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Methodological alternative for Community Physical Activity teachers in the rehabilitation of adults with neurological sequelae.

Authors: Yanelsy Merino Ruz[1]*, Sandra Banguela Beuvides[2] and Lourdes de Guadalupe Rodríguez Pérez[3]

[1]Bachelor's degree in Physical Culture. Specialist teacher of Community Physical Activity. "Aurelio Janet Torres" Sports Complex. National Institute of Sports, Physical Education and Recreation (INDER). Santa Clara, Villa Clara, Cuba, mail:yanelsymerinoruz@gmail.com; ORCID: https://orcid.org/0009-0000-9901-3060

[2]Bachelor of Science in Physical Culture. Master of Science. Assistant Professor. Central University "Marta Abreu" of Las Villas. Faculty of Physical Culture. Villa Clara, Cuba, mail: sbanguela@uclv.cu; ORCID: https://orcid.org/0000-0002-1871-2570

[3]Doctor of Science in Pedagogical Sciences. Full Professor, Central University "Marta Abreu" of Las Villas. Faculty of Physical Culture. Villa Clara, Cuba, mail: lorperez@uclv.edu.cu; ORCID: https://orcid.org/0000-0003-1417-8064

** Corresponding author: yanelsymerinoruz@gmail.com*

Abstract

This study designs a methodological alternative for the continuous pedagogical training of Community Physical Activity (CPA) teachers in the rehabilitation of adults with stroke sequelae using the biosaludable gym at the Aurelio Janet Sports Complex in Santa Clara, Cuba. Adopting a socio-critical paradigm and a mixed-methods approach, the needs of 10 teachers were diagnosed through surveys, interviews, observations and documentary analysis. Results revealed

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significant deficiencies in the cognitive, methodological and especially biosaludable-safety dimensions (70 % at a very low level), with favorable attitudes. Based on these findings, a four-component structured alternative was elaborated: teacher training and education (six theoretical-practical modules), patient functional assessment and diagnosis, physical intervention in the biosaludable gym (60-minute sessions), and family/caregiver work. The assessment by 12 specialists was with the criteria of “Very adequate” and “Adequate” ratings across all indicators (relevance, coherence, feasibility, novelty, impact and generalizability), confirming that the proposal is a viable and pertinent tool to enhance professional training and the quality of life of adults with neurological sequelae in Cuban community settings

Keywords: *continuous pedagogical training; Community Physical Activity; stroke; biosaludable gym; neurorehabilitation*

Introduction

Disability is one of the highest public health challenges globally. According to the World Health Organization (WHO, 2023), more than 1.3 billion people worldwide live with some form of significant disability. Among the most relevant causes are neurological conditions, which represent the leading cause of ill health and disability worldwide (The Lancet Neurology, 2024).

Stroke, also known as a cerebral hemorrhage, is a major health concern. It is the second leading cause of death and the leading cause of long-term disability in adults worldwide (World Stroke Organization, 2022). Each year, approximately 15 million people worldwide suffer a stroke, of whom about 5 million die and 30% are left with permanent disability.

In Cuba, cerebrovascular diseases consistently rank among the top three causes of death and are the leading cause of disability in adults. In 2023, an estimated 30,000 new cases of stroke were reported, with a mortality rate of approximately 25-26%. The most frequent sequela is hemiplegia or hemiparesis, characterized by paralysis or muscle weakness on one side of the body, accompanied by spasticity, balance problems, ataxia, and cognitive deficits, resulting in functional dependence and a significant burden on families and the healthcare system.

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Neurological rehabilitation following a stroke is based on brain neuroplasticity. However, the chronic phase is often interrupted upon hospital discharge due to limited resources and continuous access to specialized therapies. This is where Community Physical Activity (CPA) becomes relevant, a strategic component of the National Health System and the National Institute of Sports, Physical Education, and Recreation (INDER). Among its programs, the bio-healthy gyms stand out—public spaces equipped with mechanical devices that allow the practice of kinesiotherapy and mechanotherapy outdoors.

At the Aurelio Janet Sports Complex in Santa Clara, it was found that physical activity instructors have significant gaps in their knowledge of specific neurological conditions, safe prescription of adapted exercise, risk management, and adaptation of bio-healthy equipment to the sequelae of stroke. This situation leads to empirical or superficial interventions that limit therapeutic benefit and can expose patients to unnecessary risks.

The scientific problem is formulated as follows: How to contribute to the continuous pedagogical training of Community Physical Activity teachers for the physical rehabilitation of adults convalescing from strokes (CVA) in the biosaludable gym of the Aurelio Janet Sports Complex?

