

# Adapted pedagogical strategies in inclusive physical education for students with special educational needs: a systematic review

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## Abstract

**Background and Study Aim** Adapted physical activity (APA) and inclusive physical education (IPE) strategies aim to enhance the inclusion of students with special educational needs (SEN). These approaches are essential for ensuring equitable and active participation in physical education classes. This study examines the impact of adapted pedagogical strategies in physical education for students with SEN, identifying key factors that promote their inclusion, engagement, and physical development.

**Material and Methods** A systematic review was conducted using academic databases (Scopus, Web of Science, ERIC) to collect empirical studies published between 2000 and 2024. The eligibility criteria included experimental, observational, and qualitative studies evaluating adapted teaching strategies in physical education.

**Results** The findings indicate that adapting physical activities, implementing inclusive pedagogical models, and utilizing specific teaching resources are essential for fostering inclusion. Approaches such as co-teaching and peer tutoring have been particularly effective in enhancing student engagement and socialization. However, challenges persist, including inadequate infrastructure and insufficient teacher training.

**Conclusions** Adapted pedagogical strategies play a critical role in the inclusion and development of students with SEN. Further research and implementation of these strategies are necessary to ensure truly inclusive and equitable physical education for all students.

**Keywords:** educational adaptations, adapted sports, inclusive teaching, inclusive approach, school inclusion.

## Introduction

Research on adapted physical activity (APA) and inclusive pedagogical strategies in physical education (IPE) has been expanding rapidly, with an increasing focus on fostering inclusivity and supporting the holistic development of students with special educational needs (SEN). These approaches are crucial for promoting active and equitable participation in physical education classes while addressing the specific needs of each student.

Recent studies have identified various effective strategies and interventions, particularly emphasizing the adaptation of physical activities [1], the implementation of inclusive teaching models [2,3], and the use of appropriate teaching resources [4]. Inclusive educational practices in APA highlight the importance of differentiated and personalized instruction to meet the diverse needs of students [5]. For instance, adapting physical activities for overweight students has demonstrated positive outcomes in enhancing engagement and promoting equity in the classroom [1].

In addition, teachers' perceptions of the inclusion of students with disabilities play a significant role in shaping the strategies adopted

and determining their effectiveness [6]. APA focuses on adapting physical activities to enhance accessibility and provide benefits for individuals with physical, intellectual, or sensory impairments. A recent systematic review has emphasized the importance of regular, structured physical education programs in improving motor, cognitive, and social skills in preschool children [7]. These programs include targeted activities designed to develop fundamental motor skills, which are essential for engaging in more complex physical tasks [8]. Moreover, APA has demonstrated positive effects on participants' mental health, including stress reduction and improved self-esteem [9,10]. APA-based interventions, such as adapted sports, also contribute to the development of social skills and the strengthening of interpersonal relationships, which are essential for the social inclusion of students with SEN [11].

Adapted teaching strategies in IPE are diverse and include collaborative support models, specialized communication methods, activity modifications, and the use of adapted teaching resources [4]. One study identified four key components for the inclusion of students with special educational needs in physical education classes: support models and collaborative work, communication methods and instructional strategies, activity adaptations, and

the use of teaching materials and resources [12]. Co-teaching and peer tutoring have been shown to be effective approaches for fostering inclusion. These models facilitate direct interaction between students with and without disabilities, encouraging mutual learning and socialization [13,14]. The use of both verbal and non-verbal communication, along with demonstrations, is essential for helping students understand and engage in physical activities. Teachers adjust their communication methods to accommodate the specific needs of their students [15]. Modifications to rules, spaces, and materials are also crucial for ensuring full participation. For example, using balls with bells for visually impaired students or adjusting distances and time constraints for students with physical limitations can significantly enhance accessibility [16].

Despite significant advances, several challenges persist, particularly regarding inadequate infrastructure, insufficient in-service teacher training, and limited resources. It is essential to develop educational policies and training programs that enhance inclusion and accessibility in physical education classes [17,18]. Teachers must be equipped with the necessary skills to implement effective teaching strategies and foster an inclusive learning environment that accommodates the needs of all students [19]. Regardless of training, the presence of students with different disabilities in the classroom can lead to feelings of pedagogical incompetence among teachers [20] or, conversely, a sense of confidence based on their prior experience or medical background [21]. Additionally, a well-informed school and family community plays a crucial role in fostering a culture of respect and support for all students [22]. Although inclusive pedagogical strategies in physical education are gaining traction, challenges remain in their effectiveness, implementation, and adaptation to the specific needs of students with special educational needs (SEN). This often results in varying levels of participation in physical and sports activities [23].

Numerous studies have identified various pedagogical approaches that contribute to the inclusion of students with special educational needs in physical education. Research has demonstrated that adapted teaching strategies, such as co-teaching, peer tutoring, and the modification of activities, significantly enhance student engagement, socialization, and overall participation. However, challenges remain, particularly in ensuring the effective implementation of these strategies, addressing infrastructure limitations, and providing adequate teacher training. The diversity of disabilities further complicates the development of universally applicable methods, highlighting the need for a more structured and evidence-based approach to inclusive physical education.

Given these findings, this study aims to systematically analyze the impact of inclusive pedagogical strategies in physical education for students with special educational needs, identifying best practices while also examining existing obstacles to formulate recommendations for truly effective and equitable inclusion.

## Methodology

### *Information sources*

Relevant literature for this systematic review was retrieved from three major academic databases: Scopus (n = 102), Web of Science (n = 112), and ERIC (n = 30). These databases were selected for their extensive coverage of peer-reviewed research in education, physical activity, and health sciences. The search included randomized controlled trials, quasi-experimental studies, observational studies, and qualitative research focusing on adapted pedagogical strategies in inclusive physical education.

