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Effects of Group Music Therapy Combined with Dolphin Sounds on Mild Depression in Older Adults

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ABSTRACT

Introduction: Music therapy can help increase serotonin levels. Dolphin sounds produce ultrasonic frequencies, which stimulate the human brain to release endorphins; as a result, depression can be reduced. This music therapy program effectively reduces depression scores in older adults.

Methods: The sample consisted of 24 older adults with depression, divided into an experimental group and a control group selected by purposive sampling. The experimental intervention involved music therapy program sessions conducted once a day, 30 minutes per session, for a duration of 5 weeks, resulting in an index of item-objective congruence of 0.85. The Thai Geriatric Depression Scale (TGDS) was used to assess depression scores. Descriptive statistics included percentages, means, and standard deviations, while inferential statistics entailed the Wilcoxon signed-rank test and the Mann-Whitney U test, with the determination of significance at α=0.05.

Results: After receiving the music therapy program, the experimental group had a significantly lower mean depression score than before the experiment (p-value < 0.010) and significantly lower than the control group receiving regular care (p-value < 0.010).

Conclusion: The present study indicates that 30 minutes for 5 weeks of music therapy program intervention once a day is effective in reducing depression in older adults.

Keywords: Group music therapy; Older adults; Mild depression; Dolphin sounds; Music therapy; Therapeutic sounds; Depression treatment

Introduction

The National Statistical Office of Thailand predicts that the country will become a full-fledged aging society by 2022, and by 2030, the proportion of older adult individuals will increase to 26.9% of the total population [1]. Depression is a significant health issue among older adults, greatly impacting their daily lives with symptoms such as loss of appetite, insomnia, hopelessness, and despondency. Importantly, depression hampers their ability to cope with various problems effectively [2]. Severe depression can lead to feelings of life-weariness, suicidal ideation, and suicide attempts, becoming more prevalent in aging societies due to the multifaceted losses physical, psychological, and social that older adults face, necessitating significant life adjustments [3].

The studied dolphin therapy (also known as dolphin-assisted therapy, is a form of alternative treatment where humans interact with dolphins. The goal of the therapy is to help individuals with physical, emotional, or developmental challenges, including conditions like autism, PTSD, depression, or physical disabilities.) and found that dolphin sounds produce ultrasonic frequencies, which stimulate the human brain to release endorphins, known as the 'happiness hormone'. These sounds also cause the endocrine glands (specialized organs in the body that produce and release hormones directly into the bloodstream. These hormones regulate various essential functions, including

growth, metabolism, reproduction, and mood.) to vibrate, initiating emotional processes that induce positive feelings and reduce stress. Dolphin sounds range from approximately 500 Hz to at least 280 kHz [4].

Music therapy for treating depression involves the influence of music on human emotions and feelings. Using music to address depression is akin to administering emotional medicine, soothing and comforting patients through musical sounds [6]. Music therapy can help increase serotonin levels. Based on these findings, researchers recognized the complementary benefits of music therapy and dolphin sounds in reducing stress and promoting emotional well-being. To harness these effects, the researchers were interested in studying the impact of group music therapy integrating dolphin sounds on mild depression in older adults by developing a music therapy program incorporating dolphin sounds with frequencies ranging from approximately 500 Hz to at least 280 kHz [4].

This program also includes playing self-made musicals and studying the effect of group music therapy combined with dolphin sounds on mild depression in older adults, considering the appropriateness program for the elderly. The design involves group activities where elderly participants play music together. A study using music therapy in group activities found that active participation in playing instruments yields better results than passive listening [7]. Additionally, the components of music—rhythm, melody, pitch, and harmony—when processed by the limbic system stimulate the release of neurotransmitters that promote relaxation, especially serotonin. This results in a state of calm, relaxation, and stability, reducing depression in older adult individuals.

Methods

Participants

The participants were older adults from the Nakhon Phanom Social Welfare Development Center for Older Persons. A total of 24 older adults, divided into an experimental group (12 participants) and a control group (12 participants), were selected using purposive sampling based on specific inclusion criteria. The sample size was calculated by setting alpha (α) = 0.05 and power = 80.0%, so $Z\alpha/2 = 0.84$ using the Difference between two independent means (two groups)' method. These parameters were derived from a similar study [8]. To account for potential dropouts, the research team increased the sample size by 10.0%, resulting in an additional three participants per group. Consequently, the total number of participants was 24, with 12 in the experimental group and 12 in the control group. The sample size was calculated based on the effect size (d)=0.84, alpha (α)=0.05, and power= 80.0%

The inclusion criteria are as follows: participants must be 60 years or older, have depression, be free from dementia, have no hearing impairments or physical disabilities that would prevent participation, be willing to engage in the research voluntarily, and have no psychiatric disorders. The exclusion criteria include experiencing a medical emergency during the study, displaying noticeable auditory hallucinations, showing signs of confusion, and requesting to withdraw from the research.

