

# Music Therapy as an Intervention to Reduce Blood Pressure and Anxiety Levels in Older Adults With Hypertension

## A Randomized Controlled Trial

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### ABSTRACT

Hypertension is a serious medical condition, the frequency of which increases significantly with age; has a negative impact on certain health complications; and increases the rate of mortality. Music therapy as a nonpharmacological treatment has many positive effects on an individual's body and mind. A randomized controlled trial was used to evaluate the effects of music therapy on blood pressure, heart rate, and anxiety levels in older adults with hypertension living in a nursing home. Sixty older adults were randomly divided into experimental and control groups ( $n = 30$  each). Significant reductions in systolic blood pressure, heart rate, and anxiety levels were found in older adults with hypertension receiving music therapy compared with the control group. The current study confirms music therapy as a safe, non-invasive, nonpharmacological, and cost-effective intervention for reducing blood pressure, heart rate, and anxiety levels in older adults with hypertension. [*Research in Gerontological Nursing*, 15(2), 85-92.]

The World Health Organization (WHO; 2018) stated that the proportion of older adults worldwide is expected to double between 2015 and 2050, increasing from 12% to 22%. The prevalence of certain physical conditions has increased as a consequence of the growing population of older adults (Butt & Harvey, 2015).

Hypertension is a common chronic condition of late-life with negative consequences on the cardiovascular system (WHO, 2019). The high incidence of hypertension in older adults leads to an increase in the frequency of complications, such as stroke, myocardial infarction, sudden death, coronary heart disease, heart failure, and kidney disease (Butt & Harvey, 2015). An estimated 1.13 billion people worldwide have hypertension (WHO, 2019).

Pharmacological treatment is considered a recommended form of therapy for high blood pressure that should be tailored to the clinical characteristics of the patient (James et al., 2014). The mitigating effects of pharmacological therapy on high blood pressure may cause unwanted negative side effects, whereas nonpharmacological therapy does not carry these risks (Shamsi et al., 2007). Furthermore, older adults with hypertension who take anti-hypertensive medications may experience negative symptoms and side effects, such as dependence on the medication, nausea, fatigue, stomach pain, and sleep disorders (Shamsi et al., 2017; West et al., 2013). From an economic standpoint, nonpharmacological treatment of hypertension is a compelling approach for managing hypertension in developed

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and developing countries, particularly when taking into account that nonpharmacological therapies have little to no measurable side effects (Verma et al., 2021). Some authors (Rahmawati & Bajorek, 2017; Sarris et al., 2012) have suggested that use of complementary and alternative medicine to reduce blood pressure has gained in significance, which includes meditation, yoga, and music therapy. Nurses can implement nonpharmacological therapies, such as music therapy (Cardoso et al., 2017). Music therapy can help in the treatment and recovery process. Lindquist et al. (2018) noted that music used as an intervention must have a consistent and stable rhythm and be fun, dynamic, and harmonious.

In their literature review, Hosseini and Hosseini (2018) found that music therapy had positive effects on treatment of cardiovascular diseases, pain, anxiety, depression, sleep disorders, memory, learning, IQ, autism, and schizophrenia. Music therapy achieves anti-hypertensive effects by reducing risk factors associated with cardiovascular disorders and has a moderating effect on heart rate (Martiniano et al., 2018). Studies show that music therapy can have a positive effect on persons with traumatic brain injury by decreasing blood pressure (Froutan et al., 2020), and on persons with hypertension (do Amaral et al., 2016; Kühlmann et al., 2016). In the field of gerontology, few studies have been performed with the aim to determine whether music therapy decreases blood pressure; however, one study was performed among community-dwelling older adults (Astuti et al., 2019), one among older adults with cerebral vascular disease and dementia (Kurita et al., 2006), and one among older adults in Turkish nursing homes (Bekiroglu et al., 2013).

Music is also connected with mood and can make people feel relaxed or blissful (Biasutti, 2015). Some studies have noted that music therapy can decrease anxiety in persons with orthopedic conditions (Tolunay et al., 2018), chronic obstructive pulmonary disease (COPD) (Horuz et al., 2017), cancer (Gramaglia et al., 2019), and patients in intensive care (Golino et al., 2019). In a systematic review, Klainin-Yobas et al. (2015) sought to determine the effects relaxation interventions had on depression and anxiety among older adults. Of the 15 studies reviewed, only five used music interventions as a relaxation intervention; in three studies, older adults experienced greater improvements in depression after the music interventions, and in the remaining two studies, older adults experienced reduced anxiety levels compared to the control group. Music interventions have also been shown to have positive effects on life satisfaction (Haslam et al., 2014) and well-being (Castillejos & Godoy-Izquierdo, 2021).