### *Search strategy*

The search strategy for this systematic review was designed using a combination of carefully selected keywords and Boolean operators to maximize the relevance of retrieved studies. The search focused on studies addressing the inclusion of students with special educational needs in school-based physical education activities. The following keyword combinations were used:

- (“Adapted Physical Activity” OR “Inclusive Physical Education” OR “Physical Education and Disabilities” OR “Adapted Sports” OR “Para-sports” OR “Disability Inclusion in Physical Education” OR “Co-teaching in Physical Education” OR “Physical Fitness in Disability” OR “Disability and Physical Activity” OR “School Adaptation in Physical Education” OR “Adapted Physical Activity Intervention” OR “Disabilities and Sports Participation” OR “Inclusive Teaching Strategies” OR “Physical Education and Intellectual Disability” OR “Visually Impaired Students in Physical Education” OR “Hearing Impaired Students in Physical Education” OR “Disability Rehabilitation in Physical Education” OR “Social Acceptance and Inclusion in PE” OR “Boccia in Physical Education” OR “Wheelchair Basketball in Physical Education”)
- AND (“Disabilities” OR “Intellectual Disability” OR “Physical Disability” OR “Sensory Impairment” OR “Health Impairments” OR “Developmental Disabilities” OR “Special Needs” OR “Educational Intervention” OR “Physical Fitness” OR “Physical Activity” OR “Health-related Physical Fitness” OR “Sport Rehabilitation” OR “Peer Tutoring” OR “Physical Education Teachers” OR “Special Education”)

- AND (“Inclusion” OR “Participation” OR “Cooperative Teaching” OR “Co-teaching” OR “School Inclusion” OR “Barriers to Physical Activity” OR “Inclusive Curriculum” OR “Adaptation in PE” OR “Inclusive Pedagogies” OR “Attitude Change” OR “Social Inclusion”)
- AND (“Randomized Controlled Trial” OR “Case Study” OR “Survey” OR “Intervention Study” OR “Qualitative Study” OR “Mixed Methods Study” OR “Cross-sectional Study”).

To refine the results, searches were restricted to peer-reviewed articles published between 2000 and 2024 in English and Spanish. Additional filters were applied to include only empirical studies, such as randomized controlled trials, intervention studies, and qualitative research.

#### *Eligibility criteria*

The inclusion criteria for this systematic review were defined to ensure the selection of studies that provide empirical evidence on adapted teaching strategies in physical education for students with special educational needs, including motor, psychological, intellectual, and sensory disabilities, as well as disabling illnesses.

Studies were eligible for inclusion if they met the following criteria:

1. Study focus: Evaluated adapted pedagogical strategies in inclusive physical education.
2. Study design: Included randomized controlled trials, quasi-experimental studies, observational studies, or qualitative research.
3. Outcome measures: Reported data on student participation, physical fitness, social inclusion, or the impact of interventions on student development.
4. Sample size: Included a minimum of X participants (to be specified based on methodological standards).
5. Publication type: Published in peer-reviewed academic journals.
6. Language and time frame: Published in English or Spanish between 2000 and 2024.

The following exclusion criteria were applied:

- Non-peer-reviewed studies, including conference abstracts, dissertations, and reports.
- Studies that did not explicitly assess the impact of adapted teaching strategies in physical education.
- Medical or rehabilitation-focused studies that did not involve an educational context.
- Theoretical papers or reviews without empirical data.

#### *Data extraction*

Data extraction in this systematic review follows a structured and standardized approach to ensure consistency and accuracy. The following key information will be extracted from each included study:

1. Study identification: Full reference details (author, year, journal).
2. Study design: Type of study (randomized controlled trial, quasi-experimental study, observational study, qualitative research).
3. Study population:
  - Type of disability (motor, psychological, intellectual, sensory, or disabling illness).
  - Age of participants.
4. Intervention details: Description of the adapted pedagogical strategy used in inclusive physical education.
5. Outcome measures:
  - Student participation in physical education.
  - Changes in physical performance.
  - Levels of social inclusion.
  - Student and teacher attitudes toward inclusive education.

A standardized data extraction form will be used to ensure uniformity and minimize errors.

#### *Assessment of study methodology*

The methodological quality of the selected studies is assessed using standardized evaluation tools to ensure the reliability of this systematic review. Different study designs are evaluated using appropriate frameworks:

1. Randomized controlled trials (RCTs) are assessed using the Cochrane Risk of Bias Tool, which identifies potential biases at different stages, including participant selection, intervention allocation, blinding procedures, and outcome reporting.
2. Observational studies are evaluated using the Newcastle-Ottawa Scale (NOS), which assesses methodological quality based on participant selection, group comparability, and outcome assessment.
3. Qualitative studies are analyzed using the Critical Appraisal Skills Programme (CASP), which examines study design, data collection methods, researcher reflexivity, and credibility of findings.

Each included study undergoes a structured evaluation process to determine its methodological rigor and risk of bias.

## **Results**

The results of this section are structured around three main areas of analysis. Firstly, the identification of studies via academic databases is highlighted, along with the process of searching for and selecting relevant work. Secondly, the socio-demographic characteristics of the studies are examined, with sample profiles such as age, gender and geographical location being analysed. Finally, a synthesis of the studies is provided, analysing their objectives, the methodologies employed and the main results obtained, thus offering an overview of

the scientific and significant contributions.

*Identification and selection of studies*

The study selection process is summarized in Figure 1, illustrating the identification, screening, and final inclusion of studies in this systematic review. As shown in Figure 1, after removing duplicates from the 244 studies initially retrieved from Scopus, Web of Science, and ERIC, a total of 224 unique records remained. The initial screening process excluded 150 records, followed by an eligibility assessment of 74 reports, of which 47 were eliminated for various reasons. Ultimately, 27 studies met the inclusion criteria and were selected for this systematic review, ensuring methodological rigor and relevance.

Table 1 presents a summary of the included studies, outlining key characteristics such as authors, year of publication, original article title, country, participant demographics, sport practiced, type of disability studied, measured variables, participants' grade level, and study quality assessment.

Table 2 provides a synthesis of the studies included in the systematic review, detailing

their objectives, methodologies, intervention or adaptation strategies, key findings, conclusions, and recommendations. Additionally, it highlights the added value of each study in contributing to the understanding of inclusive pedagogical strategies in physical education.

