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Health perceptions of older individuals on the cognitive benefits of a multicomponent green physical activity program: A qualitative exploration in the Southwest Region of Bahia, Brazil

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ABSTRACT

Background and aims: A multicomponent exercise program (MEP) is a tailored, physical activity-based intervention that incorporates several exercise modalities to improve physical function and reduce negative health consequences, such as cognitive decline. The program incorporates green exercise (MEP-G), which is a low-cost, outdoor activity that fosters both physical and mental health benefits. The aim of this study was to explore older individuals' perceptions regarding the effectiveness of a MEP-G on their cognitive and mental health status.
Methods: This qualitative intervention study targeted individuals aged ≥60 years, physically independent, and not previously engaged in physical exercise programs, registered in the National Family Health Strategy Program in Jequié, Southwest Bahia, Brazil. A total of 14 participants were analyzed through random sampling after systematic allocation into two groups: the MEP-G and the Theoretical Behavioral Change Program (BCP). Post-intervention interviews were conducted using the focus group technique, guided by a structured question script. Data were analyzed using Bardin's content analysis method, with IRAMUTEQ software for data processing and analysis.
Results: The analysis revealed six main themes: (1) "Role of Socialization in Older Individuals' Health Context," (2) "Positive Effects of Guided Programs on Functional Capacity," (3) "Relationship Between Healthy Habits and Successful Aging," (4) "Physical Exercise as an Effective Non-Pharmacological Treatment for Mental Health," (5) "Adherence to a More Active Lifestyle," and (6) "Negative Effects of a Sedentary Lifestyle on Mental Health.
Conclusion: The findings highlighted that the MEP-G, potentially integrated into the BCP program, contributed to improvements in participants' subjective perceptions of functional autonomy and mental health. The program demonstrated its potential as an effective, low-cost, short-term intervention to promote an active lifestyle and enhance health outcomes in older adults, with the capacity for large-scale implementation.

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1. Introduction

A multicomponent exercise program (MEP) can be understood as a personalized based intervention-physical activity (PA) involving combined exercise training, with the potential to impact a variety of functional performance measures, including endurance, strength, coordination, balance, and flexibility (Kim et al., 2020). The participation of different age groups, such as older adults, in exercise programs with these characteristics helps to reduce adverse health effects, including frailty (Chiu and Yu, 2022), the number of falls (Cadore et al., 2013), mental health problems (Windle et al., 2010), cognitive decline (Paillard, 2015), as well as reductions in physical function such as balance (Dunsky, 2019), gait speed (Nascimento et al., 2022),mobility (Webber and Porter, 2010), and functional capacity (A. Casas-Herrero et al., 2019).

In recent decades, studies on the effects of MEP programs as part of non-pharmacological interventions have gained increasing interest, due to their positive impact on both physical performance and cognitive function (Sadjapong et al., 2020). These include improvements in cerebral blood flow, neuroplasticity, and the increased release of chemicals, such as dopamine and serotonin (Gonçalves et al., 2019; Zheng et al., 2016), which play a crucial role in mood regulation and cognitive function (da Encarnação et al., 2023). Such programs can also help prevent cognitive diseases, such as Alzheimer's and dementia, and enhance cognitive domains like memory, attention, reasoning, and concentration (Sampaio et al., 2019).

Recently, there has been growing interest among researchers in understanding how the environment in which physical activity is performed can positively influence health promotion, especially for older adults (Lahart et al., 2019). Newly quanti-qualitative studies have increasingly focused on the impact of "green exercise," or PA conducted in natural, outdoor settings, demonstrating that it offers more significant benefits for both physical and mental well-being compared to indoor exercises (Gonnord et al., 2023; Turecek et al., 2025).

Green exercise has been shown to enhance mood, reduce stress, and promote feelings of vitality and connectedness to nature, all of which are crucial for older adults facing social isolation and mental health challenges (Lahart et al., 2019; Zhou et al., 2023). The World Health Organization (WHO) highlights the relevance of green areas in health promotion (Nielsen and Bronwen Player, 2016). Moreover, another recent studies by have highlighted how green spaces contribute to greater social interaction and a sense of community (Brito et al., 2022; Mazzoleni et al., 2024), which are essential for improving social well-being and cognitive health in aging populations (Lahart et al., 2019; Nguyen et al., 2021). These findings suggest that engaging in outdoor PA not only improves physical fitness but also supports mental resilience, making it a valuable intervention for promoting healthier aging.

In the context of implementing PA programs with public health impacts, it is essential to evaluate the effectiveness and outcomes of these interventions comprehensively (Gaglio et al., 2013). The RE-AIM framework has been widely used as a structure to assess the implementation of health programs, including PA interventions (Choma et al., 2023). This model allows for measuring the program's "Reach," the "Effectiveness" of its outcomes, the "Adoption" by target populations, the "Implementation" of strategies, and, finally, the "Maintenance" of long-term benefits. Evaluating "effectiveness," in particular, is crucial for understanding how the program influences participants' health (Glasgow et al., 1999).

