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Effects of a music-based non-pharmacological intervention on older adults with mild to moderate dementia: results from the international "SOUND" study

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BACKGROUND

Over 55 million people live with dementia worldwide and this number is expected to triple by 2050[1] considering the increase of population longevity and the fact that ageing is one of the main factors associated with dementia.
Currently, the available medications allow symptoms to be controlled for some time, but they cannot stop the progression of the disease plus not all patients respond to such treatments[2,3]. The combination of drug therapy and psychosocial non-pharmacological music-based interventions seems to be promising in the treatment of dementia. In fact, music is considered a great resource to stimulate the brain, thanks to the powerful and various sensory, cognitive, emotional, and motor experiences it can elicit[4] and to its capability of boosting neuroplasticity[5], creating a neurological scaffold for memory and cognition[6]. Nevertheless, there is still no evidence of the effects of music on agitation, cognition and anxiety, especially in the long- term[7a,7b] nor on cognition and mood in the short and long-term[8]. Moreover, international studies are scarce[9].
This pilot study aims at contributing to the scientific debate and covering the literature gap by shedding light on the short and mid-term effects of an intervention conducted within the SOUND study ("Training Social and health care prOfessionals in mUsic-based therapeutic iNterventions to support older people with Dementia", funded by the Erasmus+ Programme, https://soundeuproject.eu/), on cognitive and executive functions, mood and well-being of 41 older adults with mild-moderate dementia (OAMD) living in Italy, Portugal and Romania.

METHODS

Study design

A quasi-experimental mixed-methods study protocol[10] was carried out to assess the efficacy of an original music-based intervention on well-being, cognition, executive functions and mood of OAMD in view of a full-scale study, to answer the following research question: To what extent can the SOUND intervention improve cognitive and executive functions, mood and well-being of older adults with mild-moderate dementia?

Outcome measures

The impact of the SOUND intervention on OAMD was assessed in three different moments - at the baseline (T_0), at the end of the intervention (T_1) and two weeks after (T_2) - through a questionnaire including psychometric scales and live monitoring observational tools (Table 1).

Table 1. Outcome variables and research tools

Outcome variables	Research tool
Well-being (primary outcome)	a. WHO-5 (WHO (Five) Well-Being Index)
Cognition (general cognition + executive functions)	MoCA (Montreal Cognitive Assessment) FAB (Frontal Assessment Battery)
Mood (anxiety and depression)	HADS (Hospital and Anxiety Depression Scale)

Inclusion criteria

The intervention, was implemented between October 2023 and February 2024 in Italy, Portugal and Romania. OAMD were included in the experimentation if they were 65 years of age or older; showed interest in the project; were able to see, hear and move (even with aids); were diagnosed with mild to moderate cognitive impairment according to the Montreal Cognitive Assessment (MoCA) and scored ≥10/30. Moreover, they did have not to experience aphasia (mild acceptable) and did have to be able to understand and undertake simple tasks as required during activities.

The intervention

The intervention included **12 sessions including** both active (vocal and rhythmic production) and passive (listening) music-based activities, delivered twice a week, for six consecutive weeks. Each session lasted about **45 minutes** and was divided into four different phases: 1) welcoming; 2) opening activity; 3) three to five main activities depending on the length and intensity of each one; 4) closing activity.

RESULTS

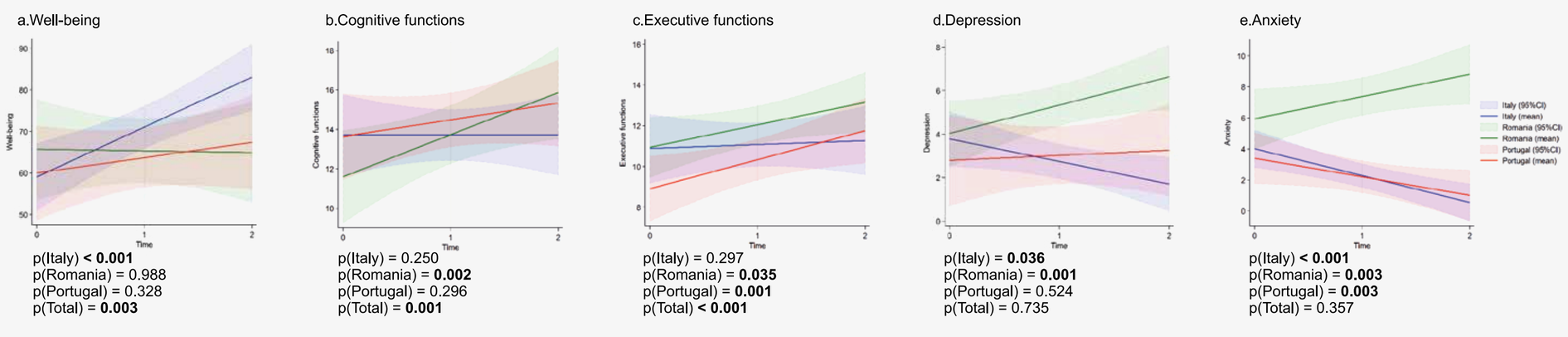
Participants' description

👤 Age
👴👵 Average age 81 years (SD 3.4)
🚻 Sex
🚺 70.7% women overall
🇵🇹: 84.6% women
🇮🇹: 53.8% women
RM: 73.3%
📚 Education
70.7% low education (0–8 years)
Italy had most higher-educated (23.1% ≥ 13 years)
🏛️ vs ⛪ Place of living
⛪ 63.4% institutionalized overall
⛪ Romania 🇷🇴: 100% residential care
⛪ Portugal 🇵🇹: 84.6% residential care
⛪ Italy 🇮🇹: 100% home

IIntervention impact

The SOUND intervention significantly improved participants' well-being, cognition and executive functions over time and remained stable at the follow-up at cross-national level. The potential of the intervention on mood is not clear due to depression and anxiety increasing among Romanian participants (Figure 1).

