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Original Article

Impact of a combined physical exercise and sensory stimulation program on the quality of life of institutionalized older adults: A qualitative study from the perspective of healthcare professionals

MARIA EDUARDA MARINHO[1]; EDUARDA COELHO[2]; CARLA AFONSO[3]; ANTONINO PEREIRA[4]; MARIA ISABEL MOURÃO-CARVALHAL[5]; SANDRA FONSECA[6]
[1,3,6] Department of Sports, Exercise and Health, University of Trás-os-Montes e Alto Douro, Vila Real, PORTUGAL
[2,5,6] Research Center in Sports Sciences, Health Sciences and Human Development (CIDESD)
[4] Polytechnic Institute of Viseu, Viseu, PORTUGAL
[4] Centre for Studies in Education and Innovation (CI&DEI)

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Abstract:
The search for effective non-pharmacological interventions for institutionalized older adults has intensified, particularly those capable of meaningfully enhancing their well-being and quality of life. However, scientific evidence regarding the combined use of physical exercise and sensory stimulation in this population remains limited, leaving an important gap in geriatric practice. This qualitative, exploratory, and longitudinal study aimed to explore healthcare professionals' perceptions of the impact of a combined physical exercise and multisensory stimulation program on institutionalized older adults living in a residential care facility in Vila Real, Portugal. Ten older people (aged 79–98 years) and eight healthcare professionals participated in the 12-week intervention. The program integrated adapted physical exercise with olfactory, auditory, and visual sensory stimulation. Semi-structured interviews were conducted with healthcare professionals at the end of the program. Data were analyzed using content analysis, which revealed eight thematic categories: *Innovative therapy*; *Motivation and participation*; *Motor and sensory stimulation*; *Satisfaction and well-being*; *Alertness and sleep*; *Reminiscence*; *Self-esteem and usefulness*; and *Overall well-being and quality of life*. Professionals consistently reported improvements in mood, engagement, cognitive alertness, motor activation, sleep regulation, reminiscence, social interaction, and perceived usefulness among participants. They further noted that the integration of sensory stimulation with physical exercise provided a meaningful therapeutic experience that promoted active participation and enhanced the daily functioning of older adults. These findings highlight the potential of multisensory, movement-based interventions as an effective non-pharmacological strategy for improving the well-being and quality of life of institutionalized older people. Future studies should explore long-term effects, include larger and more diverse samples, and integrate older adults' perspectives to strengthen evidence for implementation in geriatric care settings.
Keywords: non-pharmacological interventions; geriatric care; institutionalized older adults; exploratory study; well-being

Introduction

Population aging has become one of the most significant global public health challenges of the 21st century. The increasing number of institutionalized older adults, many of whom present multimorbidity, cognitive decline, physical frailty, sensory deterioration, and reduced autonomy, has intensified the need for effective, feasible, and low-cost non-pharmacological interventions. Ensuring quality of life in this population requires multidimensional strategies that address physical, cognitive, emotional, and social well-being. Within this context, physical exercise and sensory stimulation have emerged as promising therapeutic options capable of mitigating age-related declines and improving functional capacity, mental health, and daily engagement (Bangsbo et al., 2019; Farias & Camargo, 2024).

Regular physical activity is widely recognized as one of the most effective interventions for maintaining autonomy and reducing disability in older adults. Evidence demonstrates its benefits for muscle strength, balance, flexibility, bone health, and fall prevention, as well as its positive influence on executive functioning, memory, and processing speed (Indrakumar & Silva, 2024; Tinôco et al., 2023). Psychologically, it decreases symptoms of anxiety and depression and promotes a sense of competence, self-esteem, and social connection—factors that strongly influence adherence to exercise programs. The World Health Organization (2020) recommends that

Corresponding Author: SANDRA FONSECA, E-mail: sfonseca@utad.pt

older adults engage in varied, moderate-intensity physical activity at least three times per week, yet institutionalized individuals face numerous barriers to meeting these guidelines.

Beyond physical decline, institutionalized older adults often experience reduced sensory input due to limited environmental variety. Sensory deprivation can contribute to disorientation, agitation, apathy, sleep disturbances, and emotional instability. Consequently, sensory stimulation—whether olfactory, visual, or auditory—has gained increasing attention as a complementary therapeutic approach to environmental enrichment and to supporting cognitive and emotional functioning (Prins et al., 2020).

