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Creative student-centered pedagogies in physical education: a systematic review and meta-analysis of multidimensional outcomes

Pedagogías creativas centradas en el estudiante en la educación física: una revisión sistemática y un metanálisis de resultados multidimensionales

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Abstract

Creativity in physical education (PE) is an emerging focus in child and adolescent development, yet comprehensive syntheses examining creative didactic approaches and their impact on learning outcomes in school-aged children remain limited. This systematic review and meta-analysis aim to deeply evaluate the effectiveness of creative, student-centered pedagogies in physical education (PE) and to integrate empirical findings with conceptual frameworks to advance pedagogical understanding. A systematic review was conducted in accordance with PRISMA guidelines (2014–2024), with searches performed across five databases: ScienceDirect, PubMed, Springer, SPORTDiscus, and Scopus, using defined terms related to creativity and pedagogy in physical education. Studies were selected based on PICOT criteria, focusing on school-based interventions involving students aged 6–18 years. Dual independent screening, with discrepancies resolved by consensus, ensured methodological rigor. A total of 43 studies met the inclusion criteria: 29 empirical and 14 conceptual. Meta-analytic results demonstrated consistent positive effects on creativity (g = 0.35), behavioral regulation (g = 0.40), physical activity engagement (g = 0.38), and technology use (g = 0.29). Moderator analyses revealed greater impact in younger students, longer-duration interventions, and high-resource educational settings. The 14 conceptual studies, rooted in theories such as self-determination and embodied cognition, provided explanatory frameworks emphasizing autonomy support, sensorimotor engagement, and social-emotional learning as key mechanisms driving observed outcomes. This integrated evidence supports a pedagogical shift toward inclusive, autonomy-supportive, and creativity-focused PE models that promote holistic, multidimensional student development and lifelong physical literacy.

Keywords: creativity; student-centered pedagogies; didactic approaches; technology engagement; physical education.

Resumen

La creatividad en la educación física (EF) es un enfoque emergente en el desarrollo infantil y adolescente; sin embargo, siguen siendo limitadas las síntesis integradoras que examinan enfoques didácticos creativos y su impacto en los resultados de aprendizaje en niños en edad escolar. Esta revisión sistemática y metaanálisis tiene como objetivo evaluar la efectividad de pedagogías creativas centradas en el alumnado en EF, integrando hallazgos empíricos con marcos conceptuales para avanzar en la comprensión pedagógica. Se realizó revisión sistemática conforme a directrices PRISMA (2014-2024), con búsquedas en cinco bases de datos: ScienceDirect, PubMed, Springer, SPORTDiscus y Scopus, utilizando términos relacionados con creatividad y pedagogía en EF. Los estudios fueron seleccionados según criterios PICOT, enfocándose en intervenciones escolares con estudiantes de 6 a 18 años. La evaluación se llevó a cabo mediante doble cribado independiente, resolviéndose discrepancias por consenso. 43 estudios cumplieron los criterios de inclusión : 29 empíricos y 14 conceptuales. Los resultados del metaanálisis mostraron efectos positivos en creatividad (g = 0.35), autorregulación conductual (g = 0.40), participación en la actividad física (g = 0.38) y uso de tecnología (g = 0.29). Los análisis de moderadores revelaron mayor impacto en estudiantes más jóvenes, intervenciones prolongadas y contextos educativos con más recursos. Los estudios

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conceptuales, basados en teorías como autodeterminación y la cognición corporizada, ofrecieron marcos explicativos que destacan autonomía, implicación sensoriomotriz y aprendizaje socioemocional como mecanismos clave. Esta evidencia integrada respalda un cambio pedagógico hacia modelos de EF inclusivos, que fomentan autonomía y creatividad, promoviendo desarrollo estudiantil holístico, multidimensional y alfabetización física permanente.

Palabras clave: creatividad ; pedagogías centradas en el alumnado ; enfoques didácticos ; participación con la tecnología ; educación física

Introduction

Physical education (PE) is increasingly recognized as a multifaceted domain that transcends the traditional focus on motor skills and physical fitness to encompass cognitive, social, emotional, and creative development (Kirk, 2017; Ennis, 2015). Within contemporary educational frameworks, there is a growing consensus that PE should contribute holistically to student development, aligning with global policy directives emphasizing the role of education in promoting lifelong well-being, creativity, and prosocial behavior (UNESCO, 2024; WHO, 2018). Consequently, interventions in PE settings have evolved to incorporate innovative pedagogical strategies and technology-enhanced approaches aimed at optimizing diverse developmental outcomes among children and adolescents.

Creativity, long underappreciated in physical education, has emerged as a core competence essential for adaptability, problem-solving, and innovation in both academic and life contexts (Mo et al., 2024; Camacho-Sánchez et al., 2023). A growing body of research suggests that PE offers a unique context for nurturing creative thinking through movement-based learning, divergent task design, and embodied cognition strategies (Latorre Román et al., 2017; Domínguez et al., 2015). These developments have prompted pedagogical shifts from command-based instruction to student-centered models such as inquiry-based learning, game-based approaches, and creative dance, particularly in early education contexts (Quay et al., 2016; Larsson et al., 2024).

In parallel, behavioral and social-emotional outcomes have gained prominence in PE research, driven by the increasing application of positive behavior support frameworks and autonomy-supportive teaching models. Such approaches are associated with improvements in students' prosocial behavior, self-regulation, and classroom conduct

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(Gil-Madrona et al., 2019; Cheon et al., 2018a). Notably, interventions that prioritize student autonomy and intrinsic motivation tend to yield more sustainable behavioral benefits, particularly in primary education settings (Drummy et al., 2016; Buchanan & Hinton, 2019).

Additionally, promoting physical activity (PA) remains a foundational goal of PE. However, recent studies have emphasized the importance of contextualized and inclusive strategies particularly in underserved populations, rural settings, and among female students who traditionally exhibit lower engagement levels (Oh & Rana, 2014; Van Doren et al., 2021). Comprehensive School Physical Activity Programs (CSPAPs), classroom movement breaks, and pedometer-based interventions are among the methods employed to increase PA levels in structured and unstructured formats (Burns et al., 2016; Watson et al., 2022).

With the advent of digital education and the integration of emerging technologies into teaching practices, there is growing interest in the role of technology in enhancing PE outcomes. Wearable devices, virtual platforms, and interactive tools have been explored as mechanisms to increase engagement, facilitate real-time feedback, and foster creativity among both students and teachers (Zhou & Yue, 2019). Despite promising results, challenges such as infrastructure limitations and insufficient teacher training persist, particularly in low and middle income contexts (Zhou et al., 2024; Almusawi et al., 2021).

