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**A preferred music listening intervention to reduce anxiety in older adults with  
dementia in nursing homes**

**Abstract**

**Aim.** This paper reports the results of a study evaluating a preferred music listening intervention for reducing anxiety in older adults with dementia in nursing homes.

**Background.** Anxiety can have a significant negative impact upon older adults' functional status, quality of life, and health care resources. However, anxiety is often under-diagnosed and inappropriately treated in older adults with dementia. Little is known about the use of a preferred music listening intervention for managing anxiety in those with dementia.

**Methods.** This study used a quasi-experimental pre-test and post-test design to evaluate the effectiveness of a preferred music listening intervention on anxiety in nursing home older adults with dementia. Twenty-nine participants in the experimental group received a 30-minute music listening intervention based on their personal preferences delivered by trained nursing staff in mid afternoon, twice a week for six weeks. Meanwhile, 23 participants in the control group only received usual standard care with no music. Anxiety was measured by the Rating Anxiety in Dementia (RAID) at baseline and week six. Analysis of covariance

(ANCOVA) was used to determine the effectiveness of the preferred music listening intervention on anxiety at six weeks while controlling for pre-test anxiety, age, and marital status.

Results. ANCOVA results indicated that older adults who received a preferred music listening intervention had a significantly lower anxiety score at six weeks compared to those who received the usual standard care with no music ( $F=12.15, p=.001$ ).

Conclusions. Preferred music listening had a positive impact by reducing the level of anxiety in older adults with dementia in nursing homes

Relevance to clinical practice. Music listening intervention based on personal preferences is inexpensive and recommended to be incorporated into routine care to promote mental health of older adults with dementia in nursing homes. Nursing home staff can learn how to implement preferred music intervention in order to provide appropriate care tailored to the individual needs of those with dementia.

Keywords: nursing, older adult, elders, music, dementia, anxiety, long-term care.

## INTRODUCTION

Anxiety is one of the most prevalent health problems among older adults and commonly reported as an important behavioural symptom in those diagnosed with dementia (Ballard *et al.* 2000, Gibbons *et al.* 2006). Restlessness, irritability, muscle tension, fears, and respiratory symptoms have been found to be significantly associated with the presence of excessive anxiety and worry among those with dementia (Starkstein *et al.* 2007). According to the Progressively Lowered Stress Threshold model (PLST) (Hall & Buckwalter 1987), older adults with cognitive impairment caused by dementia have a diminished ability to process sensory stimuli. This disability may result in a progressive decline in their stress threshold level and a heightened potential for anxiety and dysfunctional behaviours. The prevalence of anxiety has been found in UK to range from 38% in Alzheimer's disease to 72% in vascular dementia (Ballard *et al.* 2000). Although studies of prevalence of anxiety in those with dementia in Taiwan are few, Chow *et al.* (2002) found the rate to have reached 39%. Despite its high prevalence, anxiety is often under-diagnosed, misdiagnosed, and inappropriately treated (Kasper 2006), and has not been well researched (Scogin *et al.* 2000). Studies examining anxiety in older adults often exclude those with cognitive impairment. Furthermore, the coexistence of anxiety and other psychological and behavioural problems in those with dementia is commonly reported, and can result in increased complexity of assessment and diagnosis of anxiety (Gibbons *et al.* 2006). The literature offers limited information about the concept of anxiety in people with dementia as well as on the assessment methods for

measuring anxiety in those with dementia. The majority of scales assessing anxiety have clinical and methodological limitations when used in those with dementia. However, for those studies that have used anxiety as an outcome it has been found to contribute to worsening of functional status (Ferretti *et al.* 2001) and quality of life in those with dementia (Hart *et al.* 2003), and thereby a greater burden to caregivers and on health care resources (Andlin-Sobocki *et al.* 2005). In addition, anxiety may trigger other behavioural problems in older adults with dementia which may lead to institutionalization (Gibbons *et al.* 2002).