Aromatherapy, for example, has demonstrated benefits for anxiety reduction, sleep regulation, and emotional balance through its interaction with the limbic system, which governs mood, memory, and autonomic responses (Fung et al., 2021; Her & Cho, 2021). Similarly, exposure to nature-based visual and auditory stimuli—real or simulated—has been shown to enhance mood, reduce stress, evoke reminiscence, and promote psychological well-being in older adults, particularly those with restricted mobility (Mostajeran et al., 2021; Jafari-Koulaee et al., 2021). Emerging studies have further suggested that combining sensory stimulation with therapeutic support may amplify benefits beyond the effects of the individual components (Khatib et al., 2025).

Despite these promising findings, research examining the combined and integrated use of physical exercise and multisensory stimulation remains scarce. Most existing studies analyze these interventions separately, and few adopt qualitative approaches that explore how healthcare professionals perceive their impact in real-world institutional contexts. Understanding professionals' insights is essential, as they are directly involved in care delivery, observe subtle behavioral and functional changes, and play a crucial role in assessing feasibility and therapeutic value.

The integration of physical exercise with sensory stimulation may offer synergistic effects. Sensory cues can enhance motivation, facilitate engagement, evoke positive emotions, and prepare participants physically and cognitively for exercise; while conversely, physical activity may potentiate the receptivity and emotional benefits of sensory enrichment. However, empirical evidence on this synergy—especially in Portuguese residential care settings—remains limited.

Despite the recognized importance of physical exercise and sensory stimulation for the well-being of institutionalized older adults, there is a significant lack of research examining their combined application in long-term care facilities. Little is known about how healthcare professionals perceive the usefulness, feasibility, and observable impacts of integrated exercise–sensory programs in daily practice. This gap limits the development of effective, evidence-based, multidimensional interventions capable of addressing the complex needs of this population.

Therefore, gaining insight into professionals' perspectives is crucial to the identification of benefits, challenges, and opportunities to improve care strategies in institutional environments.

Material & methods

Study Design

This research followed a qualitative, exploratory, and longitudinal case study design conducted between February and July 2022. The study aimed to explore healthcare professionals' perceptions of the effects of a combined physical exercise and multisensory stimulation program implemented in a residential care facility for older adults in Vila Real, Portugal. A qualitative approach was deemed appropriate due to its ability to capture subjective experiences, perceived changes, and contextualized insights derived from daily interactions with institutionalized older adults.

Participants

Older Adults

The study involved 10 institutionalized older adults (nine women, one man) aged between 79 and 98 years. Seven participants were diagnosed with senile dementia, alongside other comorbidities commonly associated with advanced age and institutionalization.

Healthcare Professionals

Qualitative data were collected from eight healthcare professionals, including psychologists, physiotherapists, and nurses, who accompanied the older adults throughout the program. All had several years of experience working with institutionalized older adults and were thus well positioned to observe changes in mood, behavior, cognition, motor functioning, and daily engagement.

Intervention Program

The intervention, developed by the authors, lasted 12 weeks and consisted of two 30-minute sessions per week. The program comprised the following components:

- olfactory stimulation: essential oils diffused through an ultrasonic diffuser;
- auditory and visual stimulation: projection of natural environments (e.g., beaches, forests, rivers) paired with congruent ambient sounds (e.g., birdsong, ocean waves, footsteps in the forest);
- adapted physical exercise: exercises using simple materials such as elastic bands and handmade or adapted weights, adjusted to participants' functional capacities.

The intervention was organized into three progressive phases (Table 1):

Table 1: Study Design

Phase	Duration	Main Activities	Primary Objective
I	4 weeks	- Low-impact exercises (walking, joint mobility, stretching) - Simple sensory stimuli (soft music, gentle scents, relaxing colors)	Acclimatization to the program
II	6 weeks	- Moderate-intensity exercises (light resistance, dynamic balance) - Varied sensory stimuli (lights, nature sounds, different aromas)	Development of physical abilities and deeper sensory exploration
III	2 weeks	- Higher-complexity exercises (coordination tasks, adapted group games) - Integrated and personalized sensory stimulation (themed environments, complex multisensory activities)	Consolidation of benefits and promotion of social interaction

This multisensory exercise environment aimed to simultaneously stimulate motor, cognitive, and emotional processes through a systematic and controlled progression.