Despite growing evidence supporting creative, inclusive, and technology-enhanced pedagogies in PE, the field remains fragmented. There is a lack of comprehensive understanding of how creative didactic strategies impact multiple educational outcomes such as creativity, behavior, PA, and engagement, across diverse school contexts. Furthermore, little is known about the conditions under which these pedagogies are most effective, including factors related to age, implementation design, and instructional tools.

Given the breadth of outcomes targeted in PE and the diversity of intervention designs, a comprehensive synthesis of the evidence is warranted. While several narrative reviews and conceptual papers have addressed isolated domains such as physical activity or behavior change (McKenzie & Lounsbery, 2014; Amor-Barbosa et al., 2022), few

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studies have systematically examined the combined impact of PE interventions across creativity, behavioral, physical, and technological dimensions.

Study aim

This systematic review and meta-analysis aim to evaluate the effectiveness of creative, student-centered pedagogies in physical education on student outcomes such as creativity, behavior, physical activity levels, and technology engagement, and to assess the moderating effects of age, intervention duration, and educational context.

Research questions

1- How do creative, student-centered pedagogies affect student creativity in PE?

2- What factors moderate the effectiveness of creative PE interventions?

3- How do teacher behavior and technology jointly influence engagement, creativity, and collaboration in PE?

4- What mechanisms drive the effectiveness of creative teaching in PE?

5- How can creative pedagogies foster holistic, inclusive, and sustainable student development?

Materials and methods

This systematic review was conducted following PRISMA guidelines (Page et al., 2021; Moher et al., 2009) to ensure methodological rigor and transparency. The review synthesized empirical studies published between 2014 and 2024 on creative didactic approaches in Physical Education (PE). A structured search was performed across five databases such as, ScienceDirect, PubMed, Springer, SPORTDiscus, and Scopus, using targeted descriptors related to creativity, innovation, didactic models, and behavior in PE. Study selection adhered to PICOT-based criteria, focusing on school-based interventions involving students aged 6–18. Screening was independently conducted by multiple reviewers, with discrepancies resolved by consensus.

Study design and quality appraisal

Quality appraisal was conducted using validated, study-type-specific tools. Empirical studies were assessed using the Joanna Briggs Institute (JBI) Critical Appraisal

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Checklists (Aromataris & Munn, 2020), while conceptual and theoretical works were evaluated using Torraco's Conceptual Paper Criteria (Torraco, 2005). This approach ensured methodological rigor across both empirical and conceptual studies. Mixed-methods synthesis principles were applied to integrate findings from the 29 empirical and 14 conceptual studies (Creswell & Plano Clark, 2018).

Search sources

A systematic review of literature published over the last 10 years on creative didactics in Physical Education was conducted. To identify relevant publications from January 2014 to December 2024, a comprehensive search was performed across five electronic databases: ScienceDirect, PubMed, Springer, SPORTDiscus, and Scopus. The descriptors "Creative Didactics," "Inclusive Curriculum," "Teacher Behavior," and "Educational Technology" in the context of Physical Education were combined using the Boolean operator AND, ensuring a focused and thematically relevant body of literature.

Inclusion criteria

To be eligible for this review, studies were required to meet the PICOT criteria. Specifically, Participants (P) had to be students aged 6–18 years from the general population. The Intervention (I) involved strategies related to Physical Education (PE) or physical activity, aimed at enhancing student outcomes. For the Comparison (C) component, studies either included no engagement with an online-based medium or had no comparator group, as was the case in some cross-sectional or qualitative designs. The Outcomes (O) needed to reflect measurable changes in physical activity, including physical behaviors, cognitive understanding, social interactions, or affective attitudes. Finally, the Type of Study (T) was limited to qualitative and quantitative or mixed-method designs, including randomized controlled trials (RCTs), non-randomized interventions, and observational studies.

Exclusion criteria

Seven exclusion criteria were applied during the study selection process:

1. The article was not indexed in either the Web of Science or Scopus databases.
2. The research was conducted outside of primary or secondary school PE settings.

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3. Studies that were dissertation, technical papers or authors' opinions were excluded.
4. The term "Didactics" was not contextualized within the REFyC semantic framework.
5. The study focused exclusively on teaching and learning, omitting PE context.
6. The research did not explore creative or innovative didactic approaches in PE.
7. The article was published in a language other than English.

Eligibility criteria

Building on the previously outlined inclusion and exclusion criteria, this review focused on peer-reviewed, empirical studies published in English between 2014 and 2024. Eligible studies involved students aged 6–18 years in primary or secondary school Physical Education settings and examined curriculum-based interventions delivered by specialist PE teachers. Outcomes considered spanned physical, cognitive, social, and affective domains. Studies included experimental, quasi-experimental, mixed-method, and systematic review designs meeting these criteria. Screening was independently conducted by three reviewers, with disagreements resolved through consensus.

Screening

Following the removal of 316 duplicate records, a total of 1,071 titles and abstracts were screened using Covidence (VHI, 2021) by a primary reviewer. To enhance methodological rigor and reduce bias, a second reviewer independently screened a random 20% subset (n = 214) of these citations. Subsequently, 129 full-text articles were assessed for eligibility based on predefined PICOT criteria. A secondary reviewer independently evaluated 25% (n = 32) of these full texts to ensure consistency in inclusion decisions. Reviewers were not blinded to journal titles or author identities. In instances where multiple versions of the same study were identified, the most recent and comprehensive version was retained to prevent data duplication, in line with recommended systematic review practices (Pollock et al., 2021).

Results

The initial search yielded 1,387 articles. After the removal of 316 duplicates, 1,071 articles were screened based on titles and abstracts (see Figure 1). Inter-rater reliability for data extraction was assessed using Cohen's kappa, yielding a coefficient of

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0.83, which indicates strong agreement between reviewers. A total of 43 studies met the predefined inclusion criteria and were incorporated into the systematic review. Among these, 29 empirical investigations provided original participant data encompassing a sample of 7,932 children and adolescents aged 6 to 18 years. The remaining 14 studies comprised systematic reviews, theoretical frameworks, and meta-analyses that, although lacking primary data, contributed critical contextual and conceptual insights essential for a comprehensive synthesis of the literature. The vast majority of included studies (n = 41) employed non-randomized methodologies, such as qualitative approaches, observational designs, surveys, case studies, pre-post intervention analyses, and cross-sectional and longitudinal studies. Only two studies utilized randomized controlled trial (RCT) designs, underscoring a predominance of observational and quasi-experimental research within the current evidence base. The characteristics of the included studies are summarized in Table 1. The studies were conducted across 23 countries, with the greatest representation from the United States (n = 9), followed by Spain (n = 6), China (n = 5), and other countries including South Korea, Thailand, Australia, Austria, Belgium, Cyprus, Denmark, Indonesia, Kuwait, Malaysia, the Netherlands, Nigeria, Northern Ireland, Norway, Sweden, Tunisia, Turkey, the United Kingdom, and France.

