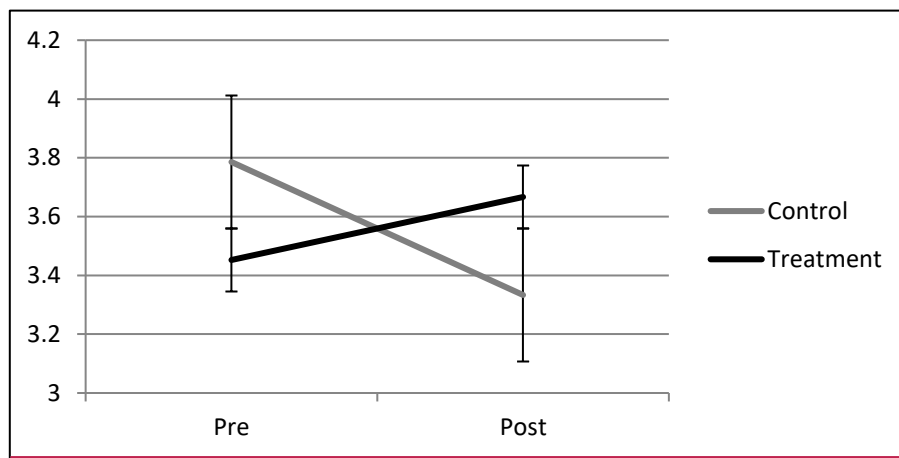


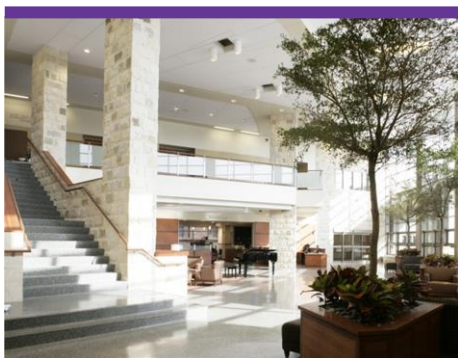
Figure 5: Pleasure

Note: Emotions measured with OERS for 10-minute period based upon length of time present: 1=never; 2= <16 seconds; 3=16-59 seconds; 4=1-5 minutes; 5=> 5 minutes.

While in the room, participants' comments were also recorded. Interestingly, participants made more comments related to pleasure during the nature intervention compared to the movie intervention. Comments of pleasure included, "I feel fantastic," and "I enjoy the sound and watching the water." Comments related to agitation and anxiety were: "I don't like it here," "It's too cornered here." These comments by the participants correspond to the objective measures of increased pleasure and reduced anxiety during the nature intervention.

Conclusion

For a pilot study with a small sample, the results are promising, and future studies with larger sample sizes have the potential to show results that are more significant. The capacity of a virtual nature experience to significantly reduce stress, reduce anxiety, and increase pleasure holds great potential to benefit people with dementia and their care staff. While direct contact with nature is preferred, this study indicates that a virtual nature experience can serve as a cost-effective adjunct to outdoor gardens when environmental conditions prevent safe use, memory care facilities do not have available space for a garden,



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or existing facilities do not have financial resources to create a therapeutic garden. In addition, a virtual nature experience requires very little direct staff involvement and affords individuals with dementia autonomy of use. New treatment strategies such as this provide hope of reducing pharmacologic interventions and of improving quality of life for individuals with dementia and the staff who care for them. Reduced stress and more positive emotions among individuals with dementia can promote positive relationships with other residents, staff, and family members and improve participation in daily activities (King, 2012; Livingston et al., 2014).

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