Procedures

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. All healthcare professionals and legal guardians of the older adults (or cognitively capable older adults themselves) received detailed information regarding study objectives, procedures, voluntary participation, and the right to withdraw at any time. Informed consent was obtained prior to participation. Confidentiality and anonymity of all participants were strictly maintained.

Semi-structured interviews were used for qualitative data collection. The interview guide was developed and validated through the following steps: drafting of the initial interview script based on study objectives and existing literature; review by a panel of experts; revision and incorporation of expert feedback; pilot interview with one professional from the study setting; transcript analysis and refinement of the script; and preparation of the final version for data collection.

Interviews were conducted in person at the end of the 12-week program, were audio-recorded with participants' consent, and lasted between 20 and 35 minutes.

Data Analysis

Data were analyzed using content analysis following Bardin's (2009) methodological guidelines. Categories were established a posteriori, based on patterns that emerged from the interviews. To ensure reliability and validity, all thematic categories were reviewed and confirmed by an external panel of experts. This analytical approach enabled a systematic and rigorous examination of professionals' perceptions and interpretations of the program's impact.

Results

The objective of this study was to identify healthcare professionals' perceptions of the impact of a combined physical exercise and multisensory stimulation program on the quality of life of institutionalized older adults. Content analysis of the semi-structured interviews revealed eight thematic categories, each representing a dimension of perceived change or benefit: *Innovative therapy*; *Motivation and participation*; *Motor and sensory stimulation*; *Satisfaction and well-being*; *Alertness and sleep; Reminiscence*; *Self-esteem and usefulness*; and *Overall well-being and quality of life*.

Below, each category is presented and supported by representative excerpts from the healthcare professionals' testimonies.

Innovative Therapy

Professionals unanimously described the program as a novel and engaging therapeutic approach within the institutional context. The multisensory elements and their integration with physical exercise were perceived as distinctive in comparison to typical activities offered in the facility.

HP1: "(…) I think it was something they had never done before and had never experienced, because I don't remember anyone ever implementing it."

HP3: "(…) Anyway, I think it was something new here at the institution... we had never worked with anything like it before."

HP5: "(…) I think it was an innovative idea, which they liked."

HP6: "(…) I am someone who appreciates new, different activities; I am very much in favor of innovation and anything that can promote well-being, engagement, and participation."

HP7: "(…) what surprised me the most, honestly, was the residents, their interaction, and their ability to respond, since it was something new and they weren't used to being exposed to it."

Motivation and Participation

Professionals reported clear increases in participants' motivation, engagement, and willingness to join the sessions. Improvements in mood, enthusiasm, and reduced depressive expressions were frequently mentioned.

HP1: "(...) they like to feel active, and they enjoyed dealing with the smells and seeing the places you showed them... especially because some of them, as they worked and lived in the countryside, didn't go out much, and you could tell that they liked to see what you brought them."

HP2: "(…) They watched and even commented. Some more than others, but those who were psychologically more active said… ah… today Eduarda did this with us, we saw this and that; so, I'd say they liked what you did with them."

HP3: "(…). When they were doing these activities, Mr. X was always there—and he wasn't one to stay in the room— because he liked these activities."

HP5: "(…) the older people responded well to the program and remained highly motivated throughout its implementation. It was noticeable that they were more interested in the activities, for example with the smells and also when… when they saw the landscapes on television."

HP6: "(...) because the average age is high, it is difficult to engage them in activities. They are at an age where they can choose whether or not they want to participate, but what interested me most was that you managed to really engage them, and they became more motivated and wanted to participate in the activities you organized."

HP8: "(...) the older adults collaborated, they were motivated and committed; I think they weren't as down, as sad and as depressed."

Motor and Sensory Stimulation

Professionals observed improvements in motor activation, willingness to move, and sensory responsiveness. The combined stimulation promoted engagement with exercises and enhanced sensory awareness.

HP2: "(…) I think exercise is always good for you. You could see that they were committed to doing the exercise routine."

HP5: "(…). I think this type of experience allows them to be more active and committed. (…) the program itself, with the use of smells and visuals, allows them to be stimulated, because due to their institutionalization, they don't always have these stimuli in their daily lives. The bridge between these three factors is advantageous because it brings them new sensations; and you often brought them new things that they had never seen before or new scents."

HP8: "(…) the fact that they are more committed—that they call you and say 'I also want to do it, I also want to be present'—has made them more active."

HP6: "(…). The fact that they are stimulated makes a difference, for example, in physical terms, being more active helps them later in their daily activities."