While quantitative metrics, such as improvements in physical indicators, are essential (Furtado et al., 2023), qualitative research such as focus group (FG), complements this framework by capturing the perceptions, experiences, and motivations of participants (Meredith et al., 2023). Through gathering qualitative data, researchers can provide a deeper understanding of the personal and social factors influencing program success, offering valuable insights for refining and optimizing public health interventions (Young et al., 2024).

In this context, the aim of the present study was to evaluate the perceptions of older individuals regarding the effectiveness of an MEP-Green (MEP-G) intervention on subjective perception of cognitive status and mental well-being. Based on previous research, we hypothesized that participation in an MEP-G would be associated with an increased perception of the benefits of an active lifestyle promotion program on physical health and cognitive function among older adults.

2. Material and methods

2.1. Study design and settings

This qualitative study, structured according to the Consolidated Criteria for Reporting Qualitative Research (COREQ) for greater reliability and transparency (Tong et al., 2007), was conducted from October to December 2022 in Jequié, Bahia, Brazil. The target population included older individuals registered in the National Program of Family Health Strategy (FHS) in the urban areas. Participants were recruited through invitations by Community Health Agents (CHAs) and informative materials at two Family Health Units (FHUs).

2.2. Participation study criteria

Eligible participants were required to meet specific inclusion and exclusion criteria to ensure the safety and reliability of the study. Inclusion criteria stipulated that participant be aged 60 years or older, physically independent, not currently enrolled in any physical exercise programs, without a diagnosis of SARS-CoV-2 infection in the previous three months, without cognitive impairments, and fully vaccinated against COVID-19. Exclusion criteria encompassed severe cardiovascular or respiratory conditions, uncontrolled diabetes, recent fractures, cognitive impairments that could hinder task performance, or any other medical conditions deemed to prevent safe participation in physical activities. These criteria were designed to establish a homogenous sample and minimize potential risks to participants' health.

2.3. Participants allocation

The individuals who participated in the enrollment phase were screened, resulting in the selection of 40 eligible participants (mean age 71.1 $\pm$ 5.5 years), who were then casually assigned in a 1:1 ratio into two groups for the intervention: MEP-G (n = 20) vs. control group of behavior change theorical program (BCP, n = 20) interventions. The both MEP-G and BCP consisted of pre-scheduled sessions, conducted in groups with the assistance of a pre-trained research team, conducted over 2 months (8 weeks).

2.3.1. Bio-sociodemographic data collection

The bio-sociodemographic data was collected from participants. This data aimed to characterize the sample comprehensively, considering key variables that could influence the effectiveness of the intervention. A structured questionnaire was used to collect information on the participants' sex, age, educational level, race/color, marital status, housing situation, religion, and employment status.

2.4. All-purpose procedures

Contact was then made with the coordination of the respective units, where older individuals registered in these health services were invited to participate in the study through the Community Health Agents (CHAs) of each micro-area. Subsequently, individuals were provided with guidance on the procedures of the programs in which they would be involved.

All participants included in the study underwent interviews and evaluations both before and after the exercise program as part of their

integration into a EISI study protocol (Rocha et al., 2024). However, qualitative data were exclusively collected following the completion of the exercise program to capture participants' perceptions and experiences after the intervention. Both the MEP and BCP were conducted by instructors who had undergone prior training to ensure consistency and standardization in the implementation of the activities across both intervention groups.

2.5. Description of multicomponent green exercise program

The MEP-G was an outdoor adapted from the VIVIFRAIL® program, a structured exercise model designed to promote physical functionality and reduce frailty in older adults (Izquierdo, 2019). The program consisted of sixteen weekly sessions, each lasting 50 min, conducted over a period of two months (8 weeks), with a frequency of two sessions per week. As shown in Table 1, the intensity of the activities was progressively increased every four sessions by adjusting training variables. Participants were encouraged to maintain their effort within the target zones, with intensity monitored using the Adapted Borg Rating of Perceived Exertion Scale (Rodrigues et al., 2023; Shariat et al., 2018).

2.6. Behavior changing program - G2

The content and structure of the meetings were based on the Brazilian VAMOS: Vida Ativa Melhorando a Saúde program, as exemplified in the Table 2 below, which outlines the key activities and approaches of the BCP (Meurer et al., 2019). Participants received pertinent, scientifically supported information with the goal of encouraging constructive behavior change and enhancing general health (Konrad et al., 2022). Four meetings were organized as part of the intervention, focusing on health education activities that addressed key themes such as maintaining an active and healthy lifestyle, promoting mental well-being, identifying sources of social support, understanding the risks associated with sedentary behavior and physical inactivity, and evaluating program outcomes. These sessions were held over an 8-week period, each lasting between 60 and 90 min.

2.7. RE-AIM framework and focus groups analysis

The RE-AIM framework offers a comprehensive approach to evaluating public health programs, focusing on five essential dimensions (Gaglio et al., 2013). Among these, the *Effectiveness* dimension is critical in assessing the program's impact on health outcomes. In this study, the *Effectiveness* was evaluated through qualitative measures, using FG sessions to capture participants' perceptions of the program's impact on their physical and mental health. The FG were guided by a structured set of questions designed to align with the *Effectiveness* dimension of the RE-AIM model. Two post-interventions FG sessions were held, one at each FHU where the program was implemented. These sessions aimed to explore participants' perceptions of the program, focusing on changes in their physical and mental health, as well as their interest in incorporating exercise into their daily lives (Table 3) (see Table 4).