Figure 1: Average trend of the outcomes variables for three countries, fitted lines (95%CI)



a.Well-being	b.Cognitive functions	c.Executive functions	d.Depression	e.Anxiety
p(Italy) **< 0.001**	p(Italy) = 0.250	p(Italy) = 0.297	p(Italy) = **0.036**	p(Italy) **< 0.001**
p(Romania) = 0.988	p(Romania) = **0.002**	p(Romania) = **0.035**	p(Romania) = **0.001**	p(Romania) = **0.003**
p(Portugal) = 0.328	p(Portugal) = 0.296	p(Portugal) = **0.001**	p(Portugal) = 0.524	p(Portugal) = **0.003**
p(Total) = **0.003**	p(Total) = **0.001**	p(Total) **< 0.001**	p(Total) = 0.735	p(Total) = 0.357

CONCLUSION

The SOUND intervention resulted effective in increasing the levels of well-being, cognitive and executive functions of older adults with mild to moderate dementia. Music-based person-centred interventions should be regularly, not only sporadically, implemented in elder care facilities, as rehabilitative treatments i.e. with not only recreational purposes. Such interventions should also be prescribed by medical professionals, e.g., neurologists, along with pharmacological treatments. It is important to provide more evidence on the effectiveness of non-pharmacological music-based interventions in the treatment of dementia.

REFERENCES

[1] World Health Organization. Global Status Report on the Public Health response to Dementia, https://www.who.int/publications/i/item/9789240033245; 2021 [accessed 16 September 2024].
[2] Schneider LS, Mangialasche F, Andreasen N, Feldman H, Giacobini E, Jones R, Mantua V, Mecocci P, Pani L, Winblad B, and Kivipelto M. Clinical trials and late-stage drug development for Alzheimer's disease: an appraisal from 1984 to 2014. Journal of Internal Medicine 2014;275(3):251–283. https://doi.org/10.1111/joim.12191.
[3] Doran SJ, and Sawyer RP. Risk factors in developing amyloid related imaging abnormalities (ARIA) and clinical implications. Frontiers in Neuroscience 2024:18. https://doi.org/10.3389/fnins.2024.1326784.
[4] Särkämö T. Cognitive, emotional, and neural benefits of musical leisure activities in aging and neurological rehabilitation: A critical review. Annals of Physical and Rehabilitation Medicine 2017;61(6):414–418. https://doi.org/10.1016/j.rehab.2017.03.006.
[5] Flo BK, Matziorinis AM, Skouras S, Sudmann TT, Gold C, and Koelsch S. Study protocol for the Alzheimer and music therapy study: An RCT to compare the efficacy of music therapy and physical activity on brain plasticity, depressive symptoms, and cognitive decline, in a population with and at risk for Alzheimer's disease. PLoS ONE 2022;17(6):e0270682. https://doi.org/10.1371/journal.pone.0270682.
[6] Brancatisano O, Baird A, and Thompson WF. A 'Music, Mind and Movement' program for people with Dementia: Initial Evidence of Improved Cognition. Frontiers in Psychology 2019;10. https://doi.org/10.3389/fpsyg.2019.01435.
[7a] Van Der Steen JT, Smaling HJ, Van Der Wouden JC, Bruinsma MS, Scholten RJ, and Vink AC. Music-based therapeutic interventions for people with dementia. Cochrane Library 2018;2018(7). https://doi.org/10.1002/14651858.cd003477.pub4.
[7b] Van der Steen JT, van der Wouden JC, Methley AM, Smaling HJ A, Vink AC, Bruinsma MS. Music-based therapeutic interventions for people with dementia. Cochrane Database of Systematic Reviews 2025, Issue 3. Art. No.: CD003477. https://doi.org/10.1002/14651858.CD003477.pub5. Accessed 23 May 2025.
[8] Moreno-Morales C, Calero R, Moreno-Morales P, and Pintado C. Music Therapy in the Treatment of Dementia: A Systematic Review and Meta-Analysis. Frontiers in Medicine 2020;7. https://doi.org/10.3389/fmed.2020.00160.
[9] Baker FA, Lee YC, Sousa TV, Stretton-Smith PA, Tamplin J, Sveinsdottir V, Geretsegger M, Wake JD, Assmus J, Gold C. Clinical effectiveness of music interventions for dementia and depression in elderly care (MIDDEL): Australian cohort of an international pragmatic cluster-randomised controlled trial. Lancet Healthy Longev. 2022;3(3):e153-e165. https://doi.org/10.1016/S2666-7568(22)00027-7. Erratum in: Lancet Healthy Longev. 2022;3(10):e653. https://doi.org/10.1016/S2666-7568(22)00227-6.
[10] Santini S, Merizzi A, Caciula I, Azevedo MJ, Hera A, Napradean L, Di Rosa M, and Quattrini S. A quasi-experimental mixed-method pilot study to check the efficacy of the "SOUND" active and passive music-based intervention on mental wellbeing and residual cognition of older people with dementia and dementia professionals' burnout: a research protocol. Frontiers in Psychology 2024:15. https://doi.org/10.3389/fpsyg.2024.1327272.

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