**Discussion**

The findings of this review highlight a range of inclusive pedagogical strategies that enhance the participation and well-being of students with motor disabilities. These approaches facilitate equitable and meaningful engagement in physical education by addressing both physical and psychosocial well-being. Specifically, the adaptation of didactic equipment and instructional strategies has been shown to improve self-esteem and confidence in students with motor disabilities [24].

An inclusive systemic approach, characterized by active collaboration among teachers, administrative staff, and educational communities, is essential for establishing sustainable and supportive learning environments [32]. Furthermore, the integration of adapted sports, including Paralympic disciplines

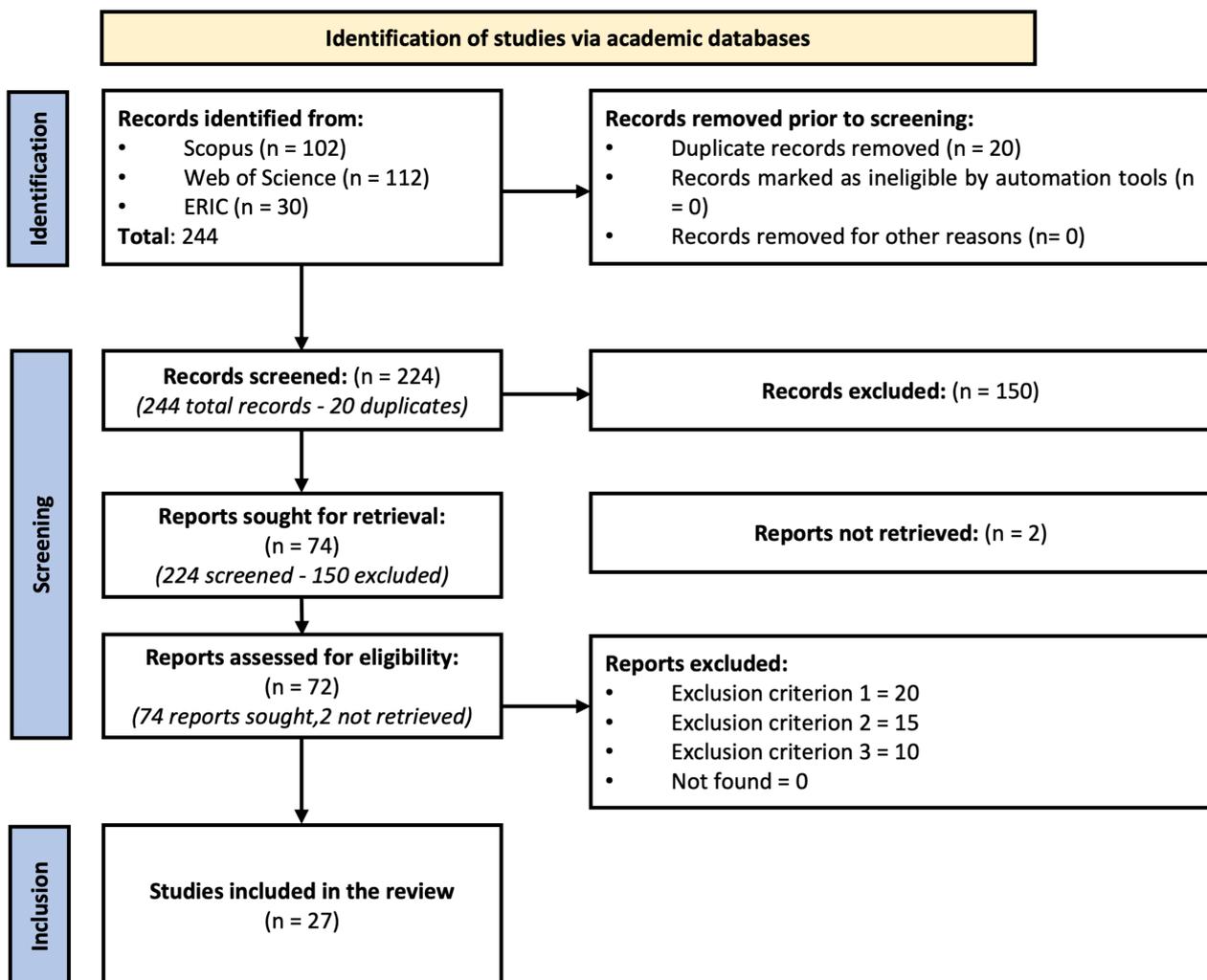


Figure 1. Flowchart of the systematic review

**Table 1.** Socio-demographic characteristics of studies

Reference Number	Title of Article	Country	Participants	Sport Practiced	Type of Disability	Variables Measured	Educational Level	Study Quality
[24]	Adapted Physical Activity: Overcoming Diversity Through Physical Education and Sports	USA, UAE	Mixed disability group (motor, intellectual, sensory)	Inclusive PE programs	Motor	Inclusion index, participation rate, instructional adaptation effectiveness	Not school-based (recreational setting)	Moderate (NOS: 5/9)
[25]	Boccia as an Adapted and Sensitizing Sport in Physical Education in Secondary Education	Spain	28 secondary school students (ages 14–16, mixed gender)	Boccia	Intellectual	Attitudes, values education, skill improvement	Secondary education	High (NOS: 7/9)
[26]	Co-teaching and School Physical Education: Interventions Aimed at the Inclusion of Students with Disabilities	Brazil	3 teachers and their students in public schools	General physical education activities	Intellectual	Collaboration, communication, inclusion outcomes	Middle school	Moderate (NOS: 5/9)
[13]	Co-teaching in Physical Education: A Strategy for Inclusive Practice	USA	High school students with and without disabilities	Physical education activities	Intellectual	Teacher collaboration, student engagement	High school	High (Cochrane RoB: Low risk)
[27]	Does Adapted Physical Activity-Based Rehabilitation Improve Mental and Physical Functioning? A Randomized Trial	Norway	246 adults with chronic disabilities	Rehabilitation exercises	Disabling diseases	Mental and physical functioning, self-efficacy, pain reduction	Not school-based (rehabilitation setting)	High (Cochrane RoB: Low risk)
[28]	Education Intervention Using Para-Sports for Athletes with High Support Needs to Improve Attitudes Towards Students with Disabilities in Physical Education	Spain	88 sixth-grade students (approx. 11 years old)	Boccia and Goalball	Sensory	Attitudes, acceptance of adaptations, inclusiveness	Primary education	High (NOS: 8/9)
[29]	Effectiveness of an Adapted Physical Activity Intervention on Health-Related Physical Fitness in Adolescents with Intellectual Disability: A Randomized Controlled Trial	Hong Kong	57 adolescents (ages 12–18, overweight or obese, mild or moderate ID)	Moderate aerobic and resistance exercises	Intellectual	Cardiorespiratory fitness, flexibility, muscular strength	Secondary education	High (Cochrane RoB: Low risk)
[30]	Evaluation of the Barriers to the Practice of Physical and Sport Activities in Spanish Adolescents	Spain	324 adolescents (ages 12–17, gender-balanced sample)	General physical activities	Psychological	Self-concept, motivation, social support, compatibility with tasks	Secondary education	Moderate (NOS: 6/9)