The current study aimed to determine the effectiveness of music therapy on blood pressure and anxiety level of older adults with hypertension living in a nursing home.

## **METHOD**

### **Design**

The current study is an experimental clinical trial performed as a pre-/posttest among older adults with hypertension living in a nursing home in Slovenia. This institution is inhabited by various types of residents, ranging from those with certain health issues but otherwise capable of living independently without the need for additional assistance to those in need of partial or full assistance from health professionals. The research includes human data processed in accordance with the Declaration of Helsinki and approved by the National Medical Ethics Committee of the Republic of Slovenia. Permission to conduct the study and for access to participants was obtained from management and all participating older adults. The protocol received Institutional Review Board approval.

Individuals attended weekly music therapy for a 10-week period, each session lasting at least 30 minutes and without use of headphones. Sessions were designed and led by one musician who was a certified music therapist. During the 10 weeks, the musician mostly played songs familiar to older adults; some were well-known worldwide, others only within Slovenia. In addition, some participants were familiar with the lyrics of the selected songs. The room in which the sessions took place was large enough for individuals to be comfortable and focused on the intervention. The room was sound-proof, absent of noise or distress, with a wooden floor and thermal insulation to ensure a pleasant temperature. Participating older adults sat in comfortable chairs with armrests and backs while listening to music. Participants were assessed before the first session of music therapy and at the end of the research period (after 10 sessions/10 weeks). Measurements were taken by the same professionals. Participants from the experimental and control groups were invited to the last meeting, which was held on the same day that participants from the experimental group had the last session of music therapy.

### **Sample and Recruitment**

The study included older adults meeting the following inclusion criteria: (a) aged  $\geq 65$  years and diagnosed with arterial hypertension; (b) no neurological/psychiatric disorder; (c) no visual or hearing impairment; (d) no mobility impairment; (e) no cognitive disorder; and (f) enjoyed

listening to music and willing to participate in the study. Hypertension was characterized by systolic blood pressure  $\geq 180$  mmHg or diastolic blood pressure  $\geq 120$  mmHg. Older adults without hypertension were excluded from the study. Researchers obtained all units of information concerning participants in medical and nursing records and in discussions with responsible health care professionals. The study sample comprised 60 older adults who met these criteria. The aim of the research was explained and all older adults agreed to be randomized into groups. We ensured them that after the research was concluded, we would continue with music therapy with the same musician for the same period. Older adults who participated in the study were enumerated by alphabetical order and assigned to the experimental group or control group through sample randomization ( $n = 30$  each). No participant dropped out of the study.

### Measures

Potential participants were approached by one researcher (S.D.) who explained the aim of the study. Older adults who signed written permission for participation were asked to complete a form requesting basic information about demographic characteristics, assessing how they felt in general (measured using the State Trait Anxiety Inventory- $X_2$  [STAI- $X_2$ ]), and the researcher measured their blood pressure and heart rate using an Omron® digital blood pressure monitor. The researcher also provided participants in the experimental group with detailed information of the music interventions (place, dates, time). The researcher accompanied participants to the room every Friday for 10 weeks, where participants in the experimental group listened to music for at least 30 minutes. Participants were assessed before the intervention (first session of music therapy) and after the last listening session (end of the research period). Assessments were administered by the same professionals employed in the participating nursing home.

The STAI by Spielberger et al. (1970) is a widely used, well-validated instrument with which to measure anxiety. The trait version (STAI- $X_2$ ) evaluates relatively stable aspects of “anxiety proneness,” including general states of calmness, confidence, and security. The STAI- $X_2$  comprises 20 statements that ask people to describe how they feel in general. Each question is rated on a 4-point scale (1 = *almost never*, 2 = *sometimes*, 3 = *often*, 4 = *almost always*), with total scores ranging from 20 to 80, and higher scores indicating greater anxiety. A score of 39 to 40 has been suggested to detect clinically significant anxiety

symptoms (Knight et al., 1983); however, other researchers suggested a higher cutoff score of 54 to 55 for older adults (Kvaal et al., 2005). The Slovenian version showed a fair degree of internal consistency (Cronbach’s  $\alpha = 0.755$ ).

### Data Analysis

Statistical analysis was performed by a professional blinded to participant and time-related data. Univariate analysis was performed by displaying the distribution and percentage of each variable. Bivariate analysis was performed using the paired  $t$  test to determine differences before and after the 10 sessions of music therapy, the primary focus being the differences in the effectiveness of listening to music. Lastly, an independent sample  $t$  test was performed to determine the differences between experimental and control groups with a 95% confidence interval (CI). Data were analyzed using SPSS version 21.0.

