

Combining Music Therapy with Balance-Centric Group Exercises to Promote Functional Stability and Psychosocial Well-Being in Institutionalized Older Adults: A Pilot Study

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Abstract: ***Background:** Institutionalized older adults may experience reduced physical activity, impaired balance, social isolation, and poorer psychosocial well-being. Music-integrated group exercise may provide an engaging approach addressing both physical and psychosocial dimensions of ageing. **Objective:** To evaluate the impact of music therapy integrated with balance-centric group exercise on functional performance and mood among institutionalized older adults. **Methods:** This quasi-experimental pilot study included 12 institutionalized adults aged 60 years and above who met the eligibility criteria. Participants completed a six-week programme comprising warm-up, rhythmic aerobic movements, balance and strengthening activities, functional tasks, relaxation, and instrumental music. Functional performance and mood were assessed before and after intervention using the Short Physical Performance Battery (SPPB) and a 5-point Likert mood scale, respectively. **Results:** Mean SPPB score increased from 6.50 ± 1.57 to 9.00 ± 1.13 , with a mean change of 2.50 points (95% CI: 1.71–3.29; $t(11)=6.97$; $p<0.001$; Cohen's $d=2.01$). Wilcoxon analysis supported the improvement ($p=0.002$). Median mood score increased from 2.00 to 4.00 ($p=0.002$), and all 12 participants showed positive changes. Holm-adjusted results remained significant. **Conclusion:** The six-week combined programme was associated with significant improvements in functional performance and mood. The findings support its feasibility as a potentially useful adjunct to geriatric physiotherapy, while the small sample and lack of a control group require cautious interpretation.*

Keywords: music therapy; balance exercise; group exercise; older adults; institutionalized elderly; functional performance; mood; SPPB

1. Introduction

The ageing population is increasing worldwide, accompanied by greater attention to physical, cognitive, emotional, and social challenges in later life. Older adults may experience reductions in mobility, balance, physical activity, independence, and quality of life. These difficulties may be amplified in institutional settings, where reduced autonomy and limited opportunities for meaningful social engagement can contribute to loneliness and emotional distress [1,8,13,14].

Physical activity is an important component of healthy ageing because it supports mobility, balance, strength, functional independence, and psychological well-being. Group-based exercise can also provide opportunities for communication and social participation. Previous evidence indicates that balance-focused exercise can improve physical performance and balance-related outcomes in older adults, while group exercise may contribute to social and mental health outcomes in institutionalized populations [3,4,7].

Music-based interventions have gained attention as an adjunct to rehabilitation in older adults. Music can provide auditory and emotional stimulation and may facilitate movement timing, motivation, and engagement. Group music interventions have been associated with improvements in cognitive and mental health outcomes

among nursing-home residents, while music incorporated into balance or multitask training has been associated with improvements in balance and gait [2,5,6,17].

Combining music with group exercise may therefore provide a multidimensional approach addressing physical performance and psychosocial engagement. Rhythmic auditory input may provide an external cue for repetitive movement, while familiar and enjoyable music may increase motivation and participation. In institutional settings, group participation may additionally support social interaction. However, evidence specifically evaluating a feasible music-integrated balance programme in institutionalized older adults remains limited.

The present pilot study therefore aimed to evaluate the impact of combining music therapy with balance-centric group exercise on functional performance and psychosocial well-being, operationalized in this study using SPPB and a 5-point mood scale, among institutionalized older adults.

2. Materials and Methods

2.1 Study Design and Setting

Ethical clearance was obtained from the MUHS Ethical Committee and the Motiwala College Ethical Committee before commencement of the study.

2.2 Participants and Sampling

Twelve institutionalized older adults completed the study. Participants were selected using simple random sampling according to the stated eligibility criteria. The final analytical sample comprised seven females (58.33%) and five males (41.67%), with a mean age of 68.75 ± 5.97 years and mean BMI of 27.20 ± 5.36 kg/m².

2.3 Eligibility Criteria

Inclusion criteria were age ≥ 60 years, residence in an institutional setting, ability to participate in group activities, willingness to provide informed consent, and low-to-medium fall risk according to the Berg Balance Scale. Exclusion criteria were unstable medical conditions (including uncontrolled hypertension, recent stroke, or severe cardiac disease), bedridden status, hearing or visual impairment, frequent falls or fall-related injuries, and high fall risk according to the Berg Balance Scale.

2.4 Materials

The intervention used chairs, music/audio equipment, a plinth or bed, informed consent forms, writing materials, and data-recording sheets.

2.5 Outcome Measures

Functional performance was assessed using the Short Physical Performance Battery (SPPB). Mood was assessed using a basic 5-point Likert scale. Balance was screened using the Berg Balance Scale for eligibility. The supplied thesis does not provide the individual participant scores or a more detailed description of the 5-point mood anchors; therefore, those details should not be added without checking the original study records.