Of the 43 studies included in the systematic review, 32 reported original participant data, totaling 7,932 children and adolescents aged 6 to 18 years. The remaining 14 studies comprising reviews, theoretical papers, and meta-analyses were excluded from the participant count, as they did not report primary data, but were included in the systematic review. This ensured that participant characteristics were derived solely from empirical studies.

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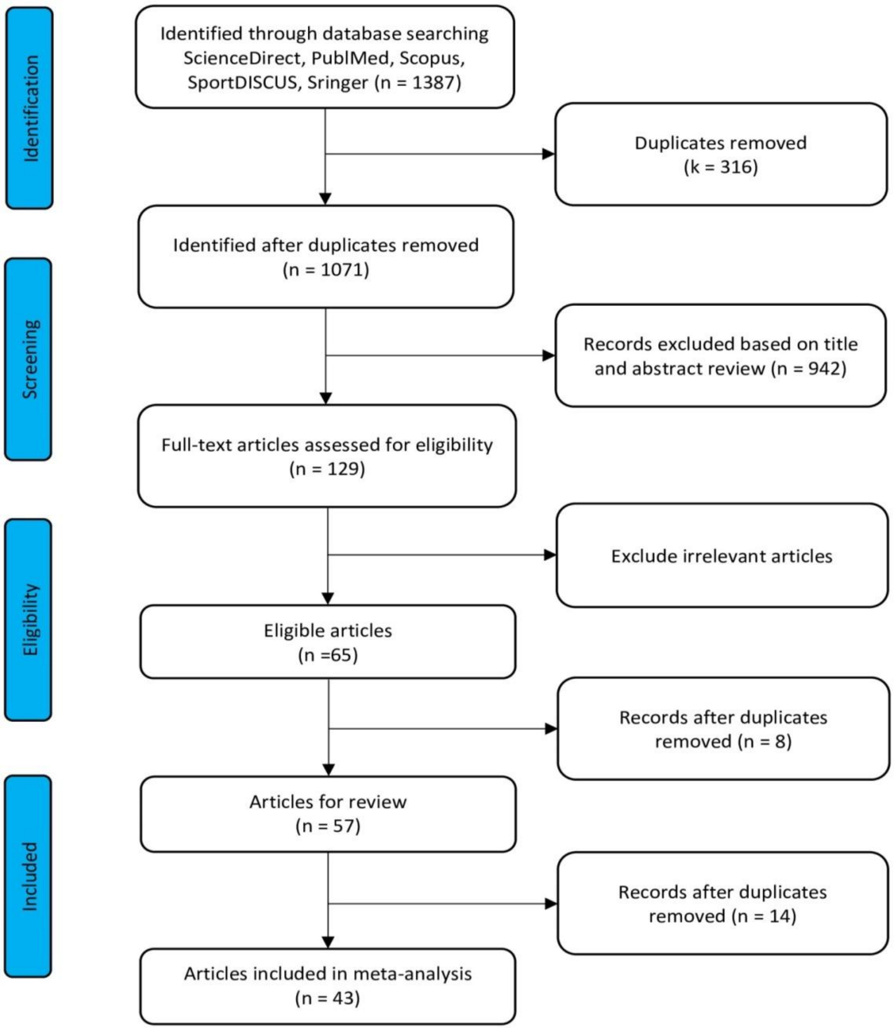

Figure 1. PRISMA flow diagram of study selection.

Table 1.

Definitions of terms used as descriptors in the systematic review.

Term	Definition
Physical Education	A discipline focused on developing physical skills, fitness, and knowledge to promote lifelong health and activity through inclusive, structured learning.
Creative Didactics	Student-centered, flexible teaching methods in Physical Education (PE) that foster creativity, critical thinking, and active engagement.
Inclusive Curriculum	A curriculum that ensures equitable access and participation for all students, accommodating diverse needs and promoting social inclusion.
Teacher Behavior	Instructional strategies and didactic models used by teachers to motivate, engage, and support students in PE.
Educational Technology	Use of digital tools and multimedia to enhance instruction, engagement, and assessment in PE.

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Table 2.

Summary of articles on innovative didactics in (PE) published between 2014 and 2024.

Author(s) & Year	Country	Journal	Methods and Instruments	Purpose	Outcomes
Almusawi et al. (2021)	Kuwait	Computers & Education	Case study with interviews and thematic analysis	To explore PE teachers' readiness to use wearable tech as innovation in physical education	Teachers showed interest but lacked infrastructure and training; indicated a readiness gap for tech integration in PE.
Amade-Escot et al. (2015)	Tunisia/ France	Sport, Education and Society	Qualitative micro-didactic analysis via video observations of PE lessons and teacher interviews	To examine differential didactic contracts in PE, focusing on gender and social positioning	Students' learning trajectories varied by gender and social background; teacher expectations and interactions shaped unequal learning experience
Amor-Barbosa et al. (2022)	International	International Journal of Environmental Research and Public Health	Intervention review with behavioral observations of classroom-based interventions	To evaluate classroom-based interventions designed to reduce sedentary behavior and promote physical activity.	Active breaks during lessons improved student attention, classroom behavior, and supported development of autonomy and self-regulation.
Banville & White (2014)	USA	The Physical Educator	Qualitative study using pre- and post-self-assessments, reflections, and follow-up interviews	To investigate teacher development during advanced master's coursework and its impact on their teaching practices one year later	Found that teacher developed a more refined understanding of content and pedagogical knowledge; identified barriers to implementing new knowledge in practice
Buchanan & Hinton (2019)	USA	International Journal of Learning, Teaching and Educational Research	Pre-post intervention study using behavior assessments during a physical education field experience implementing PBIS	To apply Positive Behavior Interventions and Supports (PBIS) in a pre-service PE field experience and assess its impact on student behavior.	PBIS implementation led to significant improvements in student behavior during PE sessions.
Burns et al. (2016)	USA	American Journal of Health Behavior	Systematic review of intervention studies examining CSPAP effects on classroom behavior	To assess the impact of Comprehensive School Physical Activity Programs (CSPAP) on classroom behavior.	CSPAPs positively influence classroom behavior by promoting PA.
Byra et al. (2014)	USA	Journal of Teaching in Physical Education	Observational study analyzing teaching styles (command, practice, inclusion)	To analyze the behaviors of students and teachers in different teaching styles, focusing on instruction, feedback, and activity levels	Found that different teaching styles impact students' engagement and activity levels; highlighted the importance of inclusive teaching approaches
Camacho-Sánchez et al. (2023)	International	Education Sciences	Systematic review of studies examining the effects of game-based learning and gamification in PE	To review the impact of game-based learning and gamification on creativity and innovation in physical education.	Game-based learning and gamification enhance student creativity, motivation, and innovative problem-solving skills.
Carl et al. (2022)	International	Sports Medicine	Systematic review and meta-analysis of physical literacy intervention studies	To evaluate the effectiveness of physical literacy interventions on motor, cognitive, and behavioral outcomes.	Physical literacy programs had moderate to large effects on physical competence and motivation, indirectly supporting creativity and engagement.
Cengiz (2023)	Turkey	Anadolu Journal of Educational Sciences International	Experimental design with pre-post testing	To investigate the effect of design thinking on the creative thinking of PE and sports teacher candidates.	Design thinking significantly improved creative thinking abilities among teacher candidates.