### RESULTS

The experimental group included 18 (60%) women and 12 (40%) men, 43% ( $n = 13$ ) were aged between 65 and 70 years, 53% ( $n = 16$ ) were widowed, and 63% ( $n = 19$ ) had completed secondary school. Twenty-five (83%) older adults in the experimental group had at least one additional chronic disorder. The control group comprised 15 (50%) women and 15 (50%) men, 47% ( $n = 40$ ) were aged between 65 and 70 years, 50% ( $n = 15$ ) were widowed, and 57% ( $n = 17$ ) had completed secondary school. Twenty-three (77%) older adults in the control group had at least one additional chronic disorder. All participants were taking anti-hypertensive medication, which remained unchanged throughout the study period.

The experimental and control groups did not vary significantly in regard to sex ( $Z = 0.772$ ;  $p = 0.440$ ), level of education ( $Z = 0.824$ ;  $p = 0.354$ ), marital status ( $Z = 0.724$ ;  $p = 0.469$ ), or age ( $Z = 0.698$ ;  $p = 0.485$ ) (Table 1).

After the intervention, mean systolic blood pressure decreased from 132.5 mmHg to 124.2 mmHg, diastolic blood pressure decreased from 77.1 mmHg to 73 mmHg (Table 2), heart rate decreased from 75.3 beats/min to 71.5 beats/min, and anxiety levels decreased from 48.3 to 45.6 in the experimental group (Table 3). Changes were also observed in the control group: systolic blood pressure decreased from 130.6 mmHg to 129.8 mmHg, diastolic blood pressure increased from 76.4 mmHg to 78.9 mmHg, heart rate decreased from 74.7 beats/min to 73.1 beats/min, and anxiety level increased from 48.1 to 48.5.

Significant reductions in systolic blood pressure ( $-8.3$  mmHg; 95% CI  $[-16.34, -0.26]$ ;  $p = 0.043$ ) and heart rate

TABLE 1

## Participant Characteristics (N = 60)

Variable	n (%)		Z	p Value
	Experimental Group (n = 30)	Control Group (n = 30)		
Sex			0.722	0.440
Female	18 (76)	15 (50)		
Male	12 (24)	15 (50)		
Age (years)			0.698	0.485
65 to 70	13 (43)	14 (47)		
71 to 80	7 (23)	10 (33)		
≥81	10 (34)	6 (20)		
Educational level			0.824	0.354
Primary school	5 (17)	9 (30)		
Secondary school	19 (63)	17 (57)		
High school or higher	6 (20)	4 (13)		
Marital status			0.724	0.469
Widowed	16 (53)	15 (50)		
Divorced	6 (20)	3 (10)		
Single	5 (16.7)	9 (30)		
Married	3 (10)	3 (10)		

(−8.8 beats/min; 95% CI [−6.91, 0.69];  $p = 0.018$ ) were noted in the experimental group compared with the control group (Table 4). Before music therapy, only two older adults had anxiety levels  $\geq 54$  according to the STAI- $X_2$ , one in the experimental group (score = 57) and one in the control group (score = 54). After 10 sessions of music therapy, seven older adults had anxiety levels  $\geq 54$ , one in the experimental group (score = 54) and six in the control group (score = 54, 55, 56, 57, 58, and 62 respectively). Results also showed a significant reduction in anxiety levels (−2.7; 95% CI [−4.42, 0.75];  $p = 0.043$ ) in older adults receiving music therapy compared with the control group. The mean difference in diastolic blood pressure was also reported, but no significant differences were found for older adults in the experimental group (−4.13 mmHg; 95% CI [−9.24, 0.97];  $p = 0.108$ ).

## DISCUSSION

Our results show that music therapy was effective at reducing systolic blood pressure, heart rate, and anxiety levels in older adults with hypertension after 10 sessions. A mean difference was also found in the levels of diastolic blood pressure, but it was not significant. A meta-analysis that

included two separate studies (do Amaral et al., 2016) found that music therapy was effective at reducing systolic blood pressure in individuals with hypertension. In both studies included in the meta-analysis, the mean difference in diastolic blood pressure was also reported, but no significant difference was found. Both results are comparable with the results of our research, as one study (Teng et al., 2007) included 30 participants with a mean age of 83 years, and the other study (Bekiroglu et al., 2013) included 60 participants with a mean age of 60 years. In the current study, we used weekly music therapy over a period of 10 weeks, but both studies mentioned used a music program with

daily sessions over a 4-week period (Bekiroglu et al., 2013; Teng et al., 2007).

