

Masthead Logo

University of Tennessee, Knoxville  
**Trace: Tennessee Research and Creative Exchange**

Chancellor's Honors Program Projects

Supervised Undergraduate Student Research and  
Creative Work

5-2019

# Testing a Musical Game Activity for Community-Dwelling Older Adults

Jordan Riggins

*University of Tennessee- Knoxville, jrigin4@vols.utk.edu*

Susan McLennon PhD ARNP

*University of Tennessee-Knoxville, smclenno@utk.edu*

Follow this and additional works at: [https://trace.tennessee.edu/utk\\_chanhonoproj](https://trace.tennessee.edu/utk_chanhonoproj)

Part of the [Geriatric Nursing Commons](#), and the [Other Nursing Commons](#)

## Recommended Citation

Riggins, Jordan and McLennon, Susan PhD ARNP, "Testing a Musical Game Activity for Community-Dwelling Older Adults" (2019).  
*Chancellor's Honors Program Projects*.

[https://trace.tennessee.edu/utk\\_chanhonoproj/2263](https://trace.tennessee.edu/utk_chanhonoproj/2263)

This Dissertation/Thesis is brought to you for free and open access by the Supervised Undergraduate Student Research and Creative Work at Trace: Tennessee Research and Creative Exchange. It has been accepted for inclusion in Chancellor's Honors Program Projects by an authorized administrator of Trace: Tennessee Research and Creative Exchange. For more information, please contact [trace@utk.edu](mailto:trace@utk.edu).

Testing a Musical Game Activity for Community-Dwelling Older Adults

Jordan Riggins, BSN Student, Susan M. McLennon, PhD, ANP-BC

University of Tennessee- Knoxville

## TESTING A MUSICAL GAME ACTIVITY

### Abstract

#### Testing a Musical Game Activity for Community-Dwelling Older Adults

**Background:** Findings from a literature review suggest that music is a promising intervention for older adults, without negative effects, and inexpensive. Understanding the usefulness of music as a leisure activity for older adults residing in the community who often lack social engagement and experience declines in well-being and other negative emotional states has been recommended.

**Purpose:** The purpose of this study was to determine the effect on mood, satisfaction, and acceptability of an innovative music game for community residing older adults. It was hypothesized that seniors who participated in Song Bingo would report improved mood afterwards, be satisfied, and want to play it again.

**Methods:** After receiving institutional review board approval, study program flyers were distributed which was offered one time at a local senior center. A song list was created from popular and age-appropriate music, verified by a clinical expert. Measures included a demographic survey, a pre/post-game mood faces scale, and one-item satisfaction and acceptability scales. Descriptive statistical analyses were conducted. Thirteen older adults participated (Mean age = 74.4; 54% female, 40% black).

**Findings:** Before the program, 33.3% of the participants reported their moods as “very happy” or “happy.” After completing the Song Bingo game, 58.4% reported their mood was either “very happy” or “happy.” The mean mood score before the program was 5.0 (SD=1.0), which increased to a mean of 5.7 (SD=1.4) afterwards. Sixty percent of the participants completely agreed or agreed that they were satisfied with the program, and 50% reported that they would play Song Bingo again.

**Conclusion:** Song Bingo improved mood in older adults residing in the community. Most participants indicated they were satisfied with Song Bingo and would play it again. Replicating this study in a larger sample and different settings is recommended.

**Keywords:** music, older adults, leisure, mood

## TESTING A MUSICAL GAME ACTIVITY

### Testing a Musical Game Activity for Community-Dwelling Older Adults

In the last decade, the average age in the United States has notably changed, largely due to an increase in the population of adults age 65 and older from 35 million in 2000 to 49.2 million in 2016 (United States Census Bureau, 2017). The vast majority of these older adults live independently in the community. As people age, they are more likely to suffer from chronic conditions, as opposed to acute conditions (Breytspraak & Badura, 2015). Chronic conditions such as diabetes, arthritis, and hypertension are common and can contribute to declines in social activities due to functional limitations. Social isolation can also occur in older adults who live alone. Both of these issues can have a significant impact on mental health, putting individuals at risk for depression (Quach, 2017). This is especially concerning since depression is the most prevalent mental health problem among older adults (Breytspraak & Badura, 2015). It is possible for health care providers to assist with these potentially negative effects of aging by identifying interventions that can be implemented at the community level to increase mood and prevent or reduce feelings of isolation.