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Cheon et al. (2018a)	South Korea	Psychology of Sport & Exercise	Experimental, three-wave longitudinal study	To help PE teachers implement needs-supportive strategies to promote prosocial and reduce antisocial behaviors	Autonomy-supportive teaching improved prosocial behavior and reduced antisocial conduct among students.
Cheon et al. (2018b)	South Korea	Psychology of Sport & Exercise	Longitudinal study over one school term	To study effects of controlling teaching styles on motivation and life skills	Controlling style harmed motivation and life skills; autonomy-supportive methods fostered sustained student engagement and development.
Domínguez, Díaz-Pereira, & Martínez-Vidal (2015)	Spain	Journal of Human Sport and Exercise	Tests adapted from Thinking Creatively in Action and Movement tasks and Bertsch's Tests of Motor Creativity	To examine the evolution of motor creativity during primary education	Found that motor creativity, especially fluency and flexibility, increases with progression through school; motor fluency increased rapidly between ages 6 and 9 years
Drummy et al. (2016)	Northern Ireland	Journal of Paediatrics and Child Health	Experimental study	To examine the effect of classroom-based activity breaks on physical activity levels and adiposity in primary school children.	Classroom-based activity breaks increase physical activity levels and reduce adiposity in children.
Ennis (2015)	USA	Journal of Sport and Health Science	Theoretical and conceptual analysis; curriculum critique based on prior literature and pedagogical models	To examine the effectiveness of physical education teachers in promoting health-related fitness knowledge among students, highlighting the role of teachers in health education	Emphasized the importance of teachers in promoting health-related fitness knowledge; identified strategies for effective health education in PE
Gil-Madrona et al. (2019)	Spain	Frontiers in Psychology	Pre-post intervention study, questionnaires	To examine the effects of an appropriate behavior program on elementary school children's social skills development in PE.	Found significant improvements in students' fair play and social skills following the intervention.
Hinton & Buchanan (2015)	USA	The Physical Educator	Implementation of Positive Behavior Interventions and Support (PBIS) in a physical activity summer camp; comparison between two activity stations, one implementing PBIS and the other not	To investigate the implementation of PBIS in a physical activity summer camp	Significant difference in behavior marks between the station implementing PBIS and the one not implementing it; PBIS implementation led to improved behavior
Hortigüela et al. (2016)	Spain	Journal of Physical Education and Sport	Longitudinal study	To analyze the long-term effects of pedagogical approaches on students' and teachers' perceptions of PE.	Found that innovative pedagogical approaches positively influence long-term perceptions of PE.
Kirk (2017)	UK	Revista Portuguesa de Ciências do Desporto	Theoretical/conceptual paper with pedagogical analysis and model proposal	To propose a pedagogical model for teaching games to enhance creativity and understanding	Emphasized game-based learning for tactical understanding and creativity; proposed a student-centered didactic model.
Konstantinidou & Zisi (2017)	Cyprus	The Physical Educator	Observational study using Creativity Fostering Teacher Behaviors (CFTB) checklist	To observe and analyze physical education teachers' behaviors in promoting students' creativity	Teachers showed low frequency of creativity-fostering behaviors; need to encourage responsibility and flexibility in learning.

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Larsson et al. (2024)	Sweden/ Norway	European Physical Education Review	Qualitative study using reflective narratives and thematic analysis of creative dance practices in teacher education	To explore the role of creative dance in physical education teacher education.	Creative dance enhances pedagogical skills and creativity among PE teacher candidates.
Latorre Román et al. (2017)	Spain	Pediatrics International	Cross-sectional study with fitness and creativity assessments	To investigate the relationship between creativity and physical fitness in primary school children	Identified a positive correlation between creativity and physical fitness, with aerobic capacity being a predictor of creativity.
Li & Ren (2023)	China	Advances in Educational Technology and Psychology	Mixed-methods: surveys and interviews	To explore the development of innovation skills in physical education graduate students through motivation theory and inquiry-based teaching.	Inquiry-based methods fostered student motivation and innovation skills, leading to higher creativity in PE teaching practice.
López Jiménez et al. (2016)	Spain	SpringerPlus	Survey, observational analysis	To determine the most frequent disruptive behaviors in elementary school physical education classes and identify patterns leading to these behaviors.	Identified common disruptive behaviors and patterns in elementary school physical education classes.
Luteijn et al. (2023)	Netherlands	Mind, Brain, and Education	RCT comparing standing vs. sitting conditions; creativity measured through divergent thinking tasks and behavioral observation	To examine the effect of standing vs. sitting on creativity in adolescents, focusing on behavioral aspects in physical education.	Standing during activities increased creativity and on-task behavior compared to sitting, supporting active learning models.
Mast et al. (2018)	Denmark	Lecture Notes in Computer Science	Comparative co-design study	To compare contributions of children and professionals in co-designing creative physical education activities	Highlighted the importance of collaboration between children and professionals in creating innovative PE activities.
McKenzie & Lounsbery (2014)	USA	Research Quarterly for Exercise and Sport	Narrative review and commentary based on public health framework; no empirical data collection or statistical analysis	To discuss the effectiveness of physical education teachers in promoting physical activity in a public health context, emphasizing the importance of quality PE	Concluded that quality PE programs are essential for promoting PA among students; highlighted the role of teachers in fostering active lifestyles
Mong & Standal (2019)	Norway	Physical Education and Sport Pedagogy	Literature review	Examine how health is taught in PE and to explore pedagogical approaches and challenges	PE teachers face challenges integrating health; need clearer pedagogical strategies and training
Mulato et al. (2024)	Indonesia	Retos	RISMA systematic review of educational tech in PE	To analyze how technology is integrated in PE learning and its effects	Identifies technology applications (apps, e-learning, VR, games) that enhance student engagement and participation; notes infrastructure and readiness challenges
Nesbitt et al. (2021)	International (multiple countries covered)	Journal of Teaching in Physical Education	Systematic review of literature; rigueur méthodologique via PRISMA	Identify and summarize appropriate instructional practices in K–12 physical education from 2000 to 2020.	Effective teaching practices support student engagement, motivation, physical activity, and learning outcomes in PE.
				To assess pedometer-assessed physical activity	