The overall objective is to design a methodological alternative for the continuous pedagogical training of Community Physical Activity teachers in the physical rehabilitation of adults convalescent from stroke in the biosaludable gymnasium of the Aurelio Janet Sports Complex.

Methodology

The study was framed within a socio-critical paradigm and a mixed-research approach, with e quantitave predominance. An applied research design was used, of a quasi-experimental pretest-posttest type in a single group.

Population and sample.

Two populations were worked: the first made up by the 10 Community Physical Activity teachers of the Aurelio Janet Sports Complex (graduates in Physical Activity and Sports Sciences, with more than three years of experience and access to bio-healthy spaces); the second,

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made up by12 specialists with more than 10 years of professional experience in Physical Culture, neurological rehabilitation, Community Physical Activity and Public Health (three of them directors of INDER linked to the AFC).

Methods and techniques.

Theoretical methods (analytical-synthetic, inductive-deductive, historical-logical and systemic-structural-functional), empirical methods (structured survey, semi-structured interview, structured observation, documentary analysis and expert criteria) and statistical methods (descriptive statistics) were used.

The survey diagnosed the level of preparedness in four dimensions: cognitive, methodological, bio-health and safety, and attitudinal, using a Likert scale from 1 (very low) to 5 (very high). Structured observation evaluated methodological performance in indicators such as selection of functional exercises, suitability to the functional level, load dosage, postural control, technical correction, safety measures, communication, and session organization (scale: Adequate / Moderately Adequate / Inadequate).

Research Stages.

Stage I (Diagnosis): characterization of the initial state of teacher preparation.

Stage II (Design): elaboration of the methodological alternative based on the bio-healthy approach.

Stage III (Evaluation): assessment of effectiveness using expert criteria. Validity was ensured through triangulation of methods, techniques, and instruments.

Results and discussion

Diagnosis Needs

The documentary analysis of the Methodological Indications for the 2025-2026 Course of the Functional Department of Community Physical Activity and the guidelines for Bio-healthy gyms showed that, although they create the regulatory space to attend to this population, they lack

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technical specificity (they do not detail exercises, intensities, contraindications or specific progressions for neurological rehabilitation).

The results of the survey applied to the 10 teachers are summarized in Table 1.

Table 1. Percentage distribution of teachers according to level of preparation by dimensions

Level	Cognitive (%)	Methodological (%)	Bio-health and safety (%)	Attitudinal (%)
Very low	30.0	30.0	70.0	0.0
Low	20.0	30.0	20.0	0.0
Half	30.0	30.0	10.0	100.0
High	20.0	10.0	0.0	0.0
Very high	0.0	0.0	0.0	0.0

Note. Prepared by the author based on the results of the survey (n = 10).

The bio-health and safety dimension was the most compromised (70% at a very low level). The cognitive dimension showed fragmented knowledge. The methodological dimension presented deficiencies in planning and pacing. In contrast, the attitudinal dimension placed 100% of the teachers at the medium level, reflecting a positive disposition.

Observation of 10 activities confirmed these findings (Table 2). A moderately adequate level predominated in most indicators. The best-rated was communication and interpersonal skills (six adequate activities). Difficulties persisted in the selection of functional exercises and in the application of safety measures.

Table 2. Results of the structured observation of the activities (n = 10)

Indicator	Appropriate	Moderately adequate	Inappropriate
Selection of functional exercises	4	4	2
Suitability to the functional level	3	4	3
Load dosage	3	4	3
Postural control and balance	4	5	1
Technical correction	3	4	3
Implementation of security measures	3	4	3
Communication and human interaction	6	4	0
Session organization	4	4	2

Note: Prepared by the author based on the observation guide.

The semi-structured interview profound into the experiences gained using the bio-healthy exercise equipment. Six out of ten professors (60%) reported using it in the care of patients with other pathologies and indicated satisfactory results in their progress. However, they also discussed the difficulties they face when working with patients with neurological sequelae, including: mobilization and gait, complexities of clinical diagnosis, systematic care, and

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insufficient preparation to undertake the task safely. The professors requested training on the characteristics of different types of stroke and their sequelae, as well as on methodological elements for planning and conducting therapy sessions.