Prior to the main data collection, the guide was piloted with a small group of 3 participants who were not part of the study but shared similar characteristics to the target population. Based on feedback from the pilot group, minor adjustments were made to ensure the guide effectively elicited the intended responses. The FG sessions were organized with the assistance of the FHU team, and participants were invited through communication from CHAs. Each session lasted about 90 min and was recorded with the participants' consent. The recordings were transcribed verbatim, ensuring confidentiality by using coded identifiers for each participant.

The researchers emphasized that participation was voluntary and would not affect participants' health services or relationships with local health professionals. To foster trust, they provided clear information about the study's goals, confidentiality, and the voluntary nature of participation, ensuring an open and supportive atmosphere. While prior contact could influence participants' responses, efforts were made to maintain neutrality and avoid leading questions during the interviews, allowing participants to express themselves freely. The initial interaction may have also influenced participants' trust and comfort, particularly on sensitive topics such as mental health.

For data analysis, we employed Bardin's Content Analysis method, a widely recognized tool in qualitative research (Bardin, 2016). The process consisted of pre-analysis, material exploration, and result interpretation. Textual data was processed using the Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires (IRAMUTEQ) software [version 0.7 alpha 2]. The transcribed content was compiled into a single textual corpus and analyzed using the Descending Hierarchical Classification (DHC) method (Camargo and Justo, 2013), which organizes frequently used words into lexical classes based on their similarity and context. These relationships were visually illustrated through a dendrogram, providing a structured and detailed representation of the key themes within the corpus.

This method enabled the identification of patterns and themes in the data, providing insight into participants' experiences and perceptions. The analysis process was carried out by two researchers independently, ensuring rigorous categorization and interpretation of the data. To maintain the anonymity of participants, they were labeled using a combination of letters, numbers, and the corresponding FHU unit name (e.g., P1-JR to P8-JR/P9-AM to P15-AM). Additionally, descriptive statistical analyses were conducted on the qualitative variables to better understand the sample's characteristics.

3. Results

3.1. Enrollment of participants

Of the 222 individuals assessed, 46 met the eligibility criteria and were allocated into two groups (MEP-G, n = 20 and BCP, n = 20). Six participants withdrew before starting the intervention program, and 14 dropped out during the 8-week program (9 MEP, 5 BCP). By the end,

Table 1
Multicomponent green exercise program structure and progression.

Phase	Type of Exercise	Duration	Sets/Repetitions	Borg RPE (0–10)	Examples of Exercises	Objective
Phase 1: Aerobic & Balance	Functional aerobic and balance exercises	10 min	Continuous or interval-based	RPE 4–5 (light to moderate)	Brisk walking, step-ups, walking with obstacles, side shuffling, balancing on one foot	Improve cardiorespiratory fitness, coordination, and balance.
Phase 2: Strength (Upper Limbs)	Pushing, pulling (resistance bands, light weights)	15 min	2–3 sets/12–20 repetitions	RPE 5–6 (moderate)	Resistance band chest press, bicep curls, shoulder presses, rowing with bands	Enhance upper limb strength and functionality.
Phase 3: Strength (Lower Limbs)	Squats, lunges, leg raises	15 min	2–3 sets/12–20 repetitions	RPE 6–7 (moderate to hard)	Squats, lunges, step-ups, leg extensions, calf raises, chair stands	Improve lower limb strength and mobility.
Phase 4: Stretching	Static stretching for upper and lower limbs	10 min	10–30 s per position	RPE 1–2 (very light)	Seated hamstring stretch, quadriceps stretch, calf stretch, chest stretch, shoulder stretch	Enhance flexibility, promote relaxation, and reduce tension.

Table 2
Structure and Key Themes of the *Behavior Change Program*.

Meeting	Week	Theme	Guiding Questions
1st Meeting	Week 1–2	Active Lifestyle	How can I incorporate physical activity into my daily routine?
2nd Meeting	Week 3–4	Healthy Eating	What strategies can be implemented to maintain a healthy diet?
			What are the impacts of a diet high in sodium and sugar on health?
3rd Meeting	Week 5–6	Social Support	Which individuals in my social circle can I rely on to stay more physically active?
			With whom can I share my physical activity goals to enhance my network?
4th Meeting	Week 7–8	Mental Health	What is my perception of my mental health?
			How does daily physical activity positively impact mental health?

Table 3
Bio-sociodemographic characteristics of the study participants.