Our results show that music therapy reduced systolic blood pressure by 8.3 mmHg in older adults with hypertension. Compared with the results of a meta-analysis by do Amaral et al. (2016), which found that music therapy reduced systolic blood pressure by 6 mmHg in older adults with hypertension, our results are more encouraging. A reduction of 5 mmHg in systolic blood pressure reduces the risk of stroke by 13% (Reboldi et al., 2011). According to the results of another meta-analysis (Ettehad et al., 2016), a 10-mmHg reduction in systolic blood pressure reduced the risk of major cardiovascular disease by 20%, heart failure by 28%, stroke by 27%, coronary heart disease by 17%, and mortality in general by 13%. It is necessary to note that every intervention that can help decrease blood pressure is important, especially if it is not associated with negative side effects or increased costs. Our results also show that music therapy reduced heart rate by 8.8 beats/min in older adults with hypertension. Similarly, a randomized controlled trial by Kunikullaya et al. (2015) showed that music therapy has positive effects on heart rate in individuals with pre-hypertension and hypertension.

TABLE 2

**Mean Differences in Blood Pressure, Heart Rate, and Anxiety Level Preintervention**

Variable	Group	Mean (SD)	Median	IQR	Range	Z	p Value
Systolic BP (mmHg)	Experimental	132.50 (23.32)	130.5	33.75	97 to 192	0.192	0.848
	Control	130.63 (22.03)	128.5	40.00	83 to 161		
Diastolic BP (mmHg)	Experimental	77.13 (12.65)	76.0	19.50	60 to 117	0.178	0.859
	Control	76.43 (11.15)	74.5	17.75	50 to 94		
Heart rate (beats/min)	Experimental	75.33 (8.73)	74.5	11.25	61 to 98	0.784	0.489
	Control	74.67 (14.41)	73.5	14.25	50 to 117		
Anxiety (STAI-X <sub>2</sub> )	Experimental	48.33 (4.16)	47.5	5.25	41 to 59	0.489	0.625
	Control	48.13 (5.71)	50.0	9.25	34 to 56		

Note. IQR = interquartile range; BP = blood pressure; STAI-X<sub>2</sub> = State Trait Anxiety Inventory-X<sub>2</sub>.

TABLE 3

**Mean Differences in Blood Pressure, Heart Rate, and Anxiety Levels Postintervention**

Variable	Group	Mean (SD)	Median	IQR	Range	Z	p Value
Systolic BP (mmHg)	Experimental	124.2 (20.49)	124.5	24.25	87 to 173	0.895	0.371
	Control	129.83 (19.32)	128	29.25	102 to 171		
Diastolic BP (mmHg)	Experimental	73 (10.01)	72	16.25	52 to 95	1.621	0.105
	Control	78.93 (13.31)	75	16.50	53 to 107		
Heart rate (beats/min)	Experimental	71.53 (10.41)	71	15.50	55 to 97	0.385	0.700
	Control	73.07 (12.66)	71	19.75	53 to 101		
Anxiety (STAI-X <sub>2</sub> )	Experimental	45.63 (5.4)	45.5	9.25	35 to 54	0.771	0.441
	Control	48.47 (5.68)	47.5	7.50	38 to 62		

Note. IQR = interquartile range; BP = blood pressure; STAI-X<sub>2</sub> = State Trait Anxiety Inventory-X<sub>2</sub>.

In the current study, according to the STAI-X<sub>2</sub>, 29 older adults had a sum score >45 and two older adults had scores ≥54 before music therapy. We agree with the suggested cutoff point of 54 for anxiety according to the STAI-X<sub>2</sub> for older adults (Kvaal et al., 2005) according to other research and the health status of participating older adults from the nursing home. Kvaal et al. (2005) explained that typical characteristics of older adults include multimorbidity, polypharmacy, and care dependency. Music therapy significantly reduced anxiety levels in older adults with hypertension (experimental group) after 10 sessions. The STAI-X<sub>2</sub> includes general states of calmness, confidence, and security with which people describe how they feel in general, but there are many known factors that can influence individuals' feelings.