Music therapy has been identified as a promising intervention for older adults. Lee and Thyer (2013) reported immersive interventions such as listening, singing, and focusing on the music were shown to elicit the therapeutic effects of music for relaxation, improved mood, and reduced depression when used in combination with pharmacological interventions. Blackburn and Bradshaw (2014) examined the usefulness of music interventions for people caring for individuals with dementia living at home. They found that a group environment for music therapy was specifically advantageous by providing an environment to foster relationships with peers, thus minimizing the social isolation that is a major contributing factor to older adult depression. Other advantages of music therapy are that it has no known side effects and is

## TESTING A MUSICAL GAME ACTIVITY

inexpensive to use (Blackburn & Bradshaw, 2014). Backer, Grocke, and Pachana (2012) examined music intervention's effect on spousal relationships. They demonstrated a reduction in agitation and improved mood for both caregivers and persons with dementia in five couples after a music intervention.

Another potential intervention is sedentary activities, including games such as Bingo, that can be implemented to reduce or prevent possible negative effects of aging. Fitzpatrick (2009) reported an improvement in both psychological and physical health perceptions in older adults in the community following participation in games. Participants felt more engaged with their peers following involvement with group games.

Senior centers provide resources and activities for seniors to engage and socialize. Common activities at community senior centers include various recreational games such as Bingo and musical programs. A novel musical game activity, which combines music with Bingo, and called Song Bingo was designed to be implemented in a senior center environment for community-residing older adults.

### **Purpose**

The purpose of this study was to determine the effect on mood, satisfaction, and acceptability of an innovative musical game program, Song Bingo, for community-residing older adults. It was hypothesized that after playing Song Bingo, seniors would report improved mood, be satisfied, and find it acceptable.

### **Literature Review**

A initial review of literature was performed to examine the effect of music on the health of community-dwelling older adults. A search of PubMed was conducted using, and six articles were included for review.

## TESTING A MUSICAL GAME ACTIVITY

Liao, Chong, Tan, and Chua (2019) conducted a randomized controlled trial to determine the effect of low-cost intervention, Tai Chi with music, to improve quality of life (QOL) in the older adult population with mild to moderate depression. The study included 112 community-dwelling older adults with mild to moderate depression living in China. QOL was measured at baseline and at every month, for three months. The researchers determined that Tai Chi with music was effective at increasing QOL for older adults with mild to moderate depression in the community.

Poulos et al. (2019) examined the effect of participatory art on the mental well-being of community-dwelling older adults. The researchers conducted a mixed-methods analysis of 127 older adults during an eight to twelve-week program involving different artistic activities such as singing, music, dance and movement, photography, and drama. Results showing increases in mental well-being and self-reported creativity were statistically significant.

Ronzi, Orton, Pope, Valtorta, and Bruce (2018) conducted a systematic review of qualitative and quantitative studies that examined the effect of interventions such as dancing, music, singing, and art that promote social inclusion on the well-being of community residing older adults. The researchers found that singing and music, art and culture, multi-activity, and intergenerational interventions consistently demonstrated positive effects on the health of older adults. The researchers suggest that future researchers use more intensive design methods and determine what the most effective interventions are, not necessarily most cost-effective.

Yeh et al. (2015) conducted a randomized clinical trial to determine the effect of music aerobic exercise (MAE) on depression and brain-derived neurotrophic factor (BDNF) levels in community-dwelling women. The study included 106 middle-aged community-dwelling women over a 12-week period. The researchers found statistically significant improvements in

## TESTING A MUSICAL GAME ACTIVITY

depressive symptoms at improvements in BDNF levels at the 12-week mark of the program. The study demonstrated the usefulness of music and movement for community-dwelling adults.