Despite the potentially serious implications of high levels of anxiety in dementia, little work has been done regarding the management of anxiety in dementia. Anxiety in those with dementia is typically managed with the use of psychotropic medications, but these treatments present risks for adverse effects (Moretti *et al.* 2006) because they are associated with increased risk of cognitive impairment, falls, and fractures (Lenze *et al.* 2003). Therefore, use of antipsychotic medications in older people with dementia has to be cautious due to these harmful side effects (Ames *et al.* 2005).

There are several well recognised non-pharmacological approaches suggested for treating anxiety in older adults including biofeedback, relaxation training, cognitive-behavioural therapy, reminiscence therapy, recreational activity, and therapeutic touch which have all been shown to have an anxiolytic effect (Krasucki *et al.* 1999). Behavioural interventions are the most commonly recommended psychological treatment for generalized anxiety disorders in the elderly (Krasucki *et al.* 1999), but these interventions

have not to date been used in those with dementia. A modified form of cognitive behavioural therapy has been suggested in managing anxiety for those with dementia (Balasubramanyam *et al.* 2007), but it has little support with evidence from clinical trials. Given the limitations of pharmacological treatments and limited evidence about non-pharmacological interventions for managing anxiety in those with dementia, development of effective non-pharmacological interventions for managing anxiety in this population is vital. One such approach is the use of music.

According to Munro and Mount (1978, p.1029), music therapy is defined as ‘controlled use of music and its influence on the human being to aid in physiologic, psychologic, and emotional integration of individual during treatment of an illness or disability.’ Music has been shown to positively influence a broad range of outcomes including alleviating anxiety, promoting relaxation, improving mood, reducing pain, decreasing agitation, improving exercise performance, and increasing food intake among various populations (Snyder & Chlan 1999). Music can facilitate feelings of physical and mental relaxation by masking environmental noises and refocusing an individual’s attention on a more pleasant emotional state (Koch *et al.* 1998). Several neuroscience studies also found that listening to preferred music can induce pleasant and positive feelings, and that the intensity of this pleasurable feeling was correlated with activation of the limbic system (Blood & Zatorre 2001, Menon & Levitin 2005). Furthermore, listening to relaxing music was found to decrease cortisol which increases in the presence of stress (Khalifa *et al.* 2003), and may in turn reduce anxiety and

promote relaxation.

Listening to personally preferred music in particular has been suggested to effectively manage agitation of older adults with dementia (Gerdner 2000a, Ragneskog *et al.* 2001, Gerdner 2005, Sung *et al.* 2006). Older adults with dementia usually have diminished ability to process environmental stimuli and are unable to learn or interpret a new environment as their disease progresses (Hall & Buckwalter 1987). Thus music can be used to introduce a sense of familiarity into a new environment or to maximise familiarity in an existing environment thereby enhancing their functional abilities (Son *et al.* 2002, Calkins 2004). A review of eight studies on preferred music for older adults with dementia (Sung & Chang 2005) suggested that music listening based on personal preference has the potential to reduce agitation and can be a viable alternative to chemical and physical restraints for managing behavioural symptoms of dementia although methodological limitations are evident in the reviewed studies.

Music listening has shown positive effects in reducing anxiety in various populations, but no study has examined the effects of preferred music listening on anxiety in those with dementia. The aim of this study was to evaluate the effects of preferred music listening intervention on anxiety in older adults with dementia residing in nursing homes.

## **METHODS**

### **Design**

The study used a quasi-experimental pre-test and post-test design.