2.6 Intervention

Participants completed a six-week music-integrated group exercise programme. The session structure described in the thesis consisted of:

- Warm-up (5–10 min): gentle neck, shoulder, and ankle mobility; breathing awareness; and postural alignment, performed seated or standing with support.
- Music integration: instrumental background music was played throughout the session, with volume adjusted to support engagement without distraction; music was described as calming, familiar, and uplifting.
- Main exercise segment (25–30 min): rhythmic marching, arm swings, side-stepping, chair rises, tandem stance, side-leg raises, reaching, turning, and sit-to-stand transitions. Exercises were synchronized with musical rhythm to encourage participation and coordination.
- Cool-down and relaxation (5–10 min): gentle stretching, guided relaxation, and deep breathing with instrumental background music.

2.7 Procedure

After ethical clearance and screening, eligible participants were informed about study procedures, risks, and benefits,

and written informed consent was obtained. Demographic information and relevant medical history were recorded. Baseline SPPB and mood scores were obtained, followed by the six-week intervention. The same outcome measures were reassessed after completion of the programme. The thesis describes a single intervention group; therefore, the manuscript does not characterize the study as randomized controlled.

2.8 Statistical Analysis

Data were analysed using IBM SPSS Statistics for Windows, Version 26.0. Data were screened for completeness, missing values, entry inconsistencies, and correct pairing of pre- and post-intervention observations. Continuous variables were summarized using appropriate descriptive statistics and categorical variables using frequencies and percentages. SPPB change was evaluated using a paired-samples t-test with mean difference, 95% confidence interval, and Cohen's *d*. Because paired SPPB differences showed some departure from normality (Shapiro–Wilk $W=0.856$, $p=0.044$), Wilcoxon signed-rank analysis was used as a sensitivity analysis. Mood, treated as ordinal data, was analysed with the Wilcoxon signed-rank test and an exact paired sign test as sensitivity analysis. Holm adjustment was applied across the two principal outcome tests. All tests were two-tailed, with statistical significance set at $p<0.05$.

Study setting: Vatsalya Old Age Home, Hirawadi, Nashik, Maharashtra, India. The intervention was conducted three sessions per week in the morning, from 11:00 AM to 12:00 PM, for six weeks.

3. Results

3.1 Participant Characteristics

Table 1: Summarizes participant characteristics. All 12 participants had complete baseline and post-intervention data for both principal outcomes

Variable	Result
Sample size	12
Age, mean $\pm$ SD	68.75 ± 5.97 years
Age, median (IQR)	69.50 (4.00) years
BMI, mean $\pm$ SD	27.20 ± 5.36 kg/m ²
Female	7 (58.33%)
Male	5 (41.67%)

3.2 Functional Performance

Mean SPPB score increased from 6.50 ± 1.57 before intervention to 9.00 ± 1.13 after intervention. The mean paired increase was 2.50 points (95% CI: 1.71–3.29). The paired-samples t-test indicated a statistically significant increase, $t(11)=6.97$, $p<0.001$, with a large standardized paired effect (Cohen's $d=2.01$). The Wilcoxon signed-rank sensitivity analysis also supported improvement: median pre-intervention score 6.50 (IQR=3.00), median post-intervention score 9.00 (IQR=2.00), Hodges–Lehmann estimate 2.50 (95% CI: 1.50–3.50), $V=78$, $p=0.002$, rank-biserial correlation=1.00. All 12 participants showed positive SPPB change.

Measure	Pre	Post	Change / test
SPPB, mean $\pm$ SD	6.50 $\pm$ 1.57	9.00 $\pm$ 1.13	2.50
95% CI of mean change	—	—	1.71–3.29
Paired t-test	—	—	t(11)=6.97, p<0.001
Cohen's dz	—	—	2.01

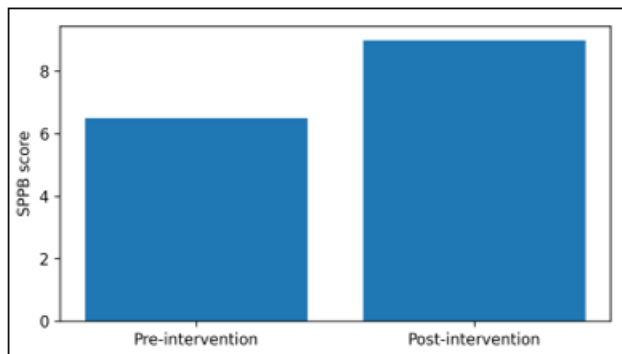


Figure 1: Pre- and Post- intervention SPPB Scores

3.3 Mood

Median mood score increased from 2.00 (IQR=1.00) before intervention to 4.00 (IQR=1.25) after intervention. Wilcoxon signed-rank analysis showed significant improvement ($V=78$, $p=0.002$), with a Hodges–Lehmann estimate of 1.50 (95% CI: 1.00–2.00) and rank-biserial correlation of 1.00. All 12 participants demonstrated a positive numerical change. The exact paired sign test showed 12 positive changes, no negative changes, and no ties ($p<0.001$).