Satisfaction and Well-Being

Professionals consistently described participants as happier, more satisfied, and in better emotional states throughout the program.

HP2: "(…) I think they seemed happier."

HP4: "(…) I think they were happier… in a better mood, because they remember events from their lives, things they did or trips they took with their families."

HP7: "(…) and the older people were happier during the program."

Alertness and Sleep

A noticeable improvement in daytime alertness and a reduction in excessive daytime sleepiness were reported, which contributed indirectly to better nighttime sleep.

HP1: "(…) yes, they are more alert; when they were in the sessions, they were more alert."

HP4: "(…). At night it's a bit variable, there are isolated incidents, but during the day they were more alert and were no longer sleeping, which means that they sleep better at night."

Reminiscence

Visual and auditory nature stimuli often evoked memories of past experiences, contributing to positive emotions and cognitive stimulation.

HP1: "(…) what you put on the television… maybe they had forgotten it…, but they try to recall old times or say that it resembles something or other… you know what I mean?"

HP6: "(…) The use of smells, for example, is something that appeals to past memories. And when they were watching those places on the television. When I walked through the room and heard you asking if they knew the place, and when they said yes, that they had been there before, with their family or on vacation."

Self-Esteem and Usefulness

The opportunity to participate in meaningful activities enhanced the older adults' sense of usefulness and self-worth.

HP4: "(…) they were… well, in a better mood, so to speak. They feel…. How should I put it?! They feel useful, like they're doing something that matters. (…) because they like new activities, new exercises, they like to feel… I notice that they like to feel useful."

Overall Well-Being and Quality of Life

Healthcare professionals perceived a global improvement in participants' well-being, emotional stability, and quality of life through the combination of sensory stimulation, exercise, and an enriched therapeutic environment.

HP8: "(...) I think it's a well-designed program; I'm always in favor of these therapies, and considering the combination of aromatherapy and physical activity, and also the other part, the projection, I think the program has promoted the well-being of the older people, because we know that exercise reduces anxiety and symptoms of depression, not to mention the visual aspect—relaxation through the use of images. The combination of all these factors has improved the quality of life of the older adults."

Discussion

The findings of this study demonstrate that the combined physical exercise and multisensory stimulation program generated meaningful improvements in the well-being, engagement, and daily functioning of institutionalized older adults. The professionals' testimonies highlight benefits across physical, emotional, cognitive, and social domains, reinforcing the therapeutic value of integrated non-pharmacological interventions in long-term care settings.

A central finding relates to the increase in motivation and participation, which healthcare professionals consistently emphasized. Participants appeared more willing to join activities and expressed enthusiasm during the sessions. These observations are consistent with Li et al. (2021), who showed that sensory-enriched environments, particularly visual and auditory nature-based stimuli, positively influence emotional responses during exercise and enhance adherence. Similarly, Steeves et al. (2016) demonstrated that environmental cues such as audiovisual stimulation enhance exercise enjoyment, reduce perceived effort, and contribute to sustained engagement. The integration of sensory elements therefore appears to function as a motivational catalyst, creating a more appealing and meaningful exercise context for older adults.

Another notable benefit reported by professionals was the improvement in alertness and daytime wakefulness, with indirect effects on nighttime sleep. These findings corroborate the work of Izadi-Avanji et al. (2019), who found that lavender aromatherapy improves sleep quality among older adults by reducing autonomic arousal and promoting relaxation. In the present study, the reduction in daytime sleepiness likely indicates enhanced daily activation, which could contribute to better circadian balance—a relevant outcome in institutional environments where monotony often leads to lethargy.

Reminiscence also emerged as a prominent theme. Sensory cues, particularly olfactory and visual stimuli, triggered personal memories and emotional recall for many participants. Such effects echo the observations of Cheng et al. (2020), who found that multisensory interventions combining virtual reality and aromatherapy significantly enhance emotional well-being by stimulating autobiographical memory retrieval. Reminiscence is widely recognized as a powerful therapeutic process in older adults, supporting identity, emotional regulation, and social connection, especially in individuals with cognitive impairment.

The combined intervention also appeared to strengthen self-esteem and feelings of usefulness, as expressed by several professionals. Participating in structured, meaningful activities contributed to a sense of value and autonomy, even among those with cognitive decline. This resonates with the principles of Bandura's (1997) social cognitive theory, particularly the role of self-efficacy in promoting active engagement and persistence in therapeutic activities. Enhanced self-esteem and perceived competence are essential for maintaining psychological well-being in institutionalized older adults.