**Table 1.** Continued.

Reference Number	Title of Article	Country	Participants	Sport Practiced	Type of Disability	Variables Measured	Educational Level	Study Quality
[11]	How to Promote Inclusion in Physical Education Classes? Adaptation as a Path	Brazil	Not applicable (essay-based study)	General physical activities	Motor	Barriers, teaching strategies, adaptation practices	All educational levels	Moderate (CASP: Qualitative assessment)
[31]	Inclusion of Children With Disabilities in Physical Education in Zimbabwean Primary Schools	Zimbabwe	24 teachers, primary school level	General physical activities	Disabling Diseases	Teacher practices, social relationships, adapted instruction	Primary	High
[32]	Inclusion of Students With Disabilities in Physical Education: The Crossroads of Systemic Coherence	Chile	135 students observed in 3 schools	General physical activities	Motor	Teacher training, infrastructure, community involvement	Elementary and middle school	High (NOS: 8/9)
[33]	Inclusion of Students With Physical Disabilities and Other Health Impairments	USA	Not specified	General physical activities	Motor and disabling diseases	Adaptation strategies, health outcomes	All educational levels	Moderate (NOS: 6/9)
[34]	Influence of Organized vs. Non-Organized Physical Activity on School Adaptation Behavior	Romania	80 adolescents (aged 14, divided into 3 groups)	Organized physical activities	Intellectual and psychological	School behavior, sensorimotor coordination	Secondary education	High (NOS: 7/9)
[35]	Modifying Physical Activities for Maximizing Learning Opportunities	Finland	4 PE teachers, 4 special educators	General physical activities	Sensory and intellectual	Teaching strategies, collaboration outcomes	All educational levels	High (CASP: Qualitative assessment)
[36]	Organizational Basics of Inclusive Education and Training Process for Karate Athletes With Disabilities	Ukraine	10 athletes (aged 14–20)	Karate	Motor	Physical fitness, motor skills	Not school-based (sports training)	Moderate (NOS: 5/9)
[37]	Participation of People Living With Disabilities in Physical Activity: A Global Perspective	Canada	Global population (no specific characteristics detailed)	General physical activities	All (physical, mental, sensory, intellectual)	Physical activity prevalence, cardiovascular fitness, musculoskeletal fitness	Not school-based (global population study)	High (NOS: 9/9)
[16]	Pedagogies for Inclusion of Junior Primary Students With Disabilities in PE	Australia	3 primary school PE teachers, junior primary students	General physical activities	Motor	Teacher attitudes, pedagogical practices, environmental modifications	Primary education	Moderate (NOS: 6/9)

Table 1. Continued.

Reference Number	Title of Article	Country	Participants	Sport Practiced	Type of Disability	Variables Measured	Educational Level	Study Quality
[14]	Peer Tutoring: Meeting the Demands of Inclusion in Physical Education Today	USA	Not specified	General physical activities	Intellectual	Learning outcomes, social inclusion	All educational levels	High (NOS: 8/9)
[38]	Promoting Social Acceptance and Inclusion in Physical Education	USA	Not specified	General physical activities	Psychological	Social interactions, teacher strategies	Middle school	High (NOS: 7/9)
[39]	School Physical Education and Disabled Students: What About Paralympic Sports?	Brazil, Portugal	1 disabled student, 44 non-disabled students, 1 teacher	Paralympic sports	Motor	Identity recognition, disability awareness	High school	Moderate (NOS: 6/9)
[40]	Students' Perspectives on Wheelchair Basketball in Mainstream and Special Schools	Germany	19 students (10 boys, 9 girls, ages 13–16)	Wheelchair basketball	Motor	Social inclusion, enjoyment, perceived challenges	Secondary education	Moderate (NOS: 6/9)
[15]	Successful Strategies for the Inclusion of Visually Impaired Students in Physical Education Classes	Brazil	1 PE teacher, 2 visually impaired students (1 boy, 1 girl)	General physical education	Sensory	Teaching strategies, guidance, and safety	Primary education (grades 1–5)	High (NOS: 7/9)
[41]	Learning Strategies and Inclusion of Students With Low Vision in Physical Education Classes	Brazil	2 students, 2 teachers	General physical education	Sensory	Strategy usage, inclusion indicators	Elementary education	Moderate (NOS: 6/9)
[22]	Strategies for Teaching Visually Impaired Students: The Curriculum Proposal of São Paulo State	Brazil	Not specified	General physical education	Sensory	Strategy effectiveness, resource adaptations	Secondary education	Moderate (NOS: 6/9)
[42]	The Impact of Adapted Physical Education on Physical Fitness of Students With Intellectual Disabilities: A Three-Year Study	Taiwan	44 students (average age: 15.9), mild to severe ID	Adapted physical education (varied activities)	Intellectual	BMI, muscular strength, endurance, flexibility, cardiovascular fitness	Secondary education	High (NOS: 8/9)
[9]	Young Para-Athletes Display More Hedonic Well-Being Than People With Disabilities Not Taking Part in Competitive Sports	Multi-country (Europe)	1,208 participants (58.4% male, average age ~17, 70.5% para-athletes)	Various para-sports (Para-athletics, Para-swimming, Wheelchair basketball, etc.)	Psychological	Hedonic well-being, life satisfaction, anxiety, vitality	Not school-based (competitive sports setting)	High (NOS: 9/9)