Chan, Wong, Onishi, and Thayala (2012) conducted a randomized controlled trial to determine the effect of music on depression in older adults. The study included 50 older adults who listened to 30 minutes of music once a week for eight weeks. Depression scores were obtained every week of the intervention. The researchers found a statistically significant reduction in depression scores following the music intervention, decreasing every consecutive week.

Chan, Chan, Mok, and Kwan Tse (2009) conducted a randomized controlled trial to examine the effect of music on depression and physiological factors, such as blood pressure, heart rate, respiratory rate. The study included 47 older adults who listened to music for a 30-minute session once a week. The researchers found statistically significant decreases in depression scores and blood pressure following the music session.

Due to the limited number of studies into music's effect on the health and mood of community-dwelling older adults in general, another search was conducted that included music interventions for people with dementia. Understanding the usefulness of music interventions for people with dementia in the home and caregivers could provide insight into its usefulness more broadly for older adults. A search was conducted in CINAHL and PubMed databases using keywords music AND dementia. The inclusion criteria were research articles published in the English language within the last 10 years (2008-2018); with human subjects age 65 and older; and a research focus of music interventions for persons with dementia in the home.

Following completion an initial search of PubMed and CINAHL databases and eliminating duplicates, a total of 222 articles were generated. Articles were screened based on

## TESTING A MUSICAL GAME ACTIVITY

title and were excluded if the primary research did not include subjects with dementia, did not include music, or researched patients in the hospital, hospice, nursing home, or long-term care facilities (non-ambulatory). This resulted in 114 articles that were then screened by abstract using the same criteria. The full texts of the remaining 97 articles were accessed and screened to ensure the research was relevant and feasible in its application for caregivers to use music for persons with dementia while living at home. Eleven articles met these criteria and addressed the use of music intervention by caregivers for persons with dementia (PWD) at home.

Baker, Grocke, and Panchana (2012) conducted a mixed-methods study to determine if a home-based Active Music Intervention (AMI) would enhance relationships of Australian caregivers and spouses with dementia. Their convenience sample included five couples in which one person had a diagnosis of dementia and the other was the caregiver. Spousal caregivers were instructed in AMI and instructed to use it three times a week for six weeks to facilitate interaction with their spouse. Caregivers also kept a journal and completed pre and post-questionnaires. The researchers found that although the intervention improved satisfaction with caregiving and improved mood of both the caregiver and spouse with dementia, these findings were not statistically significant due to insufficient power. However, the sample size was insufficient to produce significant results.

Chatterton, Baker, and Morgan (2010) conducted a systemic review of literature to determine whether it was singing that affects the PWD or the person who is singing to the PWD that produces the effect. The review included sixteen articles. The researchers concluded that the person conducting the intervention has an effect, because trained music therapists set specific goals for the PWD and nonprofessional caregivers focused more on the connection with the



## TESTING A MUSICAL GAME ACTIVITY

PWD. They concluded that both are effective. The researchers reported a limitation was the limited number of articles included in the review.

Hanser, Butterfield-Whitcomb, Kawata, and Collins (2011) conducted a randomized controlled trial to test a family, caregiver implemented music program for PWD. Their convenience sample included fourteen PWD and their family caregivers who were instructed by a music therapist to listen to a designated compact disc three times in one week. The researchers reported higher mean scores of self-reported relaxation, comfort, and happiness compared to baseline. They also reported that caregivers demonstrated the most benefit from the music program. A limitation of this study is a reported high dropout rate.

Hsu, Flowerdew, Parker, Fachner, and Odell-Miller (2015) conducted a randomized controlled trial to determine the effect of individualized music therapy on neuropsychiatric symptoms experienced by PWD and caregivers. Their sample included 17 home care PWD and their caregivers. The researchers concluded that the program resulted in improved symptoms and wellbeing for the PWD, as well as the caregivers who reported that the individualized music therapy improved caregiving satisfaction and communication. The researchers recommended that the study be replicated with a larger sample size.