This study received approval from the Human Research Ethics Committee (student level) for projects involving human participants at Boromarajonani College of Nursing, Nakhon Phanom University, under document number BCNN67009.

Intervention

Music therapy programs (MTP) include participants performing on musical instruments in a serene, well-ventilated area with plenty of sunlight. Both the older adult participants and the researchers will play the musical instruments together, with no prior musical knowledge or experience required. The therapeutic music selected to reduce depression will have the following characteristics: (i) Rhythm: consistent, with a continuous melody of notes; (ii) Cultural relevance: the melody aligns with the listener's culture and language and is familiar to them. The chosen songs include ‘Lai Toey Khong’ and ‘Mahori Esan,’ and sounds not exceeding 85 decibels. The arrangement ensures a harmonious blend of sounds without any jarring notes, creating an overall transparent and balanced sound that is neither too dense nor too sparse [9]. (iii) Additionally, dolphin sounds with frequencies ranging from approximately 500 Hz to at least 280 kHz [4] will be included in the therapy program, (iv) the therapy sessions will be conducted once a day with a duration of 30 minutes per session [10], for 5 weeks [11], aimed at reducing depression in older adults. Quality Assessment of the MTP: The program's quality was assessed using the Index of Item Objective Congruence (IOC), which three experts evaluated. It was determined to have an IOC value of 0.85. Adjustments were implemented based on expert feedback to enhance the accuracy and suitability of the language and content.

Figure 1 Musical instruments used in music therapy program

Outcome measurement

There were three outcome measures: (i) a questionnaire was used to collect data on gender, age, and education level; (ii) the Thai Mini-Mental State Examination (MMSE-Thai 2002 to assess six cognitive domains: orientation, registration, attention, calculation, language, and recall special. Older adult participants who are illiterate (cannot read or write) do not need to complete items 4, 9, and 10. The test consists of 11 questions. The cut-off scores for the MMSE-Thai 2002 are adjusted according to the educational level of the participants: illiterate older adults ≤ 14 points; older adults with primary education ≤ 17 points; and older adults with education above a primary level ≤ 22 points. Last, the Thai Geriatric Depression Scale (TGDS), which consists of 30 items, was designed to assess depressive symptoms in older adult individuals. The questions cover various aspects of the respondents' physical, mental, and social status. The TGDS uses a dichotomous scale (Yes/No) for responses. Those who scored 0-12 points indicate normal condition; 13-18 points indicate mild depression; 19-24 points indicate moderate depression, and 25-30 points indicate severe depression

Statistical analysis

The personal data collected includes gender, age, education level, underlying health conditions, and initial cognitive status assessed using the MMSE-Thai 2002. The data were analyzed using means, frequencies, and percentages. The Shapiro-Wilk test was used to assess the normality of the average depression score distributions for both the control and experimental groups. Comparison of Depression Scores Within the Experimental Group: The Wilcoxon signed-rank test was used to compare the average depression scores of older adults in the experimental group before and after participating in the music therapy program. The average depression scores of the older adults were compared between the experimental and control groups after the music therapy program using the Mann-Whitney U Test.

Results

The study involved a total of 24 participants, divided into an experimental group of 12 people and a control group of 12 people. The basic information of the two groups was analyzed and compared. The analysis revealed no statistically significant differences between the experimental and control groups across these variables (Table 1)

Table 1 Number, percentage, and test results of differences in personal characteristics of participants (n=24)

Characteristics	**Experiment** (n=12) n (%)	**Control** (n=12) n (%)	**p-value**
Age			
60 years and above	12(mean=72.8) (50.0)	12(mean=72.8) (50.0)	0.396[a]
Gender			
Male	7(29.1)	7(29.1)	0.527[b]
Female	5(20.8)	5(20.8)	
Education Level			
Primary Education	12(50.0)	8(33.3)	0.655[b]
Secondary	-	4(16.6)	
Diploma	-	-	
Bachelor	-	-	
Higher than Bachelor's	-	-	
Underlying Health Conditions			0.819[b]
Yes	7(29.2)	8(33.3)	
No	5(20.8)	4(16.7)	
MMSE-Thai 2002			0.355[a]
With cognitive impairment	-	-	
Without cognitive impairment	12(M=50.0)	12(M=50.0)	

[a] *Independent t-test*
[b] *Pearson Chi-Square test*

Average depression scores of older adults in the experimental group before and after music therapy

The comparison of average depression scores of the older adults in the experimental group before and after the music therapy program revealed that the average depression scores after MTP were significantly lower than those before MTP (p-value < 0.010) (Table 2).