**Table 2.** Synthesis of the Studies: Objectives, Methodologies and Key Results

Reference Number	Objective	Methodology	Intervention / Adaptation Strategy	Key Results	Conclusion / Recommendations	Added Value of This Study
[24]	Exploring strategies to include physical activity among individuals with special needs in inclusive environments.	Qualitative	Instructional modifications, adaptive equipment	The APA is an effective method for improving both physical and psychosocial well-being. It enhances pride in physical achievements, body image, and self-confidence. Inclusive environments and adapted equipment facilitate participation for individuals with disabilities.	Pedagogical modifications and open approaches are essential to promote inclusion and equal participation for all.	Highlights practical adaptations for inclusiveness.
[25]	Evaluate the impact of Boccia on attitudes toward disabilities in secondary education.	Quantitative	Boccia sessions and inclusive tournaments	A significant improvement in students' attitudes toward disability was observed after participating in Boccia activities. Most students perceived Boccia as a sensitizing sport rather than a tool for motor skill development.	Boccia fosters inclusion but requires broader promotion.	Highlights the role of adapted sports in inclusive education.
[26]	Analyze the feasibility of co-teaching strategies to support inclusion.	Qualitative	Co-teaching practices	Collaborative teaching methodologies effectively promote the inclusion of students with disabilities in mainstream education. Key factors for success include effective communication, joint lesson planning, and shared instructional responsibilities.	Co-teaching is feasible but requires structured planning.	Provides a model for collaborative teaching in inclusive settings.
[13]	Explore co-teaching roles to support inclusion.	Qualitative	Co-teaching framework	Co-teaching fosters an inclusive classroom culture by addressing students' individual needs and capabilities. Success depends on mutual trust and respect between teachers. Positive peer relationships play a fundamental role in learning and contribute to knowledge acquisition.	Emphasizes collaborative teaching as a strategy for inclusion.	Highlights the benefits of co-teaching in inclusive PE.
[27]	Evaluate the effects of adapted physical activity-based rehabilitation.	Quantitative (Randomized Controlled Trial)	4-week APA rehabilitation program	APA-based rehabilitation significantly improves physical and mental functioning. Increased self-efficacy and motivation contribute to these improvements, while pain and fatigue levels also decrease.	Promotes APA as an effective rehabilitation strategy.	Provides evidence-based support for APA in rehabilitation.
[28]	Evaluate the impact of para-sports awareness programs on attitudes toward disabilities.	Quantitative	Para-sports awareness program, including multimedia and simulation exercises	Significant improvement in attitudes toward disability, particularly in the acceptance of adaptations in sports practice. These positive attitudes remained stable five weeks after program completion.	Para-sports awareness programs effectively improve attitudes toward disabilities.	Highlights para-sports as tools for inclusiveness in primary education.

Table 2. Continued.

Reference Number	Objective	Methodology	Intervention / Adaptation Strategy	Key Results	Conclusion / Recommendations	Added Value of This Study
[29]	Assess the impact of a 9-month adapted physical activity program on physical fitness.	Quantitative (RCT)	Structured aerobic and resistance training sessions	Significant improvements in cardiorespiratory fitness and flexibility. No significant changes in muscular strength and endurance. The intervention group showed a mean increase of 413.6 meters in the 9-minute run/walk test compared to the control group.	Supports the implementation of extended APA programs to enhance fitness and well-being.	Provides a framework for long-term fitness programs for adolescents with ID.
[30]	Identify perceived barriers to physical activity among adolescents.	Quantitative	Questionnaire-based study on barriers	Significant gender differences in self-perception and motivation, with girls reporting lower levels than boys. Older students (ages 15–16) exhibited higher self-perception, motivation, and social support. No significant gender- or age-based differences were found regarding task incompatibility.	Highlights the need for targeted interventions based on gender and age.	Explores psychosocial barriers to sports participation.
[11]	Discuss adaptations to promote inclusion in PE.	Qualitative	Adaptations in curriculum, environment, and teaching strategies	A comprehensive approach is necessary to create an inclusive educational environment. Adaptations should be implemented across multiple areas, including curriculum, learning tasks, teaching strategies, assessment methods, and communication.	Encourages teacher training and curriculum reforms.	Proposes practical adaptation frameworks for inclusive PE.
[31]	Explore inclusive practices in PE for children with disabilities.	Qualitative	Teacher interviews, document analysis, non-participant observations	The key practices identified include a comprehensive understanding of the children, the fostering of positive teacher-student and student-student relationships, the provision of support for collaborative structures, and the adaptation of instruction. Teachers demonstrated a positive attitude towards inclusion, despite the challenges presented by factors such as class size and the lack of specialist support.	Stresses the need for capacity building and policy support.	Baseline for future studies on inclusive practices.
[32]	Understand the systemic coherence needed for inclusive practices in PE.	Qualitative (Case Studies)	Collaborative community efforts, curriculum flexibility	Inclusive strategies must align with the specific educational context. Key factors include teacher commitment, collaboration between educators and school management, effective communication within the educational community and governmental levels, proper resource allocation, and the role of teachers as primary agents for inclusive learning.	Emphasizes the need for teacher training and resource allocation for inclusivity.	Illustrates the systemic requirements for implementing inclusive education.