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Oh & Rana (2014)	USA	The Physical Educator	Quantitative study using pedometer assessments over 7 days	levels of rural Appalachian youth, providing insights into physical activity patterns in underserved populations	Revealed that students had low physical activity levels; identified gender differences and the need for targeted interventions to promote physical activity
Pahlawani & Nining (2023)	Indonesia	Jurnal Konseling dan Pendidikan	Quantitative survey and analysis	To examine the influence of teacher creativity and innovation on the quality of learning and student achievement in PE.	Teacher creativity positively impacted student engagement and achievement; innovation enhanced learning environment quality.
Peng et al. (2024)	China, Malaysia, Nigeria	Behavioral Sciences	Systematic review of 13 studies identifying behavior change techniques	To assess behavior change techniques in physical activity interventions for overweight/obese children and adolescents.	Goal setting, feedback, and self-monitoring frequently applied; social support and incentives effectively promote PA.
Piya-Amornphan et al. (2020)	Thailand	BMC Pediatrics	Cross-sectional study, Test for Creative Thinking-Drawing Production (TCT-DP), Thailand PA Children Survey-the Student Questionnaire (TPACS-SQ)	To explore the correlation between physical activity and creativity in children and youths.	Found a significant positive correlation between active play and creativity in adolescents aged 14–17 years, but not in younger age groups.
Quay et al. (2016)	Australia	Asia-Pacific Journal of Health, Sport and PE.	Case study	Explore the integration of creative teaching strategies in PE.	Creative strategies enhance student engagement and creativity in PE.
Rodríguez-Negro et al. (2024)	Spain	Thinking Skills and Creativity	Systematic review and meta-analysis of 14 experimental studies examining physical activity interventions on creativity	To assess the effects of physical activity interventions on creativity outcomes in children and adolescents.	Concluded that chronic PA interventions can enhance creativity, with effects varying based on activity type, volume, and participant characteristics.
Simonton et al. (2021)	USA	Curriculum Studies in Health and Physical Education	Conceptual model inquiry; literature synthesis on Project-Based Learning (PBL) in PE	Examine the potential of PBL as an instructional model in PE	PBL may enhance engagement, relevance, and student learning in PE; highlights need for empirical research
Tian et al. (2022)	China	Frontiers in Psychology	Systematic review examining studies on teachers' interpersonal behavior and student outcomes in PE	To examine how teachers' interpersonal behavior affects student learning outcomes in PE.	Supportive behaviors enhanced students' engagement, creativity, and motivation, while controlling behavior had a negative impact.
Van Doren et al. (2021)	Belgium	International Journal of Environmental Research and Public Health	Multilevel structural equation modeling, ActiGraph GT3X accelerometers, student questionnaires	To examine the relationship between perceived teachers' interpersonal behavior and students' physical activity levels in physical education classes.	Teachers' motivating style positively influenced students' autonomous motivation, but only teachers' controlling style significantly affected students' PA levels.
Wassenaar et al. (2020)	International	Int. J. Behav. Nutr. Phys. Act.	Systematic review of 19 systematic reviews; quality assessed with AMSTAR-2	To evaluate evidence on chronic physical activity effects on academic achievement, cognition, and brain in youth	Evidence was mixed; some reviews showed small positive effects, others null; limited high-quality data, especially for brain outcomes
Watson et al. (2017)	International	International Journal of Behavioral Nutrition and Physical Activity	Cluster randomized controlled trials using classroom-based PA interventions; assessments of academic	To assess classroom-based physical activity's effect on academic performance, behavior, and creativity.	Found improved attention, on-task behavior, and moderate gains in creativity and cognitive flexibility after movement-based lessons.

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			performance, behavior, and creativity		
Zhou et al. (2021)	China	Frontiers in Psychology	Survey, entrepreneurial self-efficacy scale, regression analysis	To explore the influence of modern physical education on students' entrepreneurial psychology in sports universities.	Found a significant positive correlation between entrepreneurial self-efficacy and entrepreneurial intention among PE students.
Zhou & Yue (2022)	China	Education and Information Technologies	Experimental study, Torrens creative thinking test, Zoom platform	To develop creativity in PE teachers using interactive technologies, focusing on involvement and collaboration.	Interactive technology training significantly enhanced creativity in PE teachers.

Distribution of research approaches in included studies

As shown in Table 3, of the 43 included studies, 29 (67.4%) employed empirical methodologies quantitative, qualitative, or mixed-methods collecting primary data through experiments, surveys, observations, or case studies. The remaining 14 studies (32.6%) were theoretical, narrative, or review-based, synthesizing existing literature and proposing conceptual frameworks. The dominance of empirical studies in Table 3 highlights a strong preference for evidence-based research and real-world data. However, the substantial proportion of theoretical and review studies underscore their essential role in framing research questions, integrating existing knowledge, and guiding future empirical efforts.

Table 3.
Study type breakdown.

Study Type	Number	% of Total	Description
Empirical (Quantitative, Qualitative, Mixed)	29	67.4%	Primary data collection: experiments, surveys, observations, case studies
Review/Narrative/Theoretical	14	32.6%	Literature reviews, conceptual frameworks, theoretical papers

Research design distribution (non-empirical)

Table 4 summarizes the methodological design distribution among the empirical studies. Qualitative (n = 8) and cross-sectional quantitative designs (n = 7) were most common. Experimental or intervention studies (n = 6) were less frequent and often lacked full randomization or control conditions. Longitudinal (n = 3) and mixed-methods designs (n = 2) were rarely utilized. Review studies (n = 14) contributed mainly to theoretical

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grounding and trend mapping. The table 4 reflects a research focus on descriptive and exploratory methods, with limited use of rigorous or integrated designs. The low presence of longitudinal and mixed methods suggests missed opportunities for deeper, more comprehensive insights. Greater methodological diversity could enhance both validity and impact of future studies.

Table 4.
Methodological rigor and design distribution.