### **Sample and setting**

The study was conducted in a long-term care facility in Taiwan. The study was reviewed by the administrative committee of the facility, and ethical approval was obtained from a university ethical review board. The inclusion criteria for study participants were 65 years and above; diagnosed with dementia, and classified as having moderate to severe cognitive decline with a Global Deterioration Scale (Reisberg *et al.* 1982) score of four to six; displayed symptoms of anxiety reported by nursing staff; resided for a minimum of six months in the current unit; no hearing impairment; and no obvious symptoms of acute pain or infection. Participants were recruited from two units in the facility with one unit randomly assigned as the experimental group and the other as the control group. The two units provided the same services with similar care routine, staffing and management style. Only participants whose family members or guardians gave informed consent were invited to participate in the study. In this preliminary study, the researchers were interested in seeing if there was a large effect size. A sample size of 28 was needed for repeated measures analysis for a large effect size, power of .80, an alpha level of .05 and an attrition rate of 2.2% reported in a previous similar study (Gerdner 2000a). In the experimental group, 30 older adults met the inclusion criteria and 29 completed the study due to hospitalization of one participant. In the control group, only 23 older adults completed the study.

### **Preferred music listening intervention**

The participants in the experimental group received the usual standard care together with the 30-minute preferred music listening intervention. The participants in the control

group received no music intervention, receiving only the usual standard care. This care matched the usual standard care the participants in the experimental group received which included 24-hour residential care with activities of daily living, basic nursing care, meal provision, and some social activities (eg. TV watching, card playing, family visiting, light exercise, and parties for special events occasionally).

The preferred music listening intervention was based on an individualized music protocol developed by Gerdner contained in the National Guideline Clearinghouse (2007) to be used in a Taiwanese context. This music protocol was based on the currently best available evidence on the use of preferred music to guide the management of behavioural problems of older adults with dementia. The preferred music listening intervention involved determining participant's music preferences with the assistance of family or caregivers, implementing the music based on participant's music preferences in a familiar setting, and regularly monitoring participant's responses to the music intervention. Prior to baseline data collection, the nursing researcher with specialty in dementia care and music therapy provided the training for the nursing staff on the use of anxiety assessment tool and the implementation of the preferred music listening intervention. The participants listened to their preferred music via CD players that were delivered by the trained nursing staff for 30 minutes in mid afternoon twice a week, giving a total of 12 sessions over six weeks.

### **Data collection**

The demographic data was collected by the research assistants from participants' records

regarding age, sex, race, religion, education level, marital status, length of residency, and medical diagnoses.

The Music Preference Survey (MPS) is a modification of the Assessment of Personal Music Preference (APMP) (Gerdner 2000b) to make it relevant to collect data from older adults in a Taiwanese context. The MPS is used to identify the importance of music in the life of older adults and collect specific information regarding their music preferences. The MPS includes music categories of both western music and Chinese and Taiwanese music that is familiar to most of the older people in Taiwan and can be completed either by interviewing the resident, a family member, or a caregiver. The importance of music to the older adult prior to the onset of cognitive impairment is categorised as follows: very important, moderately important, slightly important, and not important. The survey also collects data related to older adult's favourite types of music, forms of music, favourite artists and specific song titles. A list of categories is provided under the favourite types of music and forms of music.

Anxiety was measured by the Rating Anxiety in Dementia (RAID) tool, which was developed specifically to evaluate anxiety in people with dementia according to the person's symptoms and signs of anxiety over the previous two weeks (Shankar *et al.* 1999). RAID is based on retrospective reports by the raters over a period of time, and requires completion by those who took care of the patient and were familiar with the patient's behavioural changes in the previous two weeks. RAID has 18 items that are divided into four subgroups: worry, apprehension and vigilance, motor tension and autonomic hypersensitivity. Each item is rated