Variables	n	%
Sex		
Female	9	64.3
Male	5	35.7
Age Range (years)		
*M/SD	14	71.5 ± 5.5
60–79	12	85.7
≥80	2	14.3
Educational Level		
Illiterate	3	21.4
Reads and writes name	9	64.3
Elementary School	1	7.1
High School	1	7.1
University Level	0	0
Race/Color		
White	2	14.3
Brown	11	78.6
Black	1	7.1
Marital Status		
Married	6	42.9
Stable Relationship	2	14.3
Divorced	3	21.4
Widowed	3	21.4
Housing Situation		
Lives with others	10	71.4
Lives alone	4	28.6
Religion		
Catholic	10	71.4
Protestant	4	28.6
Others	0	0
Occupation/Working		
No	9	64.3
Yes	5	35.7

Notes: *M = mean; SD = Standard deviation; n = number of participants; % = percentage.

Table 4
Focus group interview guide: Participant perceptions of the behavior change program.

General Question	Objective of the Question
Could you share your overall thoughts and experiences about the program?	This question aims to gather an overall perspective from participants about their experience in the behavior change program.
Specific Question	**Objective of the Question**
How did you feel after participating in the behavior change program?	To assess participants' emotions after completing the program, identifying any feelings of well-being or challenges faced.
What changes did you notice in your physical and mental health?	To explore perceived changes in physical and mental health, such as improvements in energy, mood, and overall health.
Do you plan to incorporate exercise into your daily routine?	To investigate participants' intentions to continue exercising after the program.
How did the program contribute to your life?	To understand the perceived impact of the program on participants' daily lives, including changes in lifestyle and health.

data from 10 MEP-G and 13 BCP participants were analyzed in the quantitative study (Rocha et al., 2024). However, a total of 9 participants from the MEP-G group and 5 from the BCP group advanced to the qualitative phase of the study. The decision to analyze the results of the interviews for both groups together was based on the unexpected finding that BCP participants reported improvements and positive outcomes. This integrated analysis allowed for a sample of 14 participants, providing a broader understanding of perceptions and experiences more robust (Fig. 1).

3.2. Participants characterization

Table 2 summarizes the characteristics of the focus group participants. Fourteen older adults participated, with a majority being female (64.3 %) and aged between 60 and 79 years (85.7 %). Most had low to intermediate education levels; 64.3 % could read and write their names, while only 7.1 % had completed high school. In terms of race/color, the majority identified as brown (78.6 %), followed by white (14.3 %) and black (7.1 %). Regarding marital status, 42.9 % were married, while 21.4 % were widowed and another 21.4 % divorced. Most participants lived with others (71.4 %) and identified as Catholic (71.4 %). Additionally, 64.3 % were not employed at the time of the study.

3.3. Qualitative analysis

The corpus used for generating the DHC in the software consisted of a single text divided into 200 segments (ST). Of these, 80.5 % (161

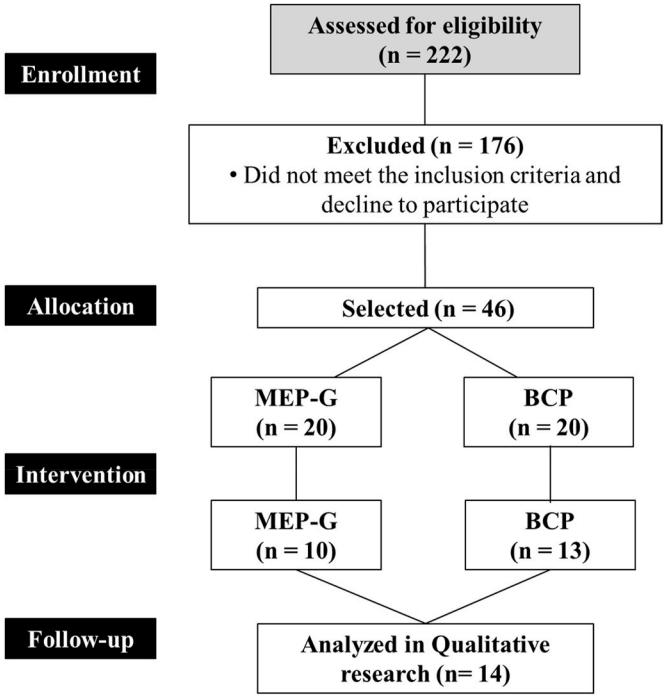

Fig. 1. Flowchart of the study.

segments) were retained, meeting the minimum retention threshold of 75 % required for lexicographic analysis. A total of 7006 occurrences (including words, forms, or lexemes) were identified, with 1245 distinct words. Of these, 384 words occurred only once, as shown in a Fig. X in the supplementary material I.

The Factorial Plane Analysis (FPA), which illustrates the relationships within the study population participating in the focus group was presented in the Figure Y of supplementary material II. This factor axes serves as the foundation for constructing the word classes, which are then visualized through a dendrogram (Fig. 2). The construction of these classes was based on the selection of words with a chi-square value (X^2) ≥ 3.84 ($p < 0.05$) and a frequency within classes of 5.62 or greater.