Hulme, Wright, Crocker, Oluboyede, and House (2010) conducted a systemic review of literature to examine nonpharmacological interventions for dementia. The review included 33 articles and examined the interventions effects on symptoms of dementia. The researchers suggested music is a feasible option, because it is an inexpensive intervention that can be implemented by informal caregivers of PWD. The researchers suggest a review into group music therapy as an option for treating symptoms of dementia.

## TESTING A MUSICAL GAME ACTIVITY

Lai, Lai, Ho, Wong, and Cheung (2016) conducted a quasi-experimental design, mixed-methods study in Hong Kong using the music with movement (MWM) theory to examine the wellbeing of PWD and their families. The sample consisted of 17 people trained to instruct family caregivers on the MWM protocol. The study consisted of three parts; developing the MWM protocol, testing the protocol, and refining the protocol. The researchers' findings lead them to make changes to the program to increase its flexibility and placing more emphasis on educating participants how to facilitate PWD enjoyment. A limitation of the study was that the protocol may not be replicable in other settings as it was specifically developed for the staff members who participated in the study.

Park and Specht (2009) conducted an analysis to examine the effect of individualized music on agitation for PWD who live at home. The non-probability convenience sample included 15 home-dwelling individuals with dementia. The participants listened to their preferred type of music for 30 minutes two times a week for three weeks, just prior to their usual peak times of agitation. The researchers' findings suggest that the listening to the music lowered the mean agitation scores of the participants contributing to the evidence that preferred music listening, even for just 30 minutes, can be a useful intervention for PWD.

Park (2010) conducted a quasi-experimental study to determine the effect of music on pain for PWD living at home. The convenience sample consisted of 15 home-dwelling individuals from Iowa with a diagnosis of dementia. The participants listened to their preferred music for 30 minutes twice a week for two weeks that was played by their family caregiver just prior to peak agitation time. The researchers measured agitation and pain levels preintervention, during intervention, and postintervention. Their findings suggest agitation was slightly decreased while listening to music, and pain levels were decreased after listening to music.

## TESTING A MUSICAL GAME ACTIVITY

Sarkamo et al. (2014) conducted a randomized controlled trial of 89 PWD-caregiver dyads. Subjects were assigned to one of three groups: singing, listening to music, or the standard of care during a ten week, once weekly, intervention. The researchers' findings suggest that the PWD musical background did not influence the effect of the intervention. However, demographic variables, such as age, can affect caregiver implemented music intervention outcomes.

Sarkamo et al. (2016) conducted a randomized controlled trial. The sample consisted of 89 PWD-caregiver dyads. The dyads were randomly assigned to a music listening group, a singing group, or a control group. The dyads were involved in a ten week once a week intervention depending on assigned group. The researchers analyzed the effect of music and singing on Quality of Life in Dementia (CBS). The researchers' findings suggest an effect in two of the five domains on the CBS: behavioral disturbances and physical signs.

This review of the literature revealed the usefulness of music to improve several different outcomes, including mood for older adults, with and without dementia. Music is a low-cost, easily accessible intervention for caregivers. The literature also supports that music also affects the mood of the caregivers and the shared experiences may enhance relationships. The benefit to spouses without a diagnosis of dementia gave insight into the usefulness of music for the population of community residing older adults. The literature also supports that games such as BINGO and other leisure activities to improve quality of life in this group. Therefore, the idea was proposed to combine music with a popular activity at senior programming, Bingo.

Senior centers provide resources and activities for seniors to engage and socialize. A musical game activity, which combines music with a popular leisure activity, called Song Bingo, which was designed to be implemented in a senior center environment for community-residing

## TESTING A MUSICAL GAME ACTIVITY

older adults. With Song Bingo, individuals are given a card similar to Bingo, with five columns and five rows. Each of the 25 boxes contain the title of a song and the artist. A facilitator plays 45 seconds of the song and players need to identify the song and mark it off on their card if it is one of the 25.