on a four-point scale: absent (0), mild or intermittent (1), moderate (2), and severe (3). A score of 11 or greater indicates significant clinical anxiety. RAID has demonstrated moderate to good reliability, with an interrater reliability that ranged from .51 to 1 and test-retest reliability ranging from .53 to 1, and its validity supported by the significant correlations between RAID and the Clinical Anxiety Scale (.54,  $p < .001$ ) and the Anxiety Status Inventory (.62,  $p < .001$ ) (Shankar *et al.* 1999). A Chinese version of the RAID was not available; therefore, the researcher translated it into Chinese for use in a Taiwanese population using the back translation method (Brislin 1986). The translated RAID was pilot-tested on five nursing home staff who can speak Chinese, to examine the comprehension of the instrument and the length of time required for completion of data collection. Based on the nursing home staff's feedback, the scale was easy to use and did not require too much time for completion. In this study, the internal consistency of the Chinese-Taiwanese RAID was established with a Cronbach's alpha coefficient of .73 and an inter-rater agreement of 90%. Each participant's level of anxiety for both the experimental and control groups were assessed at baseline and week six. All data were managed anonymously and kept in strict confidence.

### **Data analysis**

Data were managed and analysed using the statistical package SPSS (13.0) for Windows. Descriptive statistics were used to summarise the characteristics of the sample: frequency distribution for nominal data, and means and standard deviations for continuous data. Baseline data and sample characteristics for both the experimental and the control group were

analysed to determine the comparability of the two groups. ANCOVA was used to determine the effectiveness of the preferred music listening intervention on anxiety in nursing home older adults with dementia.

## RESULTS

### Sample characteristics

The sample comprised 52 older adults with 29, following one being hospitalised, in the experimental group and 23 in the control group. The mean age for this sample was 80.12 ( $\pm 7.55$ ), ranging from 65 to 99 years. The average length of residency in the facility was 4.88 years ( $\pm 2.55$ ), ranging from 2 to 16 years. Over half of the sample were male (55.8%), widowed (51.9%), Taiwanese (61.5%), and Buddhists (57.7%). The majority (76.9%) had received no formal education. The average number of medical diagnoses for each participant was 4.58 ( $\pm 1.61$ ). Half (50%) of the participants were classified as having a severe level of cognitive impairment. Most of the demographic profiles of the participants in both the experimental and control groups were similar; however there were statistically significant differences between groups for age ( $t=-2.24, p=.03$ ) and marital status ( $\chi^2=6.51, p=.04$ ). The participants in the control group (82.65,  $\pm 7.41$  years) were significantly older than those in the experimental group (78.10,  $\pm 7.15$  years) (Table 1). The baseline mean score for anxiety in the control group (9.52 $\pm$ 4.09) was slightly lower than that of the experimental group (10.93 $\pm$ 5.46) (Table 2).

### Music preferences

Music preferences were assessed by the nursing staff for each participant in the experimental group either by interviewing the participant, his/her family members, or formal caregivers. Participant's favourite types of music, forms of music, favourite artists and specific song titles were also collected if they were identified by the participants, family members, or caregivers. The most favourite type of music reported that made participants most happy was Taiwanese popular music from the 1950-1970s ( $n=18$ , 62.1%). The second ranking of the participant's most favourite type of music was Chinese popular music from the 1950-1970s ( $n=12$ , 41.4%). Five participants (17.2%) who were born in China and lived their whole life in Taiwan indicated that listening to Chinese patriotic songs made them most happy. The majority did not identify specific artists and song titles, and none of the participants identified western music as their preferred music. Six (20.7%) in the experimental group viewed music being very important, and seven (24.1%) viewed music being moderately important in life. There were 13 (44.8%) participants who indicated music was slightly important in their life.

### **Effectiveness of preferred music listening on anxiety**

After receiving six weeks of preferred music listening intervention, the mean anxiety score in the experimental group decreased from 10.93 ( $\pm 5.46$ ) at pre-test to 8.93 ( $\pm 4.86$ ) at post-test, which was a significant reduction ( $t=5.64$ ,  $p < .001$ ). The mean anxiety score in the control group also decreased slightly from 9.53 ( $\pm 4.09$ ) at pre-test to 9.35 ( $\pm 4.32$ ) at post-test, but the reduction was not significant ( $t=.68$ ,  $p=.51$ ).