This process ensures that the words most strongly associated with the thematic axes are included in the analysis, providing a clear representation of the underlying patterns within the data. The dendrogram is interpreted from left to right, reflecting the affinity between the classes. Six distinct classes were identified, organized into five branches of the total corpus analyzed, as shown in Fig. 2. Subcorpus A includes Class 5; subcorpus B comprises Classes 4 and 3; subcorpus C consists of Class 6; subcorpus D is made up of Class 2; and subcorpus E consists of Class 1. These six classes were stable, meaning they were formed by text segment units with similar vocabulary.

Class 1 was titled "Role of Socialization in the Health Context of Older Individuals," comprising 25 text segments (ST). This class represents 15.53 % of the words in the corpus, ranking fourth in terms of size. It includes words and roots with chi-square values ranging from $X^2 = 3.91$ (Dar) to $X^2 = 57.3$ [Know (*Conhecer*)]. Key terms in this class include "happy," "family," "new," "friendship," and "liking," as illustrated in Fig. 2. Participants' statements revealed that group exercise enables older individuals to experience a sense of belonging, form emotional bonds, and interact with peers as though they were family. This fosters the development of friendships and a social support network, which is crucial for attending the programs, as noted in the participants' accounts.

"[…] Here, we got to know each other more and became like a family, and we liked it here. Everyone got to know each other even more, formed more friendships, and became more united." (P3-J3)

"We got, we met a family, God bless that the project continues again for us too, and to help our exams and colleagues as well." (P3-JR)

"I hope that this year we continue with our exercise here […]." (P4-JR)

"This is very good for our minds, this process of forging new friendships, new knowledge, that's what's important […]." (P14-AM)

Class 2 was titled "Positive Effects of Guided Programs on the Functional Capacity of Older Individuals," comprising 26 text segments (ST), which represents 16.15 % of the words in the corpus, ranking third in size alongside Class 4. The class includes words and roots with chi-square values ranging from $X^2 = 3.86$ (Grupo) to $X^2 = 49.5$ [body (*Corpo*)]. Key terms in this class include "ask," "achieve," "improve," "move," "result," and "strong," as illustrated in Fig. 2. This class highlighted that the exercises were vital for promoting health and functional autonomy in older individuals, leading to improvements in muscle function and balance, as demonstrated in the following participants' statements:

"Today it doesn't hurt much, my legs are stronger. For me, it was very good, it's always good to exercise, move the body, we feel lighter, we can bend and stand up." (P13-AM)

"Today I can walk more firmly, I feel stronger, I noticed a difference in my body. I used to sit and stay there for a long time, felt pain in my leg, in my knees […]." (P12-AM)

The class 3 was named "Relationship between healthy habits and successful aging", comprising 21 text segments (ST), representing 13.0 % of the words in the set, ranking fifth in the entire corpus in terms of size. It consists of words and roots in the range between $X^2 = 3.92$ (*Andar*) and $X^2 = 35.22$ (Health [*Saúde*]). This class also includes words such as