In a meta-analysis by Bradt et al. (2013), 16 studies examined the effect of music on anxiety in persons with coronary disease, of which seven reported mean anxiety

measured by the STAI, which is comparable with our results. Bradt et al. (2013) also noted that participants who received standard care combined with music therapy had significantly lower anxiety levels than those who did not receive music therapy. Music influences behavioral, affective, cognitive, and sensory components (i.e., it reduces feelings of anxiety, depression, and psychological tension) of older adults, and increases alpha brain waves, which improve states of calmness and relaxation (Kwon et al., 2013). This explanation may help understand the long-term effect of music; however, Bradt et al. (2013) noted that the psychological mechanisms of music in the human brain are still not completely understood. Music interventions also lead to a decrease in sympathetic nervous system response, which decreases vital signs, such as heart rate, breathing, oxygenation, and blood pressure. During this process, the decrease of noradrenaline hormones inside the body's circulation is believed to increase the levels of relaxation and



TABLE 4

## Differences in Blood Pressure, Heart Rate, and Anxiety Level Within Groups

Variable	Group	Mean (SD) (Pretest)	95% CI	Mean (SD) (Posttest)	95% CI	Z	p Value
Systolic BP (mmHg)	Experimental	132.5 (23.32)	[123.8, 141.2]	124.2 (20.49)	[116.5, 131.8]	2.112	0.043
	Control	130.6 (22.03)	[122.4, 138.9]	129.8 (19.32)	[122.6, 137.1]	0.185	0.859
Diastolic BP (mmHg)	Experimental	77.13 (12.65)	[72.4, 81.8]	73.0 (10.01)	[69.3, 76.8]	1.656	0.108
	Control	76.43 (11.15)	[72.3, 80.6]	78.93 (13.31)	[73.9, 83.9]	1.313	0.199
Heart rate (beats/min)	Experimental	75.33 (8.27)	[72.1, 78.6]	71.53 (10.41)	[67.6, 75.4]	2.502	0.018
	Control	74.67 (14.41)	[69.3, 80.1]	73.07 (12.66)	[68.3, 77.8]	0.694	0.493
Anxiety (STAI-X <sub>2</sub> )	Experimental	48.33 (4.16)	[46.34, 50.59]	45.63 (5.40)	[43.71, 47.02]	1.968	0.043
	Control	48.13 (5.71)	[46.11, 50.08]	48.47 (5.68)	[46.88, 50.38]	0.126	0.900

Note. CI = confidence interval; BP = blood pressure; STAI-X<sub>2</sub> = State Trait Anxiety Inventory-X<sub>2</sub>.

calmness, thus improving sleep quality (Wang et al., 2016).

According to evidence of positive effects of music therapy, we can encourage health care staff to use music interventions with individuals who like to listen to music, and at the same time encourage further research and confirmation of further possible positive effects on individuals' well-being and health. Because we agree with Bekiroglu et al. (2013) and Tolunay et al. (2018) that music therapy is a cost-effective and easy intervention with positive effects on blood pressure, anxiety, and well-being, we suggest health care professionals use music interventions more frequently in health care practice, especially in older adults who like to listen to music. At the same time, health care professionals also need to know what type of music an individual likes. Furthermore, Sung et al. (2010) noted that music interventions performed by qualified nursing staff had a significant impact on reducing anxiety levels (for two units on average) in older adults with dementia in nursing homes.

We find our research to be relevant given that the first meta-analysis about the effect of music therapy on persons with hypertension was conducted by do Amaral et al. in 2016 and included only two studies of nonpharmacological interventions, both of which indicated a lowering of systolic blood pressure in older adults with hypertension (Bekiroglu et al., 2013; Teng et al., 2007). A reduction in systolic blood pressure of 8.3 mmHg, diastolic blood pressure of 4.1 mmHg, heart rate of 8.8 beats/min, and mean anxiety score after 10 sessions of listening to music was revealed in the current study.

## LIMITATIONS

Although an experimental approach was used, participants and researchers were not blinded, thus they knew to which group they belonged (i.e., experimental or control). Furthermore, music selection may be a limitation of the study because different types of music may have different effects on blood pressure. However, the familiarity of music used in the current intervention seems to decrease this limitation.

Blood pressure measurements were performed by one researcher, which could have influenced the outcomes. Clinical trials have a high risk of bias and, therefore, these results need to be interpreted with caution.

The current results must be interpreted with caution also given the limited sample size of older adults with diagnosed hypertension who live in a nursing home with all presented inclusion criteria (no neurological/psychiatric disorders, no visual or hearing impairment, no mobility impairment, no cognitive disorders, and liked to listen to

music) as well as the fact that all participants were taking anti-hypertensive medication.