### **Methods**

#### **Study Design**

A quasi-experimental, cross-sectional, pretest-posttest design was used to evaluate the effectiveness of a musical game activity on the mood of seniors, as well as the participant satisfaction and acceptability of the program. Institutional Review Board (IRB) approval was received prior to initiation of the study.

#### **Sampling Plan**

A convenience sampling plan was used to identify subjects. The population was seniors living in the community. Inclusion criteria included adults, age 50 to 95, who attend activities at a senior center. Exclusion criteria included those who do not read, write, or speak English due to an inability to fill out the study's survey. The age range begins at age 50 because the senior center allowed people over age 50 and older to attend programming. The population accessible to the researchers are those who regularly attended the Bingo activity time at the local senior center and were interested in participating in the study.

#### **Procedures**

The senior center activity director introduced the researchers to the attendants. An explanation of the study was provided prior to beginning the game in the activity room by the researchers, and subjects provided informed consent to participate. The study information packet was then distributed to attendees who wished to participate. The packet included 1) Study

## TESTING A MUSICAL GAME ACTIVITY

Information Sheet with Consent Cover Statement 2) Before the Musical Bingo Game Survey and 3) After the Musical Bingo Game Survey. If they did not complete the survey, they still were able to participate in the game. The researchers were present to answer any questions from participants and available to anyone who needs assistance with completing the surveys.

Participants were asked to complete a five-minute survey prior to the beginning of the game. The game was played for a total time of an hour and thirty minutes. This is the usual time for a regular Bingo game and was requested by the staff. After the conclusion of the game, time was given for participants to complete the second part of the survey, again taking approximately five minutes.

All surveys were collected regardless of completion by participants. Participants received a small gift for their time (< \$5.00) and for winners of the rounds, which is regularly anticipated as the prize for winners of the center's Bingo games.

### **Measures**

Demographic characteristics of the sample were assessed with a brief survey containing age, sex, race, and ethnicity items. The FACE Mood Scale (FMS) (Williams, Murray, Lund, Harkiss, & DeFranco, 1985; Lorish & Maisiak, 1986) was used to measure mood before and after the Song Bingo game. This scale has been used in previous research with children in a dental clinic (n=25) and adult participants in an online depression intervention (n=47) (Elefant, Contreras, Munoz, Bunge, & Leykin, 2017; Williams et al., 1985). In those two studies, validity and reliability of the 7-item scale was not reported, however, the original 20-item faces mood scale has undergone psychometric testing in 174 patients with arthritis (Lorish & Maisiak, 1986). Adequate convergent and discriminant validity were reported with significant correlations of .49 and -.37 respectively. Good test-retest reliability was reported at .81. The FMS contains faces

## TESTING A MUSICAL GAME ACTIVITY

depicting varying ranges of expressions of sadness to happiness. Participants were asked to choose the face that was closest to how they felt that day before the Song Bingo program and again after the program. Options were rated on a scale of 1-7 with 1 = very sad to 7 = very happy.

To assess program satisfaction and acceptability, two questions were asked. The first was “I was satisfied with the Song Bingo program,” and the second question was “I would like to play Song Bingo again.” For each question, participants were asked to choose from a 5-point Likert scale with response choices ranging from completely disagree (1) to completely agree (5).

### **Results**

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp, 2017). The survey responses from 13 participants were analyzed using descriptive statistical analyses, and characteristics of the sample are displayed in Table 1. Statistical analyses were used to calculate frequencies, percentages, means, and standard deviations the demographic characteristics, pre- and post-mood scale, and the satisfaction and acceptability items (satisfaction, play again). Missing items were omitted.

Participants ages ranged from 59.1 to 89.8 years old with a mean age of 74.4 years of age. Females comprised 53.8% of the participants. The participants were black (38.5%), white (30.8%), Asian (7.7%), or other (23.1%). For complete results of the demographic characteristics of the sample see Table 1. Before the program, 33.3% of the participants reported their mood as “very happy” or “happy.” After completing the Song Bingo game, 58.4% reported their mood was either “very happy” or “happy.” For complete results of the pre and port-mood, satisfaction and acceptability survey responses see Table 2. The mean mood score before the program was 5.0 (SD=1.0), which increased to a mean of 5.7 (SD=1.4) afterwards. The sample size was not

## TESTING A MUSICAL GAME ACTIVITY

large enough to support a statistical analysis (ex. t-test) of a change in mean scores or a conclusion about statistical significance. For the satisfaction item, 60% of the participants completely agreed or agreed they were satisfied with the program, and 50% reported it as acceptable and indicated they would like to play Song Bingo again. Only one person was not satisfied, and one person would not want to play again.