ANCOVA was used to examine the effectiveness of the preferred music listening intervention on anxiety at six weeks while controlling for pre-test anxiety, age, and marital status. The ANCOVA results indicated that participants who received six weeks of the preferred music listening intervention had a significantly lower anxiety score at six weeks than those who received the usual standard care with no music intervention ( $F= 12.15, p=.001$ ) (Table 2).

### **Study limitations**

The use of a convenience and small sample in this study may limit the generalisability of the results for this study. Blinding of the participants and data collectors was not possible, and this is identified as a potential source of bias. There is also the possibility of the Hawthorne effect occurring due to the fact that participants had awareness of participation in the study. Another limitation was the relatively short follow-up of the effects of the preferred music listening intervention which was only examined for a six week period. Anxiety was only measured at baseline and at the completion of all preferred music session at six weeks, and this may limit the opportunity for detecting the pattern of changes in the outcome variable. Furthermore, a randomised controlled trial with a larger sample size and in patients with dementia in different countries would provide stronger evidence of the causal relationship in the effectiveness of preferred music listening. Studies examining costs of implementing preferred music intervention for those with dementia in long-term care settings are also needed.

In our study, the participants in the experimental group received 30 minutes of preferred music listening in mid afternoon. The justification for implementing the preferred music intervention in mid afternoon is that, according to the PLST model (Hall & Buckwalter 1987), the majority of older adults with dementia tend to display anxiety and behavioural problems during mid afternoon, which is usually the time that stressors may accumulate throughout the day and their stress threshold is exceeded. Therefore, providing those with dementia a preferred music listening intervention in mid afternoon was appropriate. In addition, the preferred music listening session was kept to a 30-minute time period due to the limited attention span of those with dementia (Plaud *et al.* 1998).

## **DISCUSSION**

Our study results indicate that a preferred music listening intervention provided by trained nursing staff had a significant impact on reducing anxiety in older adults with dementia in nursing homes. Older adults with dementia who received six weeks of the preferred music listening intervention had a reduction of two units in the mean anxiety score from pre-test to post-test. This study was conducted as rigorously as possible and controlled for as many variables as possible. However, it is difficult to account for extraneous variables such as the impact of contact by nursing staff and visitors, wellbeing of the participants, use of medication, and the weather.

Comparison of our results with previous research was not possible as a review of the literature found no similar studies examining the effects of preferred music listening on

anxiety of those with dementia. The minimal number of previous studies reported on anxiety in people with dementia may be due to the lack of confidence on the tools for measuring anxiety in this group of people. The coexistence of anxiety and other psychological and behavioural problems in those with dementia can make the assessment more complicated. Current scales for anxiety in dementia vary in their construction of symptoms and can overlap with depression scales (Gibbons *et al.* 2006); therefore, additional refinement was required.

In our study, anxiety was measured before and at the completion of six weeks of preferred music listening sessions. Anxiety was not measured during the giving of the preferred music intervention due to the retrospective nature of collecting data using the RAID tool which was inappropriate to measure the immediate state of anxiety in a 30-minute period. Nevertheless, the RAID tool was the only measurement which was specifically developed for assessing the level of anxiety in those with dementia. The alpha coefficient of .73 for RAID in this study indicates an acceptable level of reliability for this tool. Further work to ensure the validity of RAID in assessment of anxiety levels in older people with dementia is needed.

Preferred music listening has not to date been examined for its effect on anxiety in older adults with dementia; however, few studies had looked at other types of music therapy on anxiety in those with dementia. Individualised music was reported to have reduced anxiety in a few patients in a small study examining the feasibility of using this intervention for those with dementia (Ragnescog *et al.* 2001). A study using the Neuropsychiatric Inventory (NPI), containing an item on anxiety, to determine the outcomes of music therapy for patients with

dementia reported a significant reduction in NPI scores immediately following music therapy but not at three weeks after the music therapy (Tuet & Lam 2006). However, this study did not use individualised or preferred music, but rather a general type of music found to be liked by many Chinese older people in Hong Kong. Since there was no study that examined the use of preferred music listening on anxiety for those with dementia, our results provide new information about the effectiveness of a preferred music listening intervention implemented by trained nursing staff on anxiety of those with dementia in nursing homes.