Measure	Pre	Post	Result
Median mood	2.00	4.00	Increase
IQR	1.00	1.25	—
Wilcoxon	—	—	$V=78$, $p=0.002$
Hodges–Lehmann	—	—	1.50 (95% CI 1.00–2.00)
Rank-biserial correlation	—	—	1.00

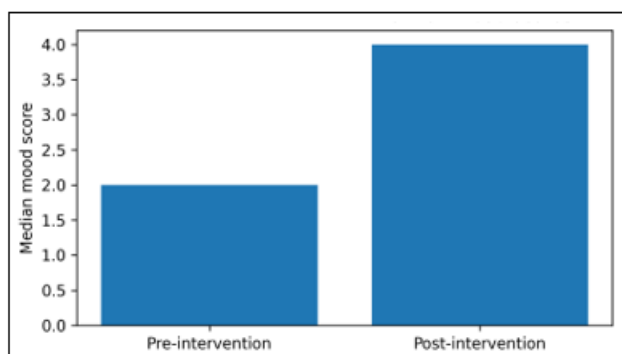


Figure 2: Pre- and Post- intervention mood Scores

3.4 Multiplicity Adjustment

After Holm adjustment for the two principal outcome tests, the statistical evidence remained significant, with adjusted $p<0.001$ for SPPB and adjusted $p=0.002$ for mood.

4. Discussion

The present pilot study evaluated a six-week programme combining music therapy with balance-centric group

exercise in institutionalized older adults. Significant pre- to post-intervention improvements were observed in functional performance and mood.

The improvement in SPPB may be related to repeated practice of balance, strengthening, aerobic, and functional activities. Rhythmic marching, side-stepping, chair rises, tandem stance, side-leg raises, reaching, turning, and sit-to-stand transitions require lower-limb strength, postural control, coordination, and mobility. These findings are consistent with evidence that structured physical exercise can improve balance and physical performance in older adults [4].

Music was integrated with movement and exercises were synchronized to musical rhythm. Rhythmic auditory stimulation may provide an external timing cue for repetitive movement and may increase engagement. Previous studies have reported beneficial effects when music is incorporated into balance or multitask training in older adults [5,6]. However, because music and exercise were delivered together in the present study, the independent contribution of music cannot be determined.

Mood also improved substantially, with the median score increasing from 2.00 to 4.00 and all participants showing a positive change. Group exercise may provide opportunities for communication, shared participation, and social connection. Previous work has suggested that group-based exercise can promote belonging and social motivation, while group exercise among institutionalized older adults may improve social and mental health outcomes [1,7].

Music may have added an emotional and motivational component to the group programme. Familiar, calming, and uplifting music may increase enjoyment and participation, while also providing auditory and social stimulation. Previous research has reported mental-health benefits from group music interventions among nursing-home residents [2] and described potential cognitive and social benefits of music-based approaches in older adults [17].

The findings should nevertheless be interpreted cautiously. The study had only 12 participants and used a single-group pre-post design without a control group. Consequently, observed improvements cannot be attributed specifically to music therapy and may reflect exercise, group interaction, repeated testing, participant engagement, or their combined effects. The six-week intervention also provides no evidence regarding maintenance of benefit.

Despite these limitations, the intervention appears feasible and uses simple resources such as chairs and music. The preliminary findings support further investigation using larger randomized controlled studies. A comparison of identical exercise with and without music would be particularly useful for determining the specific contribution of music.

5. Strengths

- Multidimensional intervention addressing functional and psychosocial aspects of ageing.

- Integration of music with balance, strengthening, aerobic, and functional activities.
- Group-based delivery that may facilitate participation and social interaction.
- Use of the standardized SPPB as a performance-based functional outcome.
- Simple, practical resources suitable for institutional settings.
- All 12 participants demonstrated positive changes in SPPB and mood.

6. Limitations

- Small sample size (n=12), limiting generalizability.
- No control or comparison group.
- Single-group pre-post design, limiting causal inference.
- Six-week intervention with no long-term follow-up.
- Limited outcome assessment, particularly for psychosocial well-being.
- Participants were restricted to those able to participate in group activities and with low-to-medium fall risk.
- The individual effects of music, exercise, and group interaction could not be separated.

7. Conclusion

The study was conducted at Vatsalya Old Age Home, Hirawadi, Nashik, Maharashtra, India.

8. Clinical Implications

Physiotherapists working with institutionalized older adults may consider incorporating rhythmic, enjoyable group activities into conventional exercise programmes when appropriate. The approach may help combine physical training with participation and psychosocial engagement, although effectiveness should be established through controlled research.

9. Future Recommendations

- Conduct larger randomized controlled studies.
- Compare exercise with music against the same exercise without music.
- Use longer follow-up periods to assess retention of benefits.
- Include standardized measures of loneliness, depression, quality of life, balance, and functional mobility.
- Consider multicentre studies across different institutional settings.

Ethical Considerations

Ethical clearance was obtained from the MUHS Ethical Committee and the Motiwala College Ethical Committee before commencement of the study.

Informed Consent

Written informed consent was obtained from participants before participation. Participants were informed that participation was voluntary and that they could withdraw from the study without providing a reason.

Conflict of Interest

The authors declare no conflict of interest.

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