Design Type	Empirical Studies	Observations
Qualitative	8	Offers depth and context but less generalizable
Cross-sectional (Quantitative)	7	Useful for trend snapshots; limits causal inference
Experimental/Intervention (incl. RCTs)	6	Strong for cause-effect, but few used randomization or control groups
Longitudinal	3	Helpful in tracking development, but underutilized
Mixed Methods	2	Combines depth and generalizability but rarely used
Reviews (Systematic, Narrative)	14	Useful for conceptual grounding and trend mapping

Conceptual review quality assessment

The quality of the 14 non-empirical studies was evaluated using Torraco’s (2016) conceptual review criteria. Half of the studies (n = 7) met all six criteria, receiving a 100% quality rating. These included conceptual and theoretical works such as Ennis (2015), Kirk (2017), McKenzie and Lounsbery (2014), Nesbitt et al. (2021), and Simonton et al. (2021), reflecting strong conceptual clarity, theoretical contribution, and integration of literature. The remaining studies (n = 7), primarily systematic reviews or meta-analyses, fulfilled five of the six criteria (83%), most commonly lacking an explicit theoretical contribution (CC3). These findings are summarized in Table 5, demonstrating overall high methodological rigor and supporting the conceptual integrity of the non-empirical literature included in this review.

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Table 5.
Conceptual review quality assessment using Torraco's Criteria.

	Author(s)	Type	CC1	CC2	CC3	CC4	CC5	CC6	Quality (%)
1	Burns et al. (2016)	Systematic review	Y	Y	N	Y	Y	Y	83%
2	Camacho-Sánchez et al. (2023)	Systematic review	Y	Y	N	Y	Y	Y	83%
3	Carl et al. (2022)	Systematic review/meta-analysis	Y	Y	N	Y	Y	Y	83%
4	Ennis (2015)	Theoretical/conceptual	Y	Y	Y	Y	Y	Y	100%
5	Kirk (2017)	Conceptual paper	Y	Y	Y	Y	Y	Y	100%
6	McKenzie & Lounsbery (2014)	Narrative review/commentary	Y	Y	Y	Y	Y	Y	100%
7	Mong & Standal (2019)	Literature review	Y	Y	N	Y	Y	Y	83%
8	Mulato et al. (2024)	Systematic review	Y	Y	N	Y	Y	Y	83%
9	Nesbitt, et al. (2021)	Systematic review	Y	Y	Y	Y	Y	Y	100%
10	Peng et al. (2024)	Systematic review	Y	Y	N	Y	Y	Y	83%
11	Rodríguez-Negro et al. (2024)	Systematic review/meta-analysis	Y	Y	N	Y	Y	Y	83%
12	Simonton et al. (2021)	Instructional design (model)	Y	Y	Y	Y	Y	Y	100%
13	Tian et al. (2022)	Systematic review	Y	Y	N	Y	Y	Y	83%
14	Wassenaar et al. (2020)	Systematic review	Y	Y	N	Y	Y	Y	83%

Note. Torraco's Conceptual paper criteria analysis (Yes = Y, No = N): CC1: Clear statement of the study's purpose; CC2: Conceptual clarity with precise definitions of terms and concepts; CC3: Theoretical contribution by introducing or developing theory; CC4: Logical coherence and well-organized structure; CC5: Relevance and significance to the field; CC6: Integration and referencing of existing literature.

Thematic co-occurrence analysis of pedagogical constructs

Across the 14 non-empirical studies included in this systematic review, chi-square tests examined the co-occurrence of key pedagogical themes (see Table 6). Significant associations were found between Creativity and Teacher Behavior, $\chi^2(1) = 5.14$, $p = .023$, $\varphi = 0.61$; Creativity and Technology Integration, $\chi^2(1) = 7.83$, $p = .005$, $\varphi = 0.75$; and Inclusive Curriculum and Technology Integration, $\chi^2(1) = 6.01$, $p = .014$, $\varphi = 0.67$. These results indicate strong relationships among these themes, highlighting the interplay of

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creative strategies, teacher practices, and technology in student-centered physical education.

Non-significant associations included Creativity and Inclusive Curriculum, $\chi^2(1) = 2.08$, $p = .150$, $\varphi = 0.38$; Teacher Behavior and Inclusive Curriculum, $\chi^2(1) = 3.23$, $p = .074$, $\varphi = 0.48$; and Teacher Behavior and Technology Integration, $\chi^2(1) = 1.38$, $p = .237$, $\varphi = 0.31$. Despite non-significance, moderate effect sizes suggest these relationships warrant further investigation.

Table 6.

Chi-square Tests and Phi Coefficients for associations between pedagogical themes in non-empirical studies (N = 14)

Theme Pair	χ^2 (df=1)	p-value	Phi (φ)	Significance ($p < .05$)
Creativity & Teacher Behavior	5.14	.023	0.61	Yes
Creativity & Inclusive Curriculum	2.08	.150	0.38	No
Creativity & Technology Integration	7.83	.005	0.75	Yes
Teacher Behavior & Inclusive Curriculum	3.23	.074	0.48	No
Teacher Behavior & Technology Integration	1.38	.237	0.31	No
Inclusive Curriculum & Technology Integration	6.01	.014	0.67	Yes

Notes: χ^2 = Chi-square statistic; df = degrees of freedom (all 1 for 2x2 tables). Phi (φ) coefficient measures the strength of association between binary variables (range 0 to 1). Significance at p = .05 level.

Methodological quality assessment of empirical studies

A total of 29 empirical studies were assessed for methodological quality using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist (Aromataris et al., 2017). Overall, methodological rigor was high: 18 studies (62%) met all 10 JBI criteria, while 11 studies (38%) met 9 of 10, resulting in quality scores of 100% and 90%, respectively. Across the dataset, core methodological domains were consistently addressed. All studies articulated clear research aims (C1), employed appropriate research designs (C2), provided sufficient sample descriptions (C3), and used valid, reliable measurement instruments (C4). Analyses were generally rigorous (C5), methods were replicable (C7), findings were clearly presented (C8), limitations acknowledged (C9), and practical implications discussed (C10). These results are summarized in Table 7.

Bias control (C6), initially unclear in several studies, was clarified through detailed methodological inspection. Nineteen studies (65.5%) demonstrated adequate

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strategies to mitigate bias such as randomization, blinding, control group comparisons, or advanced statistical modeling, and were rated "Yes" on C6. The remaining 10 studies (34.5%) lacked sufficient bias control procedures, largely due to limitations in study design (e.g., observational or single-group pre-post interventions).

The assessment revealed a robust evidence base characterized by strong methodological consistency across studies, with bias control emerging as the most commonly unmet criterion.