Global improvements in well-being and quality of life, mentioned by nearly all professionals, also reflect broader benefits documented in the literature. Kwon et al. (2020) reported that exercising in the presence of pleasant aromas contributes to positive emotions and reduces psychological distress, while Okada and Shimatani (2024) demonstrated that olfactory stimulation during aerobic exercise modulates autonomic activity and mood. The synergistic interaction between movement and sensory input seems to amplify the therapeutic impact of each component, a perspective further reinforced by Khatib et al.'s (2025) findings on multisensory stimulation combined with therapist support.

Overall, the results are consistent with the growing body of evidence supporting multidimensional, non-pharmacological interventions for older adults in institutional care. The program implemented in this study appears to offer an enriched environment capable of stimulating physical abilities, cognitive processing, emotional regulation, and social interaction simultaneously—dimensions that are frequently compromised by institutional routines and age-related decline.

However, it is important to consider the limitations of this study. The small sample size limits the generalizability of the findings, and the qualitative design captures perceptions rather than objective measurements. Additionally, the integrated nature of the intervention makes it challenging to determine which sensory or physical components contributed most strongly to the observed changes. Future research should

incorporate mixed-methods or quantitative assessments with larger samples and explore long-term outcomes to evaluate the sustainability of benefits.

Nevertheless, this study represents a meaningful step forward in understanding how combined physical and sensory interventions may enhance the daily lives of institutionalized older adults and offers valuable insights for designing more effective and engaging therapeutic programs in geriatric care contexts.

Conclusions

This qualitative study examined healthcare professionals' perceptions of the impact of a combined physical exercise and multisensory stimulation program on the quality of life of institutionalized older adults. The findings demonstrate that the program produced positive and meaningful changes across physical, emotional, cognitive, and social domains, reinforcing the therapeutic value of integrated non-pharmacological strategies in geriatric care.

Healthcare professionals consistently reported improvements in motivation, mood, participation, alertness, and daily engagement. Furthermore, the multisensory components of the intervention—particularly visual, auditory, and olfactory stimuli—appeared to evoke reminiscence, increase emotional well-being, enhance sensory responsiveness, and promote more active involvement in therapeutic activities. When combined with adapted physical exercises, these effects contributed to a richer, more stimulating environment that fostered feelings of usefulness, self-esteem, and connection to personal memories and past experiences.

An important conclusion emerging from this study is the synergistic effect created by integrating physical exercise with sensory stimulation. Rather than functioning as isolated therapeutic elements, these components complement and reinforce each other, promoting a holistic experience that supports both physical activation and emotional–cognitive engagement. Such synergy addresses the complex needs of institutionalized older adults more effectively than traditional single-component activities.

From a practical standpoint, the program demonstrated feasibility within an institutional setting, requiring minimal equipment, low operational cost, and manageable session duration. These characteristics make it a viable model for implementation in other long-term care facilities. Moreover, the program fostered a therapeutic environment capable of mitigating monotony, sensory deprivation, and inactivity—factors frequently associated with reduced quality of life in institutionalized populations.

However, the results must be interpreted cautiously. The small sample size, reliance on professionals' perceptions, and absence of quantitative outcome measures limit generalizability. Nonetheless, the findings provide valuable preliminary evidence and contribute to a growing body of literature supporting multisensory, movement-based interventions in older adult care.

Overall, this study highlights the potential of integrated physical and sensory programs to promote well-being, enhance daily functioning, and improve the overall quality of life of institutionalized older adults. The positive outcomes observed suggest that such interventions may represent an important step toward more humanized, engaging, and holistic approaches to geriatric care.

Declaration of generative AI and AI-assisted technologies in the writing process During the preparation of this manuscript, the authors did not use any generative AI or AI-assisted technologies.

Conflicts of interest The authors declare that there is no conflict of interest.

Limitations This study presents several limitations. The small sample size reduces the generalizability of the results. Because the intervention integrated multiple sensory and physical components, it is not possible to isolate the specific contribution of each component to the overall outcomes. Additionally, the qualitative methodology captures subjective perspectives from healthcare professionals but does not include objective measures or direct assessments from the older adults themselves. Future research should incorporate quantitative assessments, mixed methods designs, larger samples, and long-term follow-up to strengthen the evidence regarding the effectiveness and sustainability of multisensory exercise interventions.

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