### **Discussion**

The clinical significance of the study suggests that a musical game activity shows promising effect in increasing the mood of community residing older adults. This could be useful in preparing community programming for this population. The music game activity is unique and relatively simple to implement, especially where there is already regularly scheduled programming available for community seniors.

The mean mood score before the program was 5.0 (SD=1.0), which increased to a mean of 5.7 (SD=1.4) afterwards. This demonstrates that the music game activity effect of increasing the mood for participants. The increase in mood could be attributable to playing the game, listening to music, and possibly winning prizes. Fifty percent of participants reported that they would play the game again. Sixty percent of the participants completely agreed or agreed they were satisfied with the program. It is recommended that the game be trialed multiple times to work out any inconsistencies prior to playing. Also communicating the change from regular scheduled programming at the community center should be emphasized to ensure participants anticipate a change.

The results supported the hypotheses that participants who played Song Bingo would score higher on the mood survey after playing the game and would be satisfied. However, these

## TESTING A MUSICAL GAME ACTIVITY

results were inconclusive about the hypothesis that the music game activity would be acceptable, and they would want to play again.

### **Limitations**

The study was limited by a small sample size. A larger sample size is recommended for future studies to determine statistical significance of results. While the sample was relatively racially diverse, it was limited to one senior center in an urban southeastern region of the country. The study should be conducted at multiple locations to allow for a more comprehensive understanding of the effect of the game among various groups and regions. The use of a convenience sample limited the scope of the study to older adults who sought out community programming and participated regularly. They could potentially have a different baseline average mood or different acceptance of a new program, since they typically attend other programs.

The participants may not have enjoyed the game as much if they were not as familiar with the songs being played as other participants. There was possibly some bias in implementing the programming at the time of regularly scheduled community programming that frequent participants had come to expect. It is recommended that the game be played multiple times at the same location, so participants can begin to be accustomed to how the new game is played and not be biased by the fact that the activity is new to them. Qualitative interviews with participants may also provide additional insight into ways to improve or adjust the programming to be better suited to the needs and desires of the group.

### **Conclusion**

Song Bingo resulted in improved mood for older adults residing in the community. This knowledge can be used when implementing new programming for community-residing older adults. It was an acceptable program and the majority of the participants reported being satisfied.



## TESTING A MUSICAL GAME ACTIVITY

It is recommended that future studies include a larger sample size to further determine significance.

## TESTING A MUSICAL GAME ACTIVITY

## References

- Baker, F. A., Grocke, D., & Pachana, N. A. (2012). Connecting through music: A study of a spousal caregiver- directed music intervention designed to prolong fulfilling relationships in couples where one person has dementia. *Australian Journal of Music Therapy*, 23, 4-19.
- Blackburn, R., & Bradshaw, T. (2014). Music therapy for service users with dementia: A critical review of the literature. *Journal of Psychiatric & Mental Health Nursing*, 21(10), 879-888. doi:10.1111/jpm.12165
- Breyspraak, L. & Badura, L. (2015). Facts on Aging Quiz (revised; based on Palmore (1977; 1981)). <http://info.umkc.edu/aging/quiz/>
- Chan MF, Chan EA, Mok E, & Kwan Tse FY. (2009). Effect of music on depression levels and physiological responses in community-based older adults. *International Journal of Mental Health Nursing*, 18(4), 285–294. <https://doi-org.proxy.lib.utk.edu/10.1111/j.1447-0349.2009.00614.x>
- Chan, M., Wong, Z., Onishi, H., & Thayala, N. (2012). Effects of music on depression in older people: A randomised controlled trial. *Journal of Clinical Nursing*, 21(5-6), 776-783.
- Chatterton, W., Baker, F., & Morgan, K. (2010). The singer or the singing: who sings individually to persons with dementia and what are the effects? *American Journal of Alzheimers Disease and other Dementias* 25(8), 641-649.  
doi:10.1177/1533317510385807

## TESTING A MUSICAL GAME ACTIVITY

Elefant, A. B., Contreras, O., Munoz, R. F., Bunge, E. L., & Leykin, Y. (2017).