**Table 2.** Continued.

Reference Number	Objective	Methodology	Intervention / Adaptation Strategy	Key Results	Conclusion / Recommendations	Added Value of This Study
[33]	Identify strategies to include students with physical disabilities in PE.	Qualitative	Adapting physical activities to students' needs	Successful inclusion depends on three key factors: well-trained educators, supportive environments, and collaboration among professionals. The use of authentic assessment methods and continuous adaptation of teaching strategies is essential in addressing students' unique needs.	Promotes individualized adaptations in PE.	Provides detailed, disability-specific strategies for inclusive physical education.
[34]	Compare the effects of organized and non-organized PA on school behavior.	Quantitative	Organized after-school programs	Organized physical activity, supervised by a trainer, significantly improves school inclusion, motor skills, and psychological well-being. Adolescents engaged in structured PA exhibit lower levels of psychoticism, neuroticism, and school-related anxiety compared to those in non-organized or no physical activities.	Advocates structured PA as a means to support students with disabilities.	First study to compare the effects of organized vs. non-organized PA on school behavior.
[35]	Explore inclusive strategies in PE from educators' perspectives.	Qualitative (Case Studies)	Modifying activities, collaboration frameworks	PE and special educators demonstrated a willingness to adapt rules, equipment, and the environment to support inclusive practices. However, traditional independent roles among these educators often hinder collaboration. The study highlights the need for cooperative structures and a shared vision of inclusive teaching to effectively address diversity in PE.	Supports collaborative strategies for inclusive PE.	Introduces the TREE model as a framework for inclusive strategies.
[36]	Evaluate the impact of inclusive karate programs on physical development.	Quantitative	Inclusive karate training program	The inclusive karate training program significantly improved the physical abilities of athletes with disabilities. Key improvements included a 73.1% increase in flexibility (Sit and Reach Test), 2.3% increase in power (Standing Long Jump), and 33.4% enhancement in strength endurance (Abdominal Crunches). However, speed (60-meter run) remained unchanged.	Inclusive sports programs effectively enhance physical development in athletes with disabilities.	Highlights martial arts as a means of inclusion in adapted physical activity.
[37]	Provide an overview of the benefits and policies promoting physical activity among people living with disabilities.	Meta-Analysis	Policy-driven promotion of physical activity	People living with disabilities (PLWD) are 16-62% less likely to meet physical activity guidelines and face higher risks of inactivity-related health conditions. Physical activity significantly benefits cardiovascular and musculoskeletal fitness, reduces cardiometabolic risk factors, and improves mental health.	Advocates for stronger global policies to promote inclusion in physical activity.	Establishes a global context for physical activity disparities among people with disabilities.

Table 2. Continued.

Reference Number	Objective	Methodology	Intervention / Adaptation Strategy	Key Results	Conclusion / Recommendations	Added Value of This Study
[38]	Discuss strategies to improve social acceptance in inclusive PE.	Qualitative	Social inclusion strategies, teacher modeling	Effective inclusive practices in PE require understanding students' needs, building support networks, and incorporating modifications and accommodations. Teachers should model positive attitudes, create supportive learning environments, and use peer tutoring to enhance social interactions. These strategies foster social acceptance and inclusion, enabling students to succeed physically, cognitively, and socially.	Highlights the importance of teacher training and modeling for social inclusion.	Focuses on the social aspects of inclusion in PE.
[39]	Investigate the role of Paralympic sports in PE as a tool for inclusion.	Qualitative	Integration of Paralympic sports into the curriculum	A 5-week Paralympic sports uniting PE allowed a disabled student to express their identity and challenge normative PE practices. The unit raised disability awareness among non-disabled students but was often viewed as an awareness strategy rather than a fundamental right for disabled students. Integrating Paralympic sports fosters equity and disability identity recognition.	Encourages broader integration of Paralympic sports in PE curricula.	Links sports participation to disability identity recognition.
[11]	Analyze strategies used by PE teachers for students with hearing impairment.	Qualitative	Peer tutoring, communication aids	The study identified five key strategies for including students with hearing impairments in PE: Prior Strategies, Aid Strategies through a Peer Tutor, Strategies for Teaching the Activity, Strategies Arising from Student Response or Action, and Strategies for Communication. These approaches enhanced teaching effectiveness, student functionality, and respect for individual characteristics and needs.	Promotes the use of multiple strategies to support inclusive education.	Provides a specific focus on hearing impairments in PE settings.
[40]	Explore student perspectives on wheelchair basketball.	Qualitative	Inclusive basketball curriculum	Mainstream school students viewed wheelchair basketball positively but perceived sitting in a wheelchair as a limitation. Special school students had a more positive outlook on wheelchair use. The study highlights wheelchair basketball's potential to foster inclusion and understanding, though special school students face barriers to joining wheelchair basketball clubs.	Encourages the use of wheelchair sports as a tool for inclusive education.	Combines perspectives from both mainstream and special school students.

Table 2. Continued.

Reference Number	Objective	Methodology	Intervention / Adaptation Strategy	Key Results	Conclusion / Recommendations	Added Value of This Study
[15]	Identify and describe successful strategies for school inclusion of visually impaired students.	Qualitative-descriptive	Specific physical activities, educational adaptations, physical assistance, feedback	The study identified 22 successful strategies for including students with visual impairments in PE classes, categorized into five types: Previous Strategies, Strategies for Teaching the Activity, Strategies for Guidance and Mobility, Strategies Arising from Student Action, and Strategies for Safety. These strategies created favorable conditions for the participation of all students in the same activities.	Strategies have successfully created conditions conducive to the inclusion of students with and without disabilities.	Provides detailed, practical strategies for the inclusion of visually impaired students in PE.
[41]	Investigate teaching strategies for including low-vision students in PE.	Qualitative (Case Study)	Visual aids, modified rules	Both students with visual impairments felt included and actively participated in PE activities. Key strategies used by teachers included verbal instructions, activity demonstrations, rule modifications, and task-based teaching styles. Despite positive attitudes toward inclusion, teachers did not systematically plan strategies and resources.	Supports the structured implementation of strategies for inclusion.	Focuses on low vision as a unique inclusion challenge in PE.
[22]	Plan strategies and adaptations for visually impaired students.	Qualitative	Resource planning, tactile materials	Ten teaching strategies and four new resources were developed to include students with visual impairments in PE classes. Key strategies included verbal instructions, Braille materials, peer tutoring, real object demonstrations, and rule modifications.	Emphasizes the need for resource development to support inclusive education.	Connects theoretical approaches to practical curriculum implementation.
[42]	Examine the effect of APE on fitness and associations over a three-year period.	Quantitative (Longitudinal study)	Structured APE curriculum including Bocce, Basketball, and Track & Field	An adapted physical education (APE) program significantly improved muscular strength, endurance, and cardiovascular fitness in adolescents with intellectual disabilities over three years. However, there was limited success in improving body composition and flexibility.	Encourages tailored long-term fitness programs for adolescents with ID.	Highlights long-term fitness trends among APE participants.
[9]	Compare hedonic well-being of para-athletes and non-athletes with disabilities.	Quantitative (Survey study)	Competitive para-sports participation	Para-athletes exhibited higher well-being across all domains compared to individuals with disabilities not engaged in competitive sports. Those with acquired disabilities reported lower well-being. Participation in wheelchair basketball, para-athletics, and para-swimming was linked to higher well-being, whereas wheelchair rugby was associated with lower well-being.	Advocates for para-sports as a means to enhance well-being in disabled populations.	Provides large-scale evidence on the well-being benefits of para-sports.