Proposed methodological alternative

Based on the diagnosis, a methodological alternative was designed, structured in four interrelated components:

Component 1. Teacher Training and Development. Objective: To prepare teachers with the necessary theoretical, methodological, and practical foundations. It is structured in six modules (44 total hours): (1) Neurological Foundations (8 hours); (2) Functional Assessment (6 hours); (3) Exercise Methodology in Bio-Healthy Environments (12 hours); (4) Safety and First Aid (4 hours); (5) Communication and Motivation (4 hours); (6) Supervised Practice (10 hours). Methodology: Theoretical and practical workshops, case studies, demonstrations, on-site supervision, and support materials.

Component 2. Functional Evaluation and Diagnosis. Objective: To characterize the patient in order to establish a baseline, identify risks, and define individualized goals. This includes an initial interview (stroke history, comorbidities, medication, expectations) and the application of adapted tests: 6-minute walk test, 10-meter walk test, abbreviated Berg Balance Scale, MRC Strength Scale, Barthel Index, and fall risk assessment. Data is recorded on an individual chart with reassessments every 4–6 weeks.

Component 3. Physical Intervention in the Bio-Healthy Area. Objective: to implement an adapted and progressive exercise program. Principles: individualization, progression, safety, functionality, variety, and active participation. Typical 60-minute session: warm-up (10-12 min), main phase in a circuit of bio-healthy machines (30-35 min), cool-down (8-10 min), and closing (5 min). Specific recommendations are considered according to the type of sequela (hemiparesis, spasticity, ataxia, balance problems, and cognitive deficits).

Component 4. Working with the family and caregiver. Objective: To empower the primary caregiver to support the process, ensure safety at home, and promote continuity of care. Content:

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Basic information about stroke, safe transfer techniques, basic home exercises, warning signs, and emotional support. Format: Group workshops (two two-hour sessions).

Assessment by expert criteria

The 12 specialists (three PhDs in Physical Culture Sciences, six Master's degree holders, and three graduates, all with over 20 years of experience) assessed the indicators of relevance, clarity and comprehensibility of the actions, internal coherence, feasibility of application, scientific novelty, potential impact, and generalizability. The categories of "Very appropriate" and "Appropriate" predominated across all indicators. The main suggestions (incorporating practical session examples, increasing educational materials, and establishing systematic links with medical personnel) were included in the final version.

Discussion

The diagnostic results align with the findings of Taro (2019), Gutiérrez-Sosa (2021), and Plutin (2025), who indicated that AFC teachers require specific training to address chronic hemiplegia/hemiparesis, as the national program does not provide sufficiently detailed methodological guidelines for this population. Current training is often inadequate in neurofunctional and safety aspects.

A positive attitudinal dimension is a valuable starting point. As Aravind et al. (2023) and Pasztor et al. (2025) point out, motivation and social support directly influence adherence and functional outcomes. Transforming this disposition into actual professional competence is the central purpose of the proposed alternative.

The foundations of this alternative are based on neuroplasticity (Pollock et al., 2014; Eng, 2019) and on evidence that task-oriented high-intensity training is effective even in the chronic phase (Veerbeek et al., 2014; Kang et al., 2025). Bio-healthy gyms, when used correctly, offer an accessible, low-cost setting with high therapeutic potential (Arrué, 2019; Ceballo, 2018).

The four-component structure allows for a comprehensive approach to teacher training, patient diagnosis, safe intervention, and continuity of care at home. This approach aligns with

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healthcare-community partnership models that have demonstrated greater credibility, safety, and adherence (Aravind et al., 2023; Zhang et al., 2025).

The favorable assessment by specialists confirms the relevance, coherence, viability and novelty of the proposal in the Cuban context, where the discontinuity between hospital rehabilitation and community care constitutes a critical gap (Carbajal et al., 2020).

Conclusions

1. The theoretical and methodological foundations analyzed demonstrate that the continuous pedagogical training of AFC teachers must be permanent, contextualized and reflective, and integrate specific competencies in basic neurology, safe exercise prescription, risk management and adaptation of bio-healthy equipment.

2. The diagnosis revealed significant deficiencies, especially in the bio-health and safety dimension (70% at a very low level), followed by the cognitive and methodological dimensions, although with a favorable attitude that constitutes a positive starting point.

3. The methodological alternative, structured in four interrelated components (teacher training, functional assessment, intervention in the bio-healthy environment and work with the family), responds systematically to the identified needs.

4. The specialists' assessment confirmed the relevance, clarity and understanding of the actions, internal coherence, feasibility of application, scientific novelty, potential impact and possibility of generalization, awarding categories of "Very suitable" and "Suitable" to all the indicators evaluated.

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