Table 2 Comparison of average depression scores of older adults in the experimental group before and after the music therapy program (n = 12)

Score	**After** Mean	SD	**Before** Mean	SD	**z**	**p-value**
Average depression scores						
Normal	11.41	1.24	15.08	1.08	-3.07	0.001*
Mild	11.41	1.24	15.08	1.08		

Significant level at α=0.05

Average depression scores of older adults between experimental and control groups after music therapy program

After the music therapy program (MTP), the average depression scores of older adults in the experimental group were significantly lower than those in the control group (p-value = 0.001) (Table 3).

Table 3 Comparison of average depression scores of older adults between experimental and control groups after music therapy program (n = 24)

Score	**Experimental** Mean	SD	**Control** Mean	SD	**z**	**p-value**
Average depression score	11.41	1.24	14.16	0.71	-3.08	0.010*

Significant level at α=0.05

Discussion

The average depression scores of the older adults in the experimental group after the music therapy program are lower than before the music therapy program. The study found that the average depression scores of the experimental group were significantly lower after MTP compared to before the therapy program. This result indicates that the MTP, which included the song 'Lai Toei Khong' and 'Mahori Isan' music with a consistent rhythm and melodic continuity, effectively reduced depression.

The rhythm plays an important role in enhancing concentration, and the melody of the music affects creativity, helping to divert from feelings of stress, anxiety, and discomfort, and reducing anxiety. The chosen music matched the cultural context and language of the participants, evoking familiar and nostalgic memories. This familiarity allowed the older adults to engage with the music happily, which aligns with Istvandity's [5] systematic review. Istvandity's review examined the effects of reminiscence therapy combined with MTP on the quality of life and life satisfaction among elderly individuals in the community. The review concluded that music reminiscence therapy enhances life satisfaction, improves mood, and reduces depression in elderly individuals with depression [7].

Furthermore, the researcher actively participated in the MTP sessions with the experimental group, which included clapping and rewarding the elderly participants. This interactive and supportive environment likely contributed to the positive outcomes observed. Grocke et al. [12] supported that music therapy activities yielded better results than passive listening. Music therapy promotes social interaction, self-esteem, and pride among the elderly, improving their quality of life.

Dolphin sounds with frequencies ranging from approximately 500 Hz to at least 280 kHz [4] help balance and relax the human brain, stimulating endorphin release to induce positive emotional responses and stress relief [13]. Suwanwila et al. [10] also reported that the effects of an MTP could reduce depression in older adults in Trang Province. Their study found that post-program depression scores were significantly lower than pre-program scores. The therapy must be continuous and long-term to influence depression in older adults. In several studies [10, 11], using music therapy for 30 minutes every day for 5 weeks is a time that is effective in reducing depression in older adults.

The study found that the average depression scores of the older adults after MTP in the experimental group were significantly lower than in the control group. This finding supports the hypothesis and suggests that MTP effectively reduces depression among older adults; this results in mechanisms and processes of music therapy that induce a calm state of mind while listening. The mind is relaxed from sound waves, frequencies, rhythms, and consistent melodies, inducing a state of being with oneself in the present, concentration, and a relaxed mood, consistent with the concept of music theory and emotions, which states that emotional responses within the mind and physical responses lead to better health outcomes. The study found that the components of rhythm, melody, pitch, and harmony of sounds, along with the use of dolphin sound waves with frequencies of 500 Hz -280 kHz in the music therapy program, can pass through the limbic nervous system and stimulate the creation and function of important neurotransmitters, namely serotonin, which helps adjust moods to be positive and eliminate negative emotions [10], so that the treatment is continuous. The systematic review found that using a music therapy program every day for 30 minutes [10] for 5 weeks [11] will reduce depression in the elderly. This is consistent with the study by Wannapuek et al. [14], which found that a program combining music therapy with social support significantly reduced depression in older adults. Similarly, the study by Suwanwila et, al. [10] found that the experimental group had significantly lower post-test depression scores compared to the control group significantly.

Conclusion

Older adults treated with music therapy activities have positive feelings from having familiar rhythms and melodies, which helped reduce depression in older adults. The MTP is a safe, low-cost intervention that fosters relationships with older adults during activities; it is recommended that those interested in elderly care, including outpatient and inpatient facilities as well as community settings, consider incorporating MTP to address depression in older adults.

Some limitations were detected in the study. The study was conducted over a short period, with data collected during the MTP, and no follow-up took place after its conclusion. The sample was not randomly selected, so it was necessary to use non-parametric statistics for testing. Future research should explore the effects of MTP on other mental health issues in older adults, such as stress, anxiety, and insomnia.

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