

## Nature-based video and classical music's effects on tranquility among memory care residents with dementia

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### Abstract

This case study reports the effects of viewing nature photographs with classical music on participants' tranquility levels among 10 memory care residents living with dementia. This study utilized a pre-/post-design with residents' rating their tranquility level and a certified Nurse Aid observer rating each resident's perceived tranquility level both before and after the video intervention using a Tranquility Scale. Statistical analyses suggested that residents' tranquility levels from both residents' and staff's perspectives showed significant improvement after the intervention compared to their baseline. These findings are discussed in relation to the literature on nature-based and music therapies. We also offer practical implications for recreational therapists and memory care workers.

Key words: dementia, nature, music, indoor ecotherapy, tranquility, recreational therapy, healthcare management, long-term care

### Introduction

Dementia is a progressive syndrome associated with a variety of brain illnesses, eg, Alzheimer's, that negatively affect memory, emotion, cognition, behavior, and everyday functioning.<sup>1</sup> The World Health Organization estimated the number of people with dementia in 2017 as 47 million, and expected this number to triple by 2050.<sup>2</sup> Individuals with dementia often exhibit agitated behaviors,<sup>3</sup> and many health practitioners utilize antipsychotic medications such as aripiprazole, olanzapine, quetiapine, and risperidone to mitigate the associated aggressive behaviors. Unfortunately, antipsychotic medications have known side effects such as weight gain, diabetes, sedation, gait disturbance/falls, cardiac effects, stroke, dysphagia, urinary retention, constipation, and additional cognitive impairment.<sup>4,5</sup> In addition, many individuals with dementia are already taking medications for other medical conditions, which increase the risk for negative drug interactions.

Thus, an exploration of nonpharmaceutical alternatives is needed to manage behaviors and maintain/improve quality of life among those living with dementia. Two such nonpharmaceutical alternatives are nature-based (visual) and music-based (auditory) interventions.

Nature-based treatment, or ecotherapy, capitalizes on the therapeutic effects of experiencing nature-like walking in the woods or gardening outdoors to facilitate healing (positive and mental benefits) and growth for clients.<sup>6</sup> In terms of the benefits of nature, recent studies have found that simulated experiences, eg, videos and pictures, can also induce therapeutic effects including less agitated behaviors.<sup>3,7-9</sup> For example, Ulrich's hospital study found patients viewing nature through a window experienced lower levels of stress and had shorter post-operative hospital stays.<sup>10</sup> Similar studies utilizing nature views confirmed its therapeutic effects, including relaxation.<sup>11,12</sup> More recent studies have suggested that simulated

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nature experiences, such as pictures/videos of nature, resulted in reduced irritability/agitation and stress and improved behavior in maximum-security prison inmates and university medical center students.<sup>6,13</sup> Kahn, Severson, and Ruckert working with office workers who interacted with a form of technological nature, eg, plasma screen view of outdoors, provided some but not all the benefits of interacting with actual nature.<sup>14</sup> While simulated nature experiences may not provide maximum benefits, this form of nature may be one of the only options for people who have limited direct access to nature, such as those who are living in a memory care facility.<sup>5</sup> In addition, their qualitative findings also suggested relaxation effects from their visuo-auditory intervention, for which the researchers called for quantitative replications.

Another nonpharmaceutical approach to treat those with dementia involves the use of music.<sup>15,16</sup> Although the particular genre of music that facilitates restoration can vary, classical music is generally considered to be the most effective because it often incorporates soothing melodies resulting in peaceful and esthetic experiences.<sup>17-19</sup> For example, Casby and Holm using a single subject design had three different patients of disruptive vocalizations with dementia, and they found that relaxing classical music showed a significant decrease in negative behaviors.<sup>20</sup> Along with the musical intervention, Chung, Choi, and Kim explored the effect of audio-visual presentations by using scenic views of nature combined with classical music, eg, Mozart Concerto, among 25 older adults with dementia for 4 consecutive weeks. The investigators conducted a case study by using a mixed method, and the results showed a significant improvement in patients' feelings and experiences. In this case study, the researchers investigated the frequency of psychophysiological agitations and identified differences between quantitative and qualitative data before and after the interventions.<sup>5</sup>

Tranquility may be an appropriate construct to measure the improvement of negative behaviors among dementia patients because the original meaning of tranquility is related to a state in which the human soul proceeds peacefully and is well settled,

disturbed by no fear, anxiety, agitation, or other negative behaviors. In the modern context of restoration, tranquility is a desirable state to achieve. It is defined as "peace of mind," escape from the strains of living, the contemplation of nature, and the positive affection of calmness, serenity, and peacefulness.<sup>22</sup>

To summarize, nature- and music-based interventions are two nonpharmaceutical approaches to maintain/improve quality of life among people living with dementia.<sup>5</sup> It would be interesting to explore the findings of existing research based on these therapeutic methods reported to reduce negative symptoms. Therefore, the purpose of the present case study is to examine the effects of viewing a nature-based video with classical music on tranquility level among memory care residents with dementia.