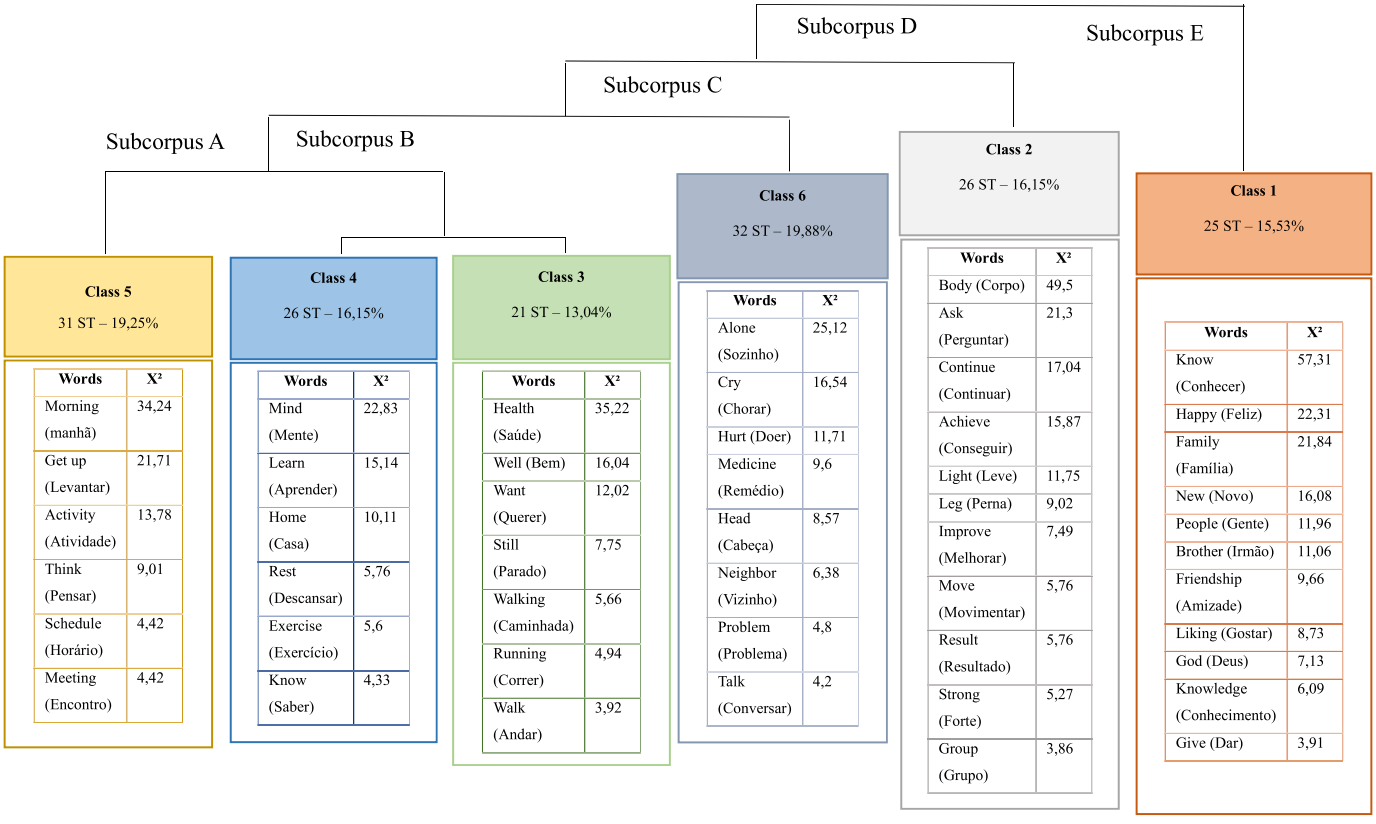

Fig. 2. The CHD dendrogram on the representation of the classes of the study population participating in the focus group [word in English (Portuguese)].

"well," "still," "walk," "run" (Fig. 2). This class reveals how much the older people recognized that both programs (multicomponent and behavior change) carried out within the FHS acted as positive triggers for a life change, leading them to incorporate healthy habits that had an impact on their daily lives, promoting less functional dependence.

"I feel bad if I sit in one place for thirty minutes, I feel agitated, I want to be walking, I don't want to be still at all, and for me, thank God, everything is going very well, what we did here worked out very well for me." (P4-JR)

"*I met a friend on a motorcycle, he offered me a ride home, I told him no, that I was close to home and could walk back to take a walk, and thanks to God and your knowledge, I was able to improve my health."* (P11-AM)

Class 4 was titled "Physical Exercise as an Effective Non-Drug Treatment in Mental Health," comprising 26 text segments (ST), which represents 16.15 % of the words in the corpus, ranking third in size alongside Class 2. The class includes words and roots with chi-square values ranging from $X^2 = 4.33$ (Knowledge [*Conhecer*]) to $X^2 = 22.83$ (mind [*Mente*]). Key terms in this class include "learn," "rest," and "exercise" (Fig. 2). This class emphasized the positive impact of both MPE and BCP on participants' mental health. It was found that physical exercise serves as a significant protective factor against cognitive decline in older individuals, while behavior change strategies aimed at promoting an active and healthy lifestyle also contributed to improved quality of life among these individuals.

"I'm really enjoying it here. If there's another session, I'll come participate again because it really helps you. It's tiring, but the mind learns more things, doing exercise at home, going for walks." (P5-JR)

"*The walk from there to here also helps, it rests the mind. Sometimes you're lost in thought, you come here and distract yourself. So, by the time you leave, you're already thinking about other things."* (P5-JR)"

Class 5 was titled "Adherence to a More Active Lifestyle," comprising 31 text segments (ST), which represents 19.25 % of the words in the corpus, ranking second in size. The class includes words and roots with chi-square values ranging from $X^2 = 4.42$ (Meeting [*Encontro*]) to $X^2 = 34.24$ (Morning [*Manhã*]). Other key terms in this class include "get up," "activity," "think," and "schedule" (Fig. 2). The statements from participants in this class highlighted the importance of motivational factors for adherence to and continuity in physical exercise. These factors were crucial in encouraging older individuals to adopt and maintain a more active and healthier lifestyle.

"I push the wall to stretch every day because at home it's just me and God, I get up in the morning, read my Bible, get up to make coffee and then I go do my exercises." (P9-AM)

"I could do it together, but schedule fixed days and times because if you don't do it like that, it won't happen. It's important to have perseverance and motivation to do that activity." (P14-AM)

"When it was the day of the activities, I woke up thinking about the meeting and called my friend so we wouldn't miss it. When they return, we'll all be here to do it again. It really gave a lot of energy." (P10-AM)

Class 6 was titled "Negative Effects of a Sedentary Lifestyle on Mental Health," comprising 32 text segments (ST), which represents 19.88 % of the words in the corpus, ranking first in size. The class includes words and roots with chi-square values ranging from $X^2 = 4.2$ [Talk (*Conversar*)] to $X^2 = 25.12$ [Alone (*Sozinho*)]. Other key terms in this class include "cry," "hurt," "medicine," and "problem" (Fig. 2). This class emphasizes the negative impact of a sedentary lifestyle on the mental health of older individuals, which can contribute to the development of mental disorders such as depression and anxiety, as well as feelings of loneliness that may impair cognitive function. Participants' statements further revealed that physical exercise played a significant role in improving mental health and mitigating these negative effects.