## CONCLUSION AND IMPLICATIONS FOR PRACTICE

The current study confirms music therapy as a safe, nonpharmacological, noninvasive, and cost-effective intervention to reduce blood pressure and anxiety levels in older adults with hypertension. Music proved to have favorable effects on blood pressure, heart rate, and the general emotional states of older adults with hypertension. Easy to use, no measurable side effects, and low cost make this intervention a reasonable additional approach for lowering blood pressure and improving well-being, especially for older adults in health care and social care institutions.

Policymakers and health care management should recognize the benefits of a nonpharmacological approach, even if the effects are temporal. As health policy, education, and health care management focus on reducing blood pressure with pharmacological treatment, using music therapy poses a challenge for health care professionals trying to use this intervention to reduce blood pressure and anxiety levels according to the dominant interventions and tasks based on the medical model.

Integrating a music therapist within the health care team can promote and influence the quality of care and facilitate better outcomes for older adults. In nursing homes, staff and family members should be encouraged to understand the importance of nonpharmacological interventions on the health status of older adults. Nurses can effectively support and learn from the music therapist by understanding the positive impacts of music therapy on older adults.

We recommend that health care providers partake in music therapy sessions to experience the therapeutic effect and become more educated about music therapy and suggest that music therapy become a part of everyday life for older adults in nursing homes who enjoy listening to music.

## REFERENCES

- Astuti, N. F., Rekawati, E., & Wati, D. N. K. (2019). Decreased blood pressure among community dwelling older adults following progressive muscle relaxation and music therapy (RESIK). *BMC Nursing*, 18(Suppl. 1), 36. <https://doi.org/10.1186/s12912-019-0357-8> PMID:31427898
- Bekiroğlu, T., Ovayolu, N., Ergün, Y., & Ekerbiçer, H. Ç. (2013). Effect of Turkish classical music on blood pressure: A randomized controlled trial in hypertensive elderly patients. *Complementary Therapies in Medicine*, 21, 147–154. <https://doi.org/10.1016/j.ctim.2013.03.005> PMID:23642944
- Biasutti, M. (2015). Pedagogical applications of cognitive research on musical improvisation. *Frontiers in Psychology*, 6, 614. <https://doi.org/10.3389/fpsyg.2015.00614> PMID:26029147
- Bradt, J., Dileo, C., & Potvin, N. (2013). Music for stress and anxiety reduction in coronary heart disease patients. *Cochrane Database of Systematic Reviews*, 12, CD006577. <https://doi.org/10.1002/14651858.CD006577> PMID:24374731
- Butt, D. A., & Harvey, P. J. (2015). Benefits and risks of antihypertensive medications in the elderly. *Journal of Internal Medicine*, 278, 599–626. <https://doi.org/10.1111/joim.12446> PMID:26497967
- Cardoso, L., Salgueiro, D., Mota, L., & Principe, F. (2017). Music therapy as an autonomous intervention of nurses for pain control in ICU: Integrative review. *Millenium*, 2, 89–97. <https://doi.org/10.29352/mill0204.08.00148>
- Castillejos, C., & Godoy-Izquierdo, D. (2021). “Music makes my old heart beat”: A randomised controlled study on the benefits of the use of music in comprehensive care for institutionalised older adults. *Applied Psychology. Health and Well-Being*, 13, 84–108. <https://doi.org/10.1111/aphw.12217> PMID:32829494
- do Amaral, M. A., Neto, M. G., de Queiroz, J. G., Martins-Filho, P. R., Saquette, M. B., & Oliveira Carvalho, V. (2016). Effect of music therapy on blood pressure of individuals with hypertension: A systematic review and meta-analysis. *International Journal of Cardiology*, 214, 461–464. <https://doi.org/10.1016/j.ijcard.2016.03.197> PMID:27096963
- Ettehad, D., Emdin, C. A., Kiran, A., Anderson, S. G., Callender, T., Emberson, J., Chalmers, J., Rodgers, A., & Rahimi, K. (2016). Blood pressure lowering for prevention of cardiovascular disease and death: A systematic review and meta-analysis. *Lancet*, 387, 957–967. [https://doi.org/10.1016/S0140-6736\(15\)01225-8](https://doi.org/10.1016/S0140-6736(15)01225-8) PMID:26724178
- Froutan, R., Eghbali, M., Hoseini, S. H., Mazloom, S. R., Yekaninejad, M. S., & Boostani, R. (2020). The effect of music therapy on physiological parameters of patients with traumatic brain injury: A triple-blind randomized controlled clinical trial. *Complementary Therapies in Clinical Practice*, 40, 101216. <https://doi.org/10.1016/j.ctcp.2020.101216> PMID:32891292
- Golino, A. J., Leone, R., Gollenberg, A., Christopher, C., Stanger, D., Davis, T. M., Meadows, A., Zhang, Z., & Friesen, M. A. (2019). Impact of an active music therapy intervention on intensive care patients. *American Journal of Critical Care*, 28, 48–55. <https://doi.org/10.4037/ajcc2019792> PMID:30600227
- Gramaglia, C., Gambaro, E., Vecchi, C., Licandro, D., Raina, G., Pisani, C., Burgio, V., Farruggio, S., Rolla, R., Deantonio, L., Grossini, E., Krengli, M., & Zeppegno, P. (2019). Outcomes of music therapy interventions in cancer patients: A review of the literature. *Critical Reviews in Oncology/Hematology*, 138, 241–254. <https://doi.org/10.1016/j.critrevonc.2019.04.004> PMID:31121392
- Haslam, C., Haslam, S. A., Ysseldyk, R., McCloskey, L. G., Pfisterer, K., & Brown, S. G. (2014). Social identification moderates cognitive health and well-being following story- and song-based reminiscence. *Aging & Mental Health*, 18, 425e434. <https://doi.org/10.1080/13607863.2013.845871>
- Horuz, D., Kurcer, M. A., & Erdoğan, Z. (2017). The effect of music therapy on anxiety and various physical findings in patients with COPD in a pulmonology service. *Holistic Nursing Practice*, 31, 378–383. <https://doi.org/10.1097/HNP.0000000000000235> PMID:29028776
- Hosseini, S. E., & Hosseini, S. A. (2018). Therapeutic effects of music: A review. *Reviews in Health Care*, 4, 1–13.
- James, P. A., Oparil, S., Carter, B. L.,ushman, W. C., Dennison-Himmelfarb, C., Handler, J., Lackland, D. T., LeFevre, M. L., MacKenzie, T. D., Ogedegbe, O., Smith, S. C., Jr., Svetkey, L. P., Taler, S. J., Townsend, R. R., Wright, J. T., Jr., Narva, A. S., & Ortiz, E. (2014). 2014 evidence-based guideline for the management of