The music provided for the participants in the experimental group were based on older adults' personal preferences thereby introducing a sense of familiarity into their environment which is likely to have stimulated positive memories. The PLST model also proposes that caregivers should facilitate more adaptive behaviours by manipulating external stimuli and regulating stressors for those with dementia, and that these interventions for managing behavioural problems are most effective when they are individualised and tailored to patient's needs (Smith *et al.* 2004). Therefore, preferred music can be a viable strategy to stimulate remote memories associated with positive feelings (Son *et al.* 2002) and induce relaxation (Cuddy & Duffin 2005).

Music preferences are important in successful implementation of a preferred music listening intervention for older adults with dementia in this study. Taiwanese older adults who were born in China preferred Chinese popular songs from the past, whereas those who were born in Taiwan preferred Taiwanese music from the past. None of our study participants

selected western music as their preferred music. However, the music preferences chosen in our study were different from those in a study examining the effects of music on sleep among cognitive-intact Taiwanese community-dwelling elders (Lai & Good 2005), in which the majority of the participants (63%) chose to listen to western music with 27% having selected Chinese music. The different type of music selected by the older adults in Lai and Good's study in comparison to our study may have occurred because the participants in Lai and Good's study could only choose from western music and Chinese music; whereas the participants in our study could listen to music based on their preferences. The most beneficial responses of listening to music are elicited when older adults listen to music that is familiar, pleasant, and meaningful to them, therefore, an individual's familiarity with the music selections may be very important for producing optimal relaxation (Lee *et al.* 2004). To achieve a more holistic approach to care, the cultural differences in music preferences of an individual should be carefully assessed in order to provide music selections that are sensitive to personal cultural background (Good *et al.* 2000). Thus, when music is used as a care approach for people with dementia, their past music interests, social and cultural background need to be taken into account. When socially and culturally specific music is offered sensitively to the individual, the acceptance and benefits from the effects of music can be improved.

The level of importance of music in the elder's life may also have an impact on the effect produced by the preferred music intervention on anxiety in those with dementia. This study

found that the importance of music in life was positively related to the reduction of anxiety. This was consistent with the findings of other studies, where positive correlations were found between the degree of significance that music had in the person's life prior to the onset of cognitive impairment and the effectiveness of the music interventions (Gerdner 2000a). According to Gerdner (2000a), when music is viewed as an important aspect in the person's life and is based on personal preferences, memories associated with positive feelings can be elicited.

The cost effectiveness of music therapy has been reported in studies on other groups of patients (Romo & Gifford 2007). Therefore, nursing staff can be taught to facilitate more adaptive behaviour by manipulating external stimuli and regulating stressors, such as providing preferred music listening intervention, for those with dementia in nursing homes.

## **CONCLUSIONS**

Effective care approaches for managing anxiety of those with dementia are essential, particularly given the increasing prevalence of dementia and the associated anxiety, as well as the negative consequences of these behavioural problems on older adults themselves and others which all lead to increased costs in care. The expected effect of preferred music listening is dependent on the identification and implementation of music based on older adult's music preferences. Therefore, careful assessment of the importance of music and preferences of older adults are important before implementing quality care which is tailored to patient individual needs. The results of this initial study on a preferred music listening

intervention suggests that it can be an effective, accessible, easy for nursing staff to learn, and less costly intervention which causes no harm for managing anxiety in those with dementia in nursing homes.

## CONTRIBUTIONS

Study design: HS and AC; Data collection: HS; Data analysis: HS, AC and WL; Manuscript preparation: HS, AC and WL

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