"At night, I used to feel sad inside the house alone, since I live alone. All of that wouldn't leave me, but coming here really distracted my mind a lot. I go out and talk to the neighbors, I'm more carefree now because I lie down and sleep, because before I couldn't sleep." (P6-JR)

"So, we distract ourselves by going out, don't let depression take over. Go out, take a walk, stop filling your head with things. Go out, take a shower, get dressed, and go out, talk to one more neighbor, one more friend that distracts […]." (P5-JR)

"I couldn't sleep, I just kept thinking. After I started coming here, thank God I cleared a lot from my mind, a lot of bad things left my mind. It was a worry for 3 years […]." (P6-JR)

Interestingly, from the Factorial Plane Analysis (FPA), it is evident that words from Classes 3 and 4, such as "health" and "mind," are positioned near the "x" axis in the upper and lower quadrants to the right. This positioning suggests that active aging requires the integration of healthy habits, such as physical exercise, which significantly contributes to mental health treatment for older adults.

Additionally, a strong proximity between words from Class 5, such as "get up" and "activity," is observed, supporting the idea that adherence to an active lifestyle is influenced by motivational factors. Furthermore, words from Class 1, such as "friendship" and "family," emphasize how group exercise fosters socialization and interaction among peers, promoting well-being and enhancing mental health in older individuals. Words from Classes 2 and 6, on the other hand, appear more isolated in their respective quadrants.

4. Discussion

The primary objective of this study was to evaluate the perceptions of older adults regarding the effectiveness of a MEP-G program on their physical and cognitive health. The study revealed that participants experienced notable improvements in physical health, mental well-being, and overall quality of life. The findings also highlighted the participants' increased awareness of the benefits of maintaining an active lifestyle, as well as their intentions to integrate regular exercise into their daily routines. Moreover, the data provided deeper insights into the participants' personal experiences, emphasizing the program's positive impact on fostering a sense of social support and improving mental well-being associated to cognitive functions.

Systematic PA is widely acknowledged for its health benefits, particularly in enhancing physical and cognitive functions (Volders et al., 2021). Cognitive decline is a significant concern among older adults, as it is associated with reduced quality of life, increased risk of functional impairment, higher healthcare costs, and greater mortality rates (Livingston et al., 2020). Regular PA is considered one of the most important modifiable protective factors against cognitive decline (Lee et al., 2015), alongside education, social interactions, and participation in cognitive activities (Glass et al., 2023)

The results of this qualitative study underscore the perceived benefits of a short-term MEP-G program for older adults. Participants reported improvements in their physical and mental health, highlighting enhanced mobility, strength, and mood as key outcomes. These findings are consistent with previous research demonstrating that even brief interventions can yield functional and cognitive improvements in older populations (Casas-Herrero et al., 2022; da Encarnação et al., 2023). The recognition of these benefits by participants reflects their growing awareness of the importance of PA as a health-promoting behavior.

A notable aspect of this study was the emphasis on social interactions. Participants reported that the program fostered strong social bonds within the group, enhancing trust among peers and with healthcare professionals. This dynamic extended beyond the program itself, as participants became more engaged with the FHU and its CHAs. These connections appear to have positively influenced participants' self-perception of their role in health promotion, reinforcing their sense of

co-responsibility for maintaining an active and healthy lifestyle (Mjøsund et al., 2022). These findings align with the results of a review on social support and PA in older adults, which highlights that companionship support, specifically, social connectedness and social comparison can positively influence PA engagement (Steinhoff and Reiner, 2024), suggesting that group-based PA are a key strategy for improving both social integration and PA levels among older individuals.

Furthermore, studies have consistently shown that adherence to exercise programs is influenced by both intrinsic and extrinsic factors, such as self-determination, routine, and social support (Geller et al., 2018). The participants' focus on routine supports previous research findings that emphasize the value of developing ingrained activity patterns in promoting sustained engagement (Harding et al., 2024). Additionally, this finding supports recent evidence (Stathi et al., 2022), which suggests that structured scheduling and clear motivational goals are central to overcoming barriers to exercise adherence in older populations.

However, contrary to the present findings that heavily emphasize individual routine, other research has highlighted the role of environmental and policy-level interventions, such as access to green spaces and community exercise programs, which were less discussed by participants (Wang et al., 2021). The urban environment in which participants reside poses challenges to maintaining an active lifestyle, including limited infrastructure such as sidewalks, green spaces, and security. Urbanization-related factors, including air pollution and heat islands, further discourage outdoor PA and contribute to sedentary behaviors—known risk factors for chronic diseases and mental health conditions such as anxiety and depression (Brito et al., 2022; Liu et al., 2022).

The WHO emphasizes the role of green spaces in health promotion (Nielsen and Bronwen Player, 2009). Participants noted that the lack of access to natural environments in their communities hindered their ability to engage in PA. Evidence suggests that exposure to green spaces encourages higher levels of physical activity and improves mental health outcomes, particularly in urban areas (de Vries et al., 2003; Nguyen et al., 2021; Wang et al., 2021). These findings highlight the need for urban planning strategies that incorporate green infrastructure to facilitate active lifestyles.