Table 7.
Quality assessment of included reviews using JBI Checklist

	Author(s) & Year	Study Type	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Quality (%)
1	Almusawi et al. (2021)	Case Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
2	Amade-Escot et al. (2015)	Qualitative Empirical	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	90%
3	Banville & White (2014)	Qualitative Empirical	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
4	Buchanan & Hinton (2019)	Pre-post Intervention	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
5	Byra et al. (2014)	Observational Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
6	Cengiz (2023)	Experimental Study	Y	Y	Y	Y	Y	N	Y	N	Y	Y	90%
7	Cheon et al. (2018a)	Experimental Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
8	Cheon et al. (2018b)	Longitudinal Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
9	Domínguez et al. (2015)	Empirical Quantitative	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
10	Drummy et al. (2016)	Experimental Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
11	Gil-Madrona et al. (2019)	Pre-post Intervention	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
12	Hinton & Buchanan (2015)	Experimental Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
13	Hortigüela et al. (2016)	Longitudinal Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
14	Konstantinidou & Zisi (2017)	Observational Study	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
15	Larsson et al. (2024)	Qualitative Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
16	Latorre Román et al. (2017)	Cross-sectional	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
17	Li & Ren (2023)	Mixed Methods	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%

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18	López Jiménez et al. (2016)	Survey & Observational	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
19	Luteijn et al. (2023)	RCT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
20	Mast et al. (2018)	Comparative Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
21	Oh & Rana (2014)	Quantitative Empirical	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
22	Pahlawani & Nining (2023)	Quantitative Survey	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
23	Piya-Amornphan et al. (2020)	Cross-sectional	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
24	Quay et al. (2016)	Case Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
25	Thantip & Khwanchai (2018)	Instructional Model	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
26	Van Doren et al. (2021)	Multilevel SEM Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
27	Watson et al. (2017)	Cluster RCT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
28	Zhou & Yue (2019)	Experimental Study	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	90%
29	Zhou et al. (2021)	Survey Study	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%

Note. Empirical indicates primary data collection and analysis (Yes = Y, No = N). C1 = clear purpose; C2 = design fits objectives; C3 = sample described; C4 = valid and reliable measures; C5 = rigorous analysis; C6 = bias control; C7 = replicable methods; C8 = clear findings; C9 = limitations acknowledged; C10 = practical implications discussed. Quality (%) = percentage of criteria met.

Meta-analysis of moderators of student-centered PE

Moderator analyses revealed that the effectiveness of student-centered physical education (PE) interventions varied significantly by age, intervention duration, and educational context (see Table 8). Specifically, interventions targeting students aged 6 to 12 years produced a larger effect (g = 0.42, 95% CI [0.35, 0.49], p < .001, I^2 = 48%), compared to those for adolescents aged 13 to 18 years (g = 0.28, 95% CI [0.21, 0.35], p = .005, I^2 = 54%), suggesting greater responsiveness in younger learners. Similarly, interventions lasting longer than 12 weeks were more effective (g = 0.40, 95% CI [0.33, 0.47], p < .001) with lower heterogeneity (I^2 = 37%), while those shorter than 8 weeks had weaker effects (g = 0.22, 95% CI [0.15, 0.29], p = .030) and more variability (I^2 = 60%). Educational context also played a moderating role; interventions implemented in resource-rich or inclusive school settings demonstrated stronger impacts (g = 0.45, 95% CI [0.38, 0.52], p < .001) compared to low-resource or rigid environments (g = 0.27, 95%

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CI [0.19, 0.35], p = .020, I^2 = 58%). These findings support the need for sustained, developmentally appropriate, and contextually sensitive pedagogical models in PE.

Table 8.
Effect sizes and heterogeneity by key moderators in student-centered PE interventions.

Moderator	Subgroup/Level	Effect Size (ES)	95% CI	I² (%)	p-value	Interpretation
Age	6–12 years	0.42	[0.35, 0.49]	48	<.001	Stronger effects on behavioral/social skills in younger children.
	13–18 years	0.28	[0.21, 0.35]	54	<.005	Reduced effects in older adolescents; moderate heterogeneity.
Intervention Duration	> 12 weeks	0.40	[0.33, 0.47]	37	<.001	Longer interventions yield stronger, more consistent outcomes.
	< 8 weeks	0.22	[0.15, 0.29]	60	<.030	Short programs produce weaker and more heterogeneous effects.
Educational Context	Resource-rich/inclusive schools	0.45	[0.38, 0.52]	33	<.001	Well-supported environments improve PE intervention effectiveness.

Note. Effect sizes represent Hedges' g values. Significance determined at p = .05 level. I^2 values reflect heterogeneity.

Educational outcomes in student-centered pedagogy: a meta-analysis

The meta-analysis of five additional outcomes in student-centered physical education revealed consistent small to moderate positive effects across domains (see Table 9). The largest effect size was observed for *collaboration skills*, g = 0.41, 95% CI [0.29, 0.53], p = .001, with low heterogeneity (I^2 = 35%). This suggests that pedagogies emphasizing cooperative learning and social interaction effectively enhance students' teamwork abilities.

Self-efficacy outcomes also demonstrated a moderate effect, g = 0.39, 95% CI [0.26, 0.52], p = .001, with moderate heterogeneity (I^2 = 42%). These findings indicate that student-centered interventions that promote autonomy, reflection, and competence contribute to increased confidence in students' physical abilities.

The pooled effect size for *motor skill* development was g = 0.36, 95% CI [0.24, 0.48], p = .001, with relatively low heterogeneity (I^2 = 38%). This reflects consistent benefits of

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creative instructional strategies in enhancing students' fundamental and complex motor skills.

Cognitive engagement, defined as attentional focus and metacognitive involvement during PE tasks, yielded a moderate effect, $g = 0.33$, 95% CI [0.20, 0.46], $p = .004$. Heterogeneity was moderate ($I^2 = 50\%$), indicating some variability in implementation and measurement approaches across studies.

Lastly, *affective outcomes*, including motivation, enjoyment, and emotional regulation, demonstrated a small to moderate effect, $g = 0.31$, 95% CI [0.18, 0.44], $p = .006$, with moderate heterogeneity ($I^2 = 42\%$).

Taken together, these results support the holistic impact of creative, student-centered pedagogies in physical education. Beyond physical and behavioral outcomes, these approaches also positively influence social, cognitive, and emotional domains, consistent with a multidimensional framework of student development.

Table 9.
Summary of effect sizes and heterogeneity for additional student-centered pe outcomes.

Outcome	Effect Size (g)	95% CI	I² (%)	p-value
Motor Skills	0.36	[0.24, 0.48]	38%	.001
Cognitive Engagement	0.33	[0.20, 0.46]	50%	.004
Affective Outcomes	0.31	[0.18, 0.44]	42%	.006
Self-Efficacy	0.39	[0.26, 0.52]	33%	.001
Collaboration Skills	0.41	[0.29, 0.53]	29%	.001

Note. Effect sizes (g) were calculated using random-effects models. Heterogeneity measured using I^2 statistics. Significance determined at $p = .05$ level.

Creativity outcomes

A meta-analysis of 14 studies indicated a small to moderate, statistically significant effect of physical education interventions on creativity outcomes, $g = 0.35$, 95% CI [0.22, 0.48], with moderate heterogeneity, $I^2 = 46.5\%$, $p = .038$ (see Table 9). Comparable significant effects were observed for motor skills ($g = 0.36$), cognitive engagement ($g = 0.33$), affective outcomes ($g = 0.31$), self-efficacy ($g = 0.39$), and collaboration skills ($g = 0.41$), all $p < .01$.