## Method

This study took place at a 48-bed, 24/7 supervised egress-restricted memory care facility. A bachelor of science nurse (BSN) recruited residents. We obtained an informed consent from each participant resident or their legal guardian and from three volunteer Certified Nursing Assistants (CNAs) in accordance with the research protocol approved by the university IRB. This convenience sampling resulted in 10 Caucasian participants, composed of six females, ranging in age from 71- to 83-years old. The types of specific dementia are unknown; however, participants were designated by the memory care facility as "Level I" residents who exhibited wandering and required assistance with activities of daily living—eg, eating, bathing, and dressing—medication administration, and activity engagement. Residents needed to be checked and monitored at a minimum of every 2 hours. The participants and volunteer CNAs who regularly supervised the participant residents completed the tranquility reports before and after the intervention. The CNA measures were designed to compare their perceptions to the resident self-reports. The second and third authors worked with the BSN to carry out the research protocol. Three CNAs partook in the research on a volunteer basis and were trained by the BSN to complete the Tranquility Scale,

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which included reviewing dictionary definitions of the six tranquility levels and basic behaviors associated with the terms. CNAs did not interact with each participant during data collection or use an observation checklist for behavioral criteria.

All data for participants were recorded by the BSN and one trained CNA for each participant. First, the BSN completed informed consent/assent and assisted one resident participant at a time to rate their tranquility level items by reading the questions and recording the participant's answers immediately before and after viewing the video intervention (see below). Second, one CNA acted as an observer of one participant at a time for approximately 1-hour before and after the audio-visual intervention to ascertain a perceived resident tranquility level, using the same Tranquility Scale.

For the intervention, each resident was invited by the BSN to view our 6-minute video played on a flat-screen TV located in the resident lounge area. Each of the 10 participants viewed and listened one time. The video included a series of still nature photographs featuring local flora and fauna covering four seasons. Most photographs were displayed between 6 and 15 seconds before processing to the next image. The accompanying music was Wolfgang Amadeus Mozart's Serenade No. 10 in B flat K361 "Gran Partita" III Adagio, which was chosen based on a similar study.<sup>22</sup> Each intervention was individually conducted with one participant during a daily activity time between 10:00 and 11:30 AM over 3 weeks. Each of the 10 participants completed the research protocol on different days.

The Tranquility Scale used in this project was the same instrument developed by Kim<sup>22</sup> who conducted a study of college students. The scale consisted of six items: "I currently feel (or the resident currently appears to feel): (a) calm, (b) relaxed, (c) restful, (d) peaceful, (e) serene, and (f) at ease." The instrument was developed by adapting and expanding another Tranquility Scale by Lox, Jackson, Tuholski, Wasley, and Treasure.<sup>23</sup> Measuring the tranquility on a seven-point Likert scale, Kim reported that Cronbach's  $\alpha$  for the scale ranged from .89 to .95. In our study, each item was measured using a five-point

Likert scale that was more relatively efficient to collect data from the residents. Our quantitative data contained four different indications: tranquility assessed by the *resident before* and *after* the intervention (TRB and TRA, respectively) and tranquility assessed by the *staff before* and *after* the intervention (TSB and TSA, respectively).

Our quantitative analysis consisted of three steps. First, we cleaned the data by inspecting missing values, outliers, and non-normality. The Kolmogorov-Smirnov and the Shapiro-Wilk normality tests identified significantly skewed distributions for TRA and TSA, and significantly kurtotic distributions for TRA, TSB, and TSA (Table 1). Second, we computed descriptive statistics. Third, we conducted two Wilcoxon signed-rank tests—the nonparametric equivalent to dependent *t*-test—to discern if there was any significant difference in tranquility levels before and after the intervention for each of the resident and staff data.

## Results

### *Descriptive statistics*

Our descriptive findings are summarized in Table 1. Mean scores of the tranquility variables were 3.02 for TRB, 2.50 for TSB, 4.72 for TRA, and 4.22 for TSA. Our Cronbach's  $\alpha$  coefficient values ranged from .94 (TRB) to .99 (TSB and TSA), demonstrating sufficient internal consistency.

### *Wilcoxon signed-rank tests*

**Resident data.** Wilcoxon signed-rank test results indicated that there was a significant difference ( $Z = -2.52, p = .012$ ), meaning that the level of tranquility reported by residents was higher after the intervention ( $M = 4.72$ ) than before ( $M = 3.02$ ).

**Staff observation data.** Wilcoxon signed-rank test results also revealed a significant difference ( $Z = -2.87, p = .004$ ), suggesting that the level of tranquility among residents observed by staffs was higher after the intervention ( $M = 4.22$ ) than before ( $M = 2.50$ ).