It is important to acknowledge that the researchers' backgrounds, experiences, and perspectives may have influenced the data collection, interpretation, and analysis processes. According to previous explanations, researcher reflexivity is crucial in qualitative research, as personal biases and assumptions can shape both the process of data collection and the interpretation of findings (Engward and Davis, 2015). In this study, the research team, with expertise in gerontology, PA, and mental health, may have shaped their interpretations based on prior knowledge, which could have introduced certain biases, as noted previously. For example, the team's focus on the cognitive benefits of PA could have influenced how we interpreted participants' responses.

To minimize potential biases, we employed strategies such as ongoing reflection, team discussions, and the rigorous application of Bardin's content analysis (de Faria-Schützer et al., 2021). These strategies helped ensure that the results were interpreted objectively and in alignment with the data collected. Maintaining methodological transparency and consistent team communication throughout the study allowed us to stay mindful of our biases and aim for a more balanced and accurate interpretation of participants' experiences (Malterud, 2001; Sutton and Austin, 2015). Research using qualitative approaches in sport and exercise science has been steadily growing (dos Santos Nascimento et al., 2021; Smith, 2018),. As demonstrated in our study, this type of analysis provides valuable insights into the lived experiences of individuals, offering a deeper understanding of their perceptions and behaviors.

4.1. Strengths and limitations

This study presents several strengths. First, the qualitative approach allowed for an in-depth exploration of older adults' perceptions regarding physical activity and its integration into their daily lives. The intervention's low cost and implementation within the FHS framework highlight its feasibility and scalability, offering a practical model for similar programs. Furthermore, the study successfully engaged a diverse group of participants, fostering community bonds and enhancing the perceived role of health services in promoting active lifestyles.

While this study provides valuable insights into older adults' perceptions of PA, several limitations must be acknowledged. The research did not examine the influence of gender roles, societal expectations, and socioeconomic status on attitudes toward exercise—factors known to shape health behaviors and potentially offer a more nuanced understanding of barriers and motivators for regular PA in this population. Moreover, the findings reflect the experiences of a specific group of older adults residing in urban areas, which may limit generalizability to rural or culturally distinct populations. The FG methodology may have also introduced social desirability bias, as participants could have tailored their responses to align with perceived expectations. Lastly, the short duration of the intervention constrains insights into long-term adherence and outcomes, highlighting the need for further exploration.

4.2. – Perspectives for future studies

Future studies should aim to assess the long-term impact of similar interventions, including adherence rates, sustained health benefits, and broader implications for cognitive and physical functioning. Expanding the scope to include participants from varied cultural and geographic backgrounds would enhance the generalizability of findings. In addition, incorporating mixed-methods designs could provide a comprehensive understanding of the quantitative outcomes alongside qualitative insights. Exploring the role of environmental and policy-level factors, such as access to green spaces or community infrastructure, could also offer valuable perspectives on promoting physical activity in older populations. Furthermore, future studies may consider including a formal member checking process, allowing participants to review and validate the results in order to increase the accuracy and reliability of the interpretation.

5. Conclusion

The main findings of this study underscore the importance of motivation and routine in fostering adherence to an active lifestyle while identifying key factors that influence older adults' perceptions of health and co-responsibility. Interventions such as the one presented here hold significant promise for promoting healthy aging and enhancing the quality of life for older populations. These initiatives can be extremely important in tackling the issues of an aging society by utilizing the advantages of community-based approaches and removing recognized obstacles. Further research is needed to build upon these findings and ensure.

CRediT authorship contribution statement

Carolina Rego Chaves Dias: Writing – review & editing, Writing – original draft, Visualization, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Saulo Vasconcelos Rocha:** Writing – review & editing, Writing – original draft, Visualization, Resources, Project administration, Methodology, Data curation, Conceptualization. **Milena Fernandez Dias:** Writing – original draft, Visualization, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Bruno Morbeck de Queiroz:** Writing – original draft, Visualization, Software, Formal analysis, Data curation, Conceptualization. **Natália Nascimento Silva:**

Writing – original draft, Visualization, Resources, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Ariani França Conceição:** Writing – original draft, Visualization, Resources, Methodology, Conceptualization. **Bruna Maria Palotino-Ferreira:** Writing – original draft, Visualization, Resources, Methodology, Conceptualization. **Sonia Brito-Costa:** Writing – review & editing, Visualization. **Sofia de Lurdes Rosas da Silva:** Writing – review & editing, Visualization. **Clarice Alves dos Santos:** Writing – original draft, Visualization, Resources, Project administration, Conceptualization. **Lélia Renata Carneiro Vasconcelos:** Writing – original draft, Visualization, Resources, Project administration, Conceptualization. **Guilherme Eustáquio Furtado:** Writing – review & editing, Visualization, Resources, Conceptualization.

Data availability

All data analyzed during this study is included in this published article and its supplementary information files.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmmh.2025.100401.

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