Microinterventions produce immediate but not lasting benefits in mood and distress. *Internet Interventions*, *10*, 17-22. Retrieved from <http://dx.doi.org/10.1016/j.invent.2017.08.004>

Fitzpatrick, T. R. (2009). The quality of dyadic relationships, leisure activities and health among older women. *Health Care for Women International*, *30*(12), 1073-1092.

doi:10.1080/07399330903199367

Hanser, S. B., Butterfield-Whitcomb, J., Kawata, M., & Collins, B. E. (2011). Home-based music strategies with individuals who have dementia and their family caregivers. *Journal of Music Therapy*, *48*(1), 2-27.

Hsu, M. H., Flowerdew, R., Parker, M., Fachner, J., & Odell-Miller, H. (2015). Individual music therapy for managing neuropsychiatric symptoms for people with dementia and their carers: a cluster randomised controlled feasibility study. *BMC Geriatrics*, *15*, 84.

doi:10.1186/s12877-015-0082-4

Hulme, C., Wright, J., Crocker, T., Oluboyede, Y., & House, A. (2010). Non-pharmacological approaches for dementia that informal carers might try or access: a systematic review. *International Journal of Geriatric Psychiatry*, *25*(7), 756-763. doi:10.1002/gps.242

IBM Corp. (2017). IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.

## TESTING A MUSICAL GAME ACTIVITY

- Lai, C. K., Lai, D. L., Ho, J. S., Wong, K. K., & Cheung, D. S. (2016). Interdisciplinary collaboration in the use of a music-with-movement intervention to promote the wellbeing of people with dementia and their families: Development of an evidence-based intervention protocol. *Nursing and Health Sciences Journal*, 18(1), 79-84. doi:10.1111/nhs.12238
- Liao, S., Chong, M., Tan, M., & Chua, Y. (2019). Tai Chi with music improves quality of life among community-dwelling older persons with mild to moderate depressive symptoms: A cluster randomized controlled trial. *Geriatric Nursing*, 40(2), 154–159. <https://doi-org.proxy.lib.utk.edu/10.1016/j.gerinurse.2018.08.001>
- Lee, J., & Thyer, B. A. (2013). Does Music Therapy Improve Mental Health in Adults? A Review. *Journal of Human Behavior in the Social Environment*, 23(5), 591-603. doi:10.1080/10911359.2013.766147
- Lorish, C. D. and Maisiak, R. (1986), The face scale: A brief, nonverbal method for assessing patient mood. *Arthritis & Rheumatism*, 29: 906-909. doi:[10.1002/art.1780290714](https://doi.org/10.1002/art.1780290714)
- Mark, J., Williams, G., Murray, J. J., Lund, C. A., Harkiss, B., & DeFranco, A. (1985.) Anxiety in the child dental clinic. *Child Psychology and Psychiatry*, 26(2), 305-310.
- Park, H. (2010). Effect of music on pain for home-dwelling persons with dementia. *Pain Management Nursing*, 11(3), 141-147. doi:10.1016/j.pmn.2009.05.004
- Park, H., & Pringle Specht, J. K. (2009). Effect of individualized music on agitation in individuals with dementia who live at home. *Journal of Gerontological Nursing*, 35(8), 47-55. doi:10.3928/00989134-20090706-01