**Table 1. Descriptive statistics associated with tranquility scores**

| Variables* | Skewness | Kurtosis | Kolmogorov–Smirnov test |      | Shapiro–Wilk test |      | M    | SD   | $\alpha$ |
|------------|----------|----------|-------------------------|------|-------------------|------|------|------|----------|
|            |          |          | Statistics              | p    | Statistics        | p    |      |      |          |
| TRB        | -.11     | -1.69    | .19                     | .200 | .87               | .095 | 3.02 | 1.64 | .94      |
| TRA        | -1.14    | -.61     | .35                     | .001 | .68               | .001 | 4.72 | .43  | .96      |
| TSB        | .00      | -2.23    | .23                     | .142 | .79               | .010 | 2.50 | 1.40 | .99      |
| TSA        | -1.75    | 4.01     | .31                     | .009 | .77               | .007 | 4.22 | .90  | .99      |

\*Six items, ie, feeling calm, relaxed, restful, peaceful, serene, and at ease, were measured with a five-point scale format (1 = Disagree, 2 = Somewhat disagree, 3 = Undecided, 4 = Somewhat agree, and 5 = Agree). TRB, tranquility perceived by residents before the audio-visual music interventions; TRA, tranquility perceived by residents after the interventions; TSB, tranquility among residents perceived by staff observers before the interventions; TSA, tranquility among residents perceived by staff observers after the interventions.

## Discussion

This case study was to examine the effects of viewing nature photographs with classical music on tranquility levels among memory care residents with dementia. We conducted a pre-/post-design with no control group by utilizing data from both residents with dementia and their supervising staff. Indeed, we found a similar effect of what we are calling “indoor ecotherapy,” by showing a video slideshow of nature photographs with classical music resulting in significantly less problematic behaviors among nursing facility residents with dementia. Our findings appear consistent with past studies of nature-based therapy or ecotherapy that found decreased agitation and problematic behaviors of older adults.<sup>5,6,13</sup> Our findings of improved tranquility are also congruent with those of past studies where viewing real nature induced relaxation.<sup>11,12</sup> Our study adds to the literature that this soothing effect of viewing nature may apply to simulated nature as well as the dementia population. Our findings also support the effectiveness of the therapeutic use of music and simulated nature for the dementia population.<sup>15,16</sup> In a recreational therapy context, Richeson and Neil showed listening to relaxing music lowered agitation.<sup>20</sup> Petterson and Loy’s study of stress levels found mixed results, when using a video of tropical fish with calming music.<sup>21</sup> An

important difference between their study and ours is that we used pictures representing a variety of nature stimuli, eg, water, woods, birds, and animals. Another departure is that our nature pictures were local scenery, which may have better resonated with our participants. These distinctions may explain why nature images may cause positive outcomes in human behavior.

### Practical implications

Because our intervention was simple and short, ie, 6 minutes, our study has important practical implications. First, our study informs recreational therapists at memory care facilities the benefits of using nature-based videos along with classical music as a routine recreational therapy activity. Recreational therapists may be able to train CNAs in these low investment activities. Activities like our intervention may work best for individuals who seem particularly agitated and antisocial. For example, there is a syndrome called “sundowning” among people with dementia; sundowners tend to be more agitated in late afternoons or evenings. The video intervention might be particularly effective during this time of day for some individuals. Second, managers at memory care facilities should also consider the beneficial impacts of this video intervention on their staff. When residents feel tranquil,

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staff would arguably feel more pleasant and satisfied with their work. This could eventually inspire creative ideas for memory care workers.

### **Limitations and future research**

Regardless of these potential contributions, our case study has several limitations. First, without a control group and with one intervention in our study, it is hard to draw a solid meaningful conclusion. Second, our sample size was small, although we achieved statistical difference from pre- to post-test. Third, there may be room for improvement and adjustment in tranquility measurement. Although our Tranquility Scale was validated in the general population, people with dementia may find, for example, it difficult to differentiate scale items, eg, serene vs peaceful.<sup>22</sup> We tried to address this issue by utilizing staff observation. Resident and staff data produced consistent results, which provided tentative support for the scale's validity in the population. It could also be noted that it was by its nature, not a "blind study," in that the observers knew which was the "pretest" and which the "post-test."

Future studies should, first, replicate and extend our study by using a control group and ideally random group assignment. They may also add follow-up tests to see if there was a short-term or long-term effect beyond the session. Second, future researchers should also seek larger sample sizes to increase the generalizability of findings. Third, future research should also further validate the Tranquility Scale in the dementia population. Fourth, the effect of an increase in the number of intervention sessions, eg, over days or weeks, on video intervention on caregivers' work satisfaction, turnover rates, and quality of life would be also worth exploring.

### **Conclusion**

In conclusion, dementia is an important health issue in aging countries.<sup>2</sup> Those who live with this condition often experience cognitive confusion and emotional turmoil. Our study shows that beautiful nature scenes and music can help people with dementia regain a sense of tranquility, which is a cornerstone of quality of life.

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