such as wheelchair basketball, serves a dual purpose: raising awareness among able-bodied students and providing a platform for self-expression and confidence-building among students with disabilities [39, 40].

To accommodate the diverse educational needs of students, teaching-learning programs must remain flexible, incorporating personalized pedagogical practices and adapted assessment methods. Studies confirm that customized instructional strategies, such as peer tutoring and modified assessment criteria, contribute to more inclusive physical education settings [11, 16, 28].

Trained teachers, safe inclusive environments, collaborative pedagogical practices contribute to a transformative physical education that generates positive individual and collective educational outcomes for students with motor disabilities [33, 36, 37]. Inclusion has progressed through adapted teaching strategies that compensate for physical limitations while ensuring access to physical activity [43]. Studies indicate that assistive technologies, including sports wheelchairs and support devices, facilitate active participation in modified sports [44]. Adapting game rules, using specialized equipment, and implementing targeted modifications have also been effective in enhancing inclusion [45]. An individualized approach that considers the specific abilities of each student is fundamental to fostering meaningful participation [46]. Furthermore, training teachers in differentiated instructional strategies is crucial to ensuring that students with motor disabilities benefit from an inclusive learning environment [20]. Continuous interaction between teachers, students, and parents plays a key role in assessing and adjusting teaching practices, allowing for more effective management of inclusiveness in physical education [47].

The present study has shown that inclusive strategies for sensory disabilities, particularly the implementation of awareness-raising programs using multimedia exercises and simulations, lead to lasting improvements in attitudes toward sensory disabilities and greater acceptance of educational adaptations [28]. While special educators are willing to adapt game rules, sports equipment, and physical activity settings to support inclusion, overcoming the challenges related to their professional independence remains crucial. Establishing collaborative pedagogical structures and fostering a shared vision of inclusive teaching enables a more effective response to pedagogical diversity [35].

Despite the well-documented benefits of physical activity for cardiovascular and mental health, participation remains insufficient among students with sensory disabilities [42]. To address this gap, public policies should actively promote greater engagement in physical education and sports [37]. Additionally, strengthening collaboration between

special educators and physical education teachers is essential for developing effective instructional strategies tailored to the specific needs of these students [48].

For hearing-impaired students, inclusion can be supported through strategies such as peer tutoring and communication aids, which enhance the effectiveness of inclusive teaching [11]. The integration of sign language into physical education instruction has been widely explored as a method for improving accessibility for deaf students [49, 50]. Tactile adaptations and audible signaling devices also play a crucial role in facilitating participation in physical activities for students with hearing impairments [49].

Similarly, visually impaired students benefit from orientation and safety strategies, as well as specific modifications to physical activities [15]. Resources such as Braille didactic materials further support their inclusion in physical education settings [22]. Recent adaptations in inclusive teaching have focused on sensory aids and multimodal instructional supports, integrating both visual and auditory cues to enhance learning [51]. For example, adapting verbal instructions by incorporating pictograms and explanatory videos helps visually impaired students better understand physical activities [52].

Research on the psychological aspects of inclusion in physical education and sports highlights significant differences in self-esteem, motivation, and well-being depending on gender, age, and type of disability [30]. However, no gender- or education-level-based differences were found in task incompatibility. Regarding participation in physical activity, studies indicate that people with disabilities are less likely to meet physical activity recommendations, despite its well-documented benefits for cardiovascular, musculoskeletal, and mental health [37]. Additionally, inclusive strategies in physical education, such as understanding students' needs and establishing support networks, play a key role in fostering social inclusion and acceptance [38]. Finally, para-athletics has been shown to enhance the well-being of adolescent girls with disabilities, particularly when compared to those who do not engage in competitive sports. However, the impact varies by discipline, with wheelchair rugby being associated with lower well-being [9].

Students with psychological disabilities, including behavioral and emotional disorders, benefit from educational approaches that foster a safe and respectful environment [53]. Research indicates that behavior management techniques and strategies for promoting emotional regulation are essential for effective inclusion in physical education [54]. For example, the positive behavioral approach has been shown to encourage student participation in physical activities [55]. Additionally,

relaxation and mindfulness techniques, when integrated into physical education sessions, help reduce anxiety and improve student attention [56, 57]. The implementation of cooperative games and group activities further contributes to enhancing self-esteem and social skills [58]. Creating a trusting and supportive environment, where students feel valued, plays a critical role in fostering their engagement [59]. Finally, the need for individualized strategies to adapt activities to students' emotional and behavioral fluctuations has been emphasized, ensuring their full participation in physical education [46].

The existing literature on the inclusion of students with intellectual disabilities in physical education and sports highlights the benefits of targeted pedagogical interventions across multiple domains, including attitudes and physical abilities [25]. Studies have reported significant improvements in students' attitudes toward disability following participation in boccia activities, emphasizing the sport's role in promoting educational values and equal opportunities [60]. Collaborative teaching methods, such as joint planning and effective communication between teachers, have been shown to enhance the inclusion of students with disabilities in mainstream schools [26]. Research also confirms that co-teaching, based on mutual trust and respect between educators, facilitates inclusion by addressing students' individual needs [13]. Participation in organized physical activities has been linked to improved school inclusion and psychological well-being in adolescents, reducing psychoticism and neuroticism [34]. Additionally, studies emphasize the role of cooperative structures and a shared vision in overcoming barriers to inclusive physical education [35]. Adapted physical education programs have been shown to significantly improve muscle strength, endurance, and cardiovascular fitness in adolescents with intellectual disabilities [42]. However, research indicates that while aerobic and resistance training sessions improve cardiorespiratory health and flexibility, they do not lead to significant gains in muscular strength [29].