- high blood pressure in adults: Report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *Journal of the American Medical Association*, 311, 507–520. <https://doi.org/10.1001/jama.2013.284427> PMID:24352797
- Klainin-Yobas, P., Oo, W. N., Suzanne Yew, P. Y., & Lau, Y. (2015). Effects of relaxation interventions on depression and anxiety among older adults: A systematic review. *Aging & Mental Health*, 19, 1043–1055. <https://doi.org/10.1080/13607863.2014.997191> PMID:25574576
- Knight, R. G., Waal-Manning, H. J., & Spears, G. F. (1983). Some norms and reliability data for the State-Trait Anxiety Inventory and the Zung Self-Rating Depression scale. *British Journal of Clinical Psychology*, 22, 245–249. <https://doi.org/10.1111/j.2044-8260.1983.tb00610.x> PMID:6640176
- Kühlmann, A. Y. R., Etnel, J. R. G., Roos-Hesselink, J. W., Jeekel, J., Bogers, A. J. J., & Takkenberg, J. J. M. (2016). Systematic review and meta-analysis of music interventions in hypertension treatment: A quest for answers. *BMC Cardiovascular Disorders*, 16, 69. <https://doi.org/10.1186/s12872-016-0244-0> PMID:27095510
- Kunikullaya, K. U., Goturu, J., Muradi, V., Hukkeri, P. A., Kunnavig, R., Doreswamy, V., Prakash, V. S., & Murthy, N. S. (2015). Music versus lifestyle on the autonomic nervous system of prehypertensives and hypertensives—A randomized control trial. *Complementary Therapies in Medicine*, 23, 733–740. <https://doi.org/10.1016/j.ctim.2015.08.003> PMID:26365454
- Kurita, A., Takase, B., Okada, K., Horiguchi, Y., Abe, S., Kusama, Y., & Atarasi, H. (2006). Effects of music therapy on heart rate variability in elderly patients with cerebral vascular disease and dementia. *Journal of Arrhythmia*, 22, 161–166. [https://doi.org/10.1016/S1880-4276\(06\)80014-1](https://doi.org/10.1016/S1880-4276(06)80014-1)
- Kvaal, K., Ulstein, I., Nordhus, I. H., & Engedal, K. (2005). The Spielberger State-Trait Anxiety Inventory (STAI): The state scale in detecting mental disorders in geriatric patients. *International Journal of Geriatric Psychiatry*, 20, 629–634. <https://doi.org/10.1002/gps.1330> PMID:16021666
- Kwon, M., Gang, M., & Oh, K. (2013). Effects of group music therapy on brain wave, behaviour, and cognitive function among patients with chronic schizophrenia. *Asian Nursing Research*, 7, 168–174. <https://doi.org/10.1016/j.anr.2013.09.005> PMID:25030341
- Lindquist, R., Tracy, M. F., & Snyder, M. (2018). *Complementary & alternative therapies in nursing* (8th ed.). Springer. <https://doi.org/10.1891/9780826144348>
- Martiniano, E. C., Santana, M. D. R., Barros, É. L. D., do Socorro da Silva, M., Garner, D. M., de Abreu, L. C., & Valenti, V. E. (2018). Musical auditory stimulus acutely influences heart rate dynamic responses to medication in subjects with well-controlled hypertension. *Scientific Reports*, 8, 958. <https://doi.org/10.1038/s41598-018-19418-7> PMID:29343839
- Rahmawati, R., & Bajorek, B. V. (2017). Self-medication among people living with hypertension: A review. *Family Practice*, 34, 147–153. <https://doi.org/10.1093/fampra/cmz137> PMID:28122846