## TESTING A MUSICAL GAME ACTIVITY

- Park, H. O. (2008). The effect of individualized music on agitation in patients with dementia who live at home. University of Iowa, Retrieved from <http://proxy.lib.utk.edu:90/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=109850943&scope=site> Available from EBSCOhost ccm database.
- Poulos, R. G., Marwood, S., Harkin, D., Opher, S., Clift, S., Cole, A. M. D., ... Poulos, C. J. (2019). Arts on prescription for community-dwelling older people with a range of health and wellness needs. *Health & Social Care in the Community*, 27(2), 483–492. <https://doi-org.proxy.lib.utk.edu/10.1111/hsc.12669>
- Quach, J. & Lee, J. A. (2017). Do music therapies reduce depressive symptoms and improve QOL in older adults with chronic disease? *Nursing*, 47(6), 58-63.
- Ronzi, S., Orton, L., Pope, D., Valtorta, N. K., & Bruce, N. G. (2018). What is the impact on health and wellbeing of interventions that foster respect and social inclusion in community-residing older adults? A systematic review of quantitative and qualitative studies. *Systematic Reviews*, 7(1), 1-22.
- Sarkamo, T., Laitinen, S., Numminen, A., Kurki, M., Johnson, J. K., & Rantanen, P. (2016). Clinical and demographic factors associated with the cognitive and emotional efficacy of regular musical activities in dementia. *Journal of Alzheimers Disease*, 49(3), 767-781. doi:10.3233/jad-150453
- Sarkamo, T., Tervaniemi, M., Laitinen, S., Numminen, A., Kurki, M., Johnson, J. K., & Rantanen, P. (2014). Cognitive, emotional, and social benefits of regular musical activities in early dementia: randomized controlled study. *Gerontologist*, 54(4), 634-650. doi:10.1093/geront/gnt100

## TESTING A MUSICAL GAME ACTIVITY

United States Census Bureau. (2017). The nation's older population is still growing, census bureau reports. Retrieved from <https://www.census.gov/newsroom/press-releases/2017/cb17-100.html>

Yeh, S.-H., Lin, L.-W., Chuang, Y. K., Liu, C.-L., Tsai, L.-J., Tsuei, F.-S., ... Yang, K. D. (2015). Effects of music aerobic exercise on depression and brain-derived neurotrophic factor levels in community dwelling women. *BioMed Research International*, 2015, 1–10. <https://doi-org.proxy.lib.utk.edu/10.1155/2015/135893>

## TESTING A MUSICAL GAME ACTIVITY

## Appendix A

Table 1. Characteristics of the Sample

	Frequency (%)	Mean (SD)	Range
Age (missing = 1)	12 (100)	74.4 (10.1)	59-90
Gender			
Male	6 (46.2)		
Female	7 (53.8)		
Race			
Black	5 (38.5)		
White	4 (30.8)		
Asian	1 (7.7)		
Other	3 (23.1)		
Ethnicity (missing = 7)			
Non-Hispanic	6 (46.2)		
Hispanic	1		

## TESTING A MUSICAL GAME ACTIVITY

## Appendix B

Table 2: Descriptive Statistics of Pre- and Post-Mood and Acceptability (Satisfaction/Play Again) Scores

	Before Song Bingo Frequencies (%)	Before Song Bingo Mean (SD)	After Song Bingo Frequencies (%)	After Song Bingo Mean (SD)
Mood (missing = 1)				
Very happy	1 (8.3)	5.0 (1.0)	5 (41.7)	5.7 (1.4)
Happy	3 (25.0)		2 (16.7)	
Kind of happy	3 (25.0)		2 (16.7)	
OK	5 (41.7)		2 (16.7)	
Kind of sad	0		1 (8.3)	
Sad	0		0	
Very sad	0		0	
Satisfaction (missing = 3)				
Completely agree			3 (30.0)	3.8 (1.0)
Agree			3 (30.0)	
Neutral			3 (30.0)	
Disagree			1 (10.0)	
Completely disagree			0	
Play Again (missing = 3)				
Completely agree			3 (30.0)	3.6 (1.3)
Agree			2 (20.0)	
Neutral			4 (40.0)	
Disagree			0	
Completely disagree			1 (10.0)	