A needs-based pedagogical approach enhances satisfaction, motivation, and well-being among students with intellectual disabilities by simplifying instruction while promoting meaningful peer integration [61]. Structured teaching strategies, including simplified motor tasks and the use of clear, repeated instructions, support the successful participation of these students in physical activities [62]. Additionally, students with intellectual disabilities benefit from cooperative learning, peer learning, ability grouping, extended visual aids, and curriculum differentiation, all of which enhance their learning experience and participation in physical education [63]. Further adaptations

include designing low-complexity exercises and gradually increasing difficulty as students' skills develop [64]. To foster social interaction and engagement, adapted physical education programs should incorporate peer-supported physical education and group activities, which have been shown to be effective in improving participation and social integration [65]. Modified team sports and structured group activities are particularly beneficial for students with intellectual disabilities [66]. Moreover, establishing a stable and predictable learning environment enhances students' ability to focus and actively participate in physical activities, making it a critical factor for success [53].

Inclusive strategies in physical education are essential to ensuring the participation of all students, regardless of their disability. Effective inclusive teaching practices rely on a thorough understanding of students' educational needs and the adaptation of learning environments [38]. These strategies involve strong support networks (including psychological, medical, and paramedical resources), learning-friendly environments, and peer tutoring, all of which contribute to enhanced social interaction [39]. Beyond promoting social inclusion, these approaches support academic, social, and professional success for students with disabilities [38]. Furthermore, ongoing adaptation of teaching methods, authentic assessments, and interdisciplinary collaboration allow educators to meet the specific educational and medical needs of students [33]. Co-teaching has also been identified as a key pedagogical approach in fostering an inclusive classroom culture [13, 26]. By combining the expertise of multiple educators, co-teaching enables greater personalization of instruction, accommodating the diverse learning needs of students [13, 26]. Finally, studies have demonstrated that adapted sports activities, such as Boccia, foster positive shifts in students' attitudes toward disability, reinforcing values of equality and inclusion [60].

Inclusive physical education requires adapted teaching strategies for students with disabling illnesses. Research indicates that assistive technologies, such as wearable health devices, enhance physical activity levels by providing real-time data, improving chronic disease management, and promoting treatment compliance [67]. These technologies offer instant access to accurate health information, enabling students to take an active role in their treatment, which contributes to better fitness and overall well-being [67]. Another essential strategy is the adaptation of learning environments, including modifications to sports equipment, which facilitate the participation of students with disabling illnesses in physical activities [16]. Additionally, differentiated pedagogical approaches, incorporating individualized adjustments to

physical activity programs, have been shown to increase student engagement [46]. Beyond physical modifications, psychological support from teachers and peers, along with accessible sports facilities, plays a significant role in boosting confidence and motivation among students with disabling illnesses, encouraging their sustained participation in physical exercise [68]. Finally, studies emphasize that teacher training on how to support students with special needs is a critical factor in ensuring the success of inclusive strategies [20].

The findings of this review emphasize the critical role of adapted pedagogical strategies in fostering inclusive and equitable physical education for students with special educational needs. While various approaches, such as co-teaching, peer tutoring, assistive technologies, and differentiated instruction, have demonstrated positive impacts on student engagement, physical development, and social inclusion, persistent challenges remain. Infrastructure limitations, gaps in teacher training, and disparities in resource availability continue to hinder the full implementation of inclusive practices. Addressing these challenges requires a multifaceted approach, combining policy development, professional training, and cross-sector collaboration to ensure sustainable and effective inclusion in physical education. The discussion in this review highlights the importance of refining and adapting inclusive pedagogical strategies to meet the diverse and evolving needs of students with disabilities, ultimately contributing to a more inclusive educational framework.

#### *Limitations and Future Directions*

This study has several limitations. First, the majority of studies included in this review rely on qualitative methodologies, which may limit the generalizability of findings. Second, most of the selected studies originate from developed countries, potentially overlooking the challenges and contexts faced in developing countries. Additionally, the diversity of disabilities studied and the range of educational interventions employed make direct comparisons between studies difficult. Future research should incorporate quantitative and mixed-method approaches to enhance result validity and facilitate broader generalization. Expanding

the scope to include studies from developing countries would provide a more comprehensive perspective on the challenges and solutions related to inclusion in physical education. Moreover, longitudinal studies are needed to examine the long-term effects of adapted pedagogical strategies on student participation, physical performance, and social inclusion. Finally, technological innovations, such as assistive devices and digital platforms, present promising opportunities to enhance the accessibility and effectiveness of inclusive pedagogical interventions.

## **Conclusions**

This systematic review highlights the importance of adapted pedagogical strategies in promoting the inclusion of students with special educational needs (SEN) in physical education. The findings indicate that adapting physical activities, implementing inclusive pedagogical models, and utilizing specific teaching resources are essential for ensuring active and equitable participation among students. Inclusive approaches, such as co-teaching and peer tutoring, have been shown to enhance student engagement and socialization for both students with and without disabilities.

Despite these advancements, challenges persist, particularly regarding inadequate infrastructure, insufficient in-service teacher training, and limited resources. To address these barriers, it is essential to develop educational policies and training programs that support inclusion and accessibility in physical education. Additionally, collaboration among teachers, administrative staff, and educational communities plays a key role in fostering inclusive and sustainable learning environments.

Finally, adapted pedagogical strategies in physical education have a significant impact on student inclusion, active participation, and physical and social development. Continued research and implementation of these strategies are essential to ensure truly inclusive and equitable physical education for all students.

## **Conflict of interests**

The authors declare that there is no conflict of interests.

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