- Reboldi, G., Gentile, G., Angeli, F., Ambrosio, G., Mancina, G., & Verdecchia, P. (2011). Effects of intensive blood pressure reduction on myocardial infarction and stroke in diabetes: A meta-analysis in 73,913 patients. *Journal of Hypertension*, 29, 1253–1269. <https://doi.org/10.1097/HJH.0b013e3283469976> PMID:21505352
- Sarris, J., Moylan, S., Camfield, D. A., Pase, M. P., Mischoulon, D., Berk, M., Jacka, F. N., & Schweitzer, I. (2012). Complementary medicine, exercise, meditation, diet, and lifestyle modification for anxiety disorders: A review of current evidence. *Evidence-Based Complementary and Alternative Medicine*, 2012, 809653. <https://doi.org/10.1155/2012/809653> PMID:22969831
- Shamsi, A., Dehghan Nayeri, N., & Esmaeili, M. (2017). Living with hypertension: A qualitative research. *International Journal of Community Based Nursing and Midwifery*, 5, 219–230. PMID:28670584
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait-Anxiety Inventory*. Consulting Psychologists Press.
- Sung, H. C., Chang, A. M., & Lee, W. L. (2010). A preferred music listening intervention to reduce anxiety in older adults with dementia in nursing homes. *Journal of Clinical Nursing*, 19, 1056–1064. <https://doi.org/10.1111/j.1365-2702.2009.03016.x> PMID:20492050
- Teng, X. F., Wong, M. Y., & Zhang, Y. T. (2007). The effect of music on hypertensive patients. *Proceedings of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2007, 4649–4651. [https://www.researchgate.net/publication/5844042\\_The\\_Effect\\_of\\_Music\\_on\\_Hypertensive\\_Patients](https://www.researchgate.net/publication/5844042_The_Effect_of_Music_on_Hypertensive_Patients)
- Tolunay, T., Bicici, V., Tolunay, H., Akkurt, M. O., Arslan, A. K., Aydogdu, A., & Bingol, I. (2018). Rhythm and orthopedics: The effect of music therapy in cast room procedures, a prospective clinical trial. *Injury*, 49, 593–598. <https://doi.org/10.1016/j.injury.2018.02.008> PMID:29454656
- Verma, N., Rastogi, S., Chia, Y. C., Siddique, S., Turana, Y., Cheng, H. M., Sogunuru, G. P., Tay, J. C., Teo, B. W., Wang, T. D., Tsoi, K. K. F., & Kario, K. (2021). Non-pharmacological management of hypertension. *Journal of Clinical Hypertension (Greenwich, Conn.)*, 23, 1275–1283. <https://doi.org/10.1111/jch.14236> PMID:33738923
- Wang, Q., Chair, S. Y., Wong, E. M., & Li, X. (2016). The effects of music intervention on sleep quality in community-dwelling elderly. *Journal of Alternative and Complementary Medicine (New York, N.Y.)*, 22, 576–584. <https://doi.org/10.1089/acm.2015.0304> PMID:27223689
- West, T., Pruchnicki, M. C., Porter, K., & Emptage, R. (2013). Evaluation of anticholinergic burden of medications in older adults. *Journal of the American Pharmacists Association*, 53, 496–504. <https://doi.org/10.1331/JAPhA.2013.12138> PMID:24030127
- World Health Organization. (2018). *Ageing and health: Key facts*. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
- World Health Organization. (2019). *Hypertension*. <https://www.who.int/news-room/fact-sheets/detail/hypertension>