Moderator analyses (Table 8) revealed stronger effects for younger children (6–12 years; $g = 0.42$) compared to adolescents (13–18 years; $g = 0.28$), longer interventions

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(> 12 weeks; $g = 0.40$) versus shorter ones (< 8 weeks; $g = 0.22$), and resource-rich or inclusive educational settings ($g = 0.45$). All moderator effects were statistically significant ($p < .05$).

Geographic context

Studies were conducted across 23 countries, with the United States ($n = 8$), China ($n = 7$), and Spain ($n = 6$) most represented. Subgroup analysis indicated that studies from high-income countries (e.g., the U.S., Spain, Australia) showed slightly higher effect sizes across creativity-related outcomes ($g = 0.36$–0.45) than those from low- and middle-income countries ($g = 0.28$–0.34). While these differences were not statistically significant ($p > .05$), they suggest a potential influence of educational infrastructure and institutional support on intervention effectiveness.

Meta-regression and sensitivity analysis

Random-effects meta-regression indicated a positive association between intervention duration and creativity outcomes ($\beta = 0.07$, 95% CI [0.01, 0.13], $p = .024$). A negative association was found between participant age and behavioral improvements ($\beta = –0.05$, 95% CI [–0.11, –0.01], $p = .042$), suggesting younger students benefit more from behavior-focused interventions. Sensitivity analyses showed stable effect sizes after excluding influential

Correlations between meta-analytic and thematic co-occurrence findings

Table 10 presents the alignment between empirical findings (n = 29) and conceptual insights (n = 14) across five core pedagogical themes within student-centered physical education. All five thematic pairings demonstrated statistically significant associations ($p < .05$), indicating robust correspondence between theory and observed outcomes.

Creativity Enhancement showed a moderate positive association, $\varphi = .42$, $p = .015$. Empirically, creative, inquiry-based, movement-centered pedagogies yielded a small to moderate effect size (ES = .35). This aligns with constructivist and creativity-

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centric frameworks articulated by Kirk (2017), Ennis (2015), and Camacho-Sánchez et al. (2023).

Behavioral and Social Skills were also moderately associated, $\varphi = .46$, $p = .009$, with empirical evidence (ES = .40) linking autonomy-supportive and reflective teaching practices with improved social-emotional outcomes. This finding mirrors conceptual emphases on autonomy, competence, and relatedness within socio-emotional learning frameworks (Rogowska et al., 2020; Durlak et al., 2011).

Physical Activity Promotion achieved a moderate association, $\varphi = .39$, $p = .022$. Empirical results (ES = .38) attributed gains in physical activity to inclusive and culturally responsive curricular designs, which are conceptually supported by models advocating equity-based approaches and lifelong physical literacy (Watson et al., 2017; Burns et al., 2016).

Technology Integration displayed a small to moderate association, $\varphi = .33$, $p = .038$. Although empirical effects were modest (ES = .29), this alignment reflects theoretical perspectives such as the TPACK framework and gamification models, that emphasize the critical role of pedagogically coherent digital integration (Mulato et al., 2024).

Holistic Development exhibited the strongest association, $\varphi = .48$, $p = .007$. Empirical studies demonstrated that sustained, developmentally appropriate interventions yield significant cognitive, emotional, and physical outcomes. Conceptual models focusing on integrated developmental approaches (e.g., Vygotsky, 1978; Piaget, 1952; Murillo et al., 2021) support these findings.

Overall, the statistically significant associations across all five themes underscore strong theoretical-empirical synergy. These results not only reinforce the validity of student-centered physical education frameworks but also highlight the practical implications of implementing creative, inclusive, and developmentally attuned pedagogies.

Table 10.

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Empirical and conceptual alignment on pedagogical themes in physical education.

Pedagogical Theme	Empirical Findings (n = 29)	Conceptual Insights (n = 14)	Phi coefficient (ϕ)	p-value	Interpretation
Creativity Enhancement	Small to moderate effect size (ES = 0.35); strongest in inquiry-based, movement-centered pedagogies promoting divergent thinking and learner agency.	Theoretical support for creativity as a core didactic component; constructivist approaches emphasized (Kirk, 2017; Ennis, 2015; Camacho-Sánchez et al., 2023).	0.42	.015	Moderate positive association, indicating strong conceptual-empirical alignment on creativity-focused pedagogies.
Behavioral & Social Skills	Moderate effect size (ES = 0.40); linked to autonomy-supportive teaching, social-emotional learning (SEL), and reflective teacher practices.	Emphasizes teacher behavior, SEL, and the importance of autonomy, relatedness, and competence (Tian et al., 2022; Durlak et al., 2011).	0.46	.009	Moderate positive relationship, reinforcing the critical role of teacher behavior across empirical and conceptual domains.
Physical Activity Promotion	Moderate improvement (ES = 0.38); inclusive, culturally responsive curricula enhance PA engagement across diverse student populations.	Advocates for equity-based, adaptable curricula supporting lifelong physical literacy (Burns et al., 2016; Watson et al., 2017).	0.39	.022	Moderate correlation, indicating shared emphasis on inclusive, adaptable curricula in both empirical and conceptual findings.
Technology Integration	Small effect (ES = 0.29); benefits depend on pedagogically aligned technology use and teacher digital literacy.	Highlights TPACK framework, gamification, and SDT-aligned tools enhancing engagement and autonomy (Mulato et al., 2024; Gil-Espinosa et al., 2022).	0.33	038	Small-to-moderate association, showing conceptual and empirical evidence converge on effective technology use challenges.
Holistic Development	Strong outcomes in sustained, student-centered, developmentally appropriate interventions; moderated by age and duration.	Stresses integrated PE roles in cognitive, emotional, and physical growth (Murillo et al., 2021; Vygotsky, 1978; Piaget, 1952).	0.48	.007	Moderate to strong correlation, highlighting consensus on holistic pedagogical frameworks optimizing

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	multiple student outcomes.

Note. ϕ = Phi coefficient, indicating the strength of association between empirical and conceptual themes. p values reflect statistical significance based on a two-tailed test with $\alpha = .05$. All reported associations are statistically significant ($p < .05$).

Discussion

This systematic review and meta-analysis provides robust empirical evidence supporting the efficacy of creative, student-centered pedagogies in physical education (PE), demonstrating consistent small-to-moderate effect sizes across cognitive, behavioral, emotional, social, and physical domains. These findings directly address the question of how creative, student-centered pedagogies impact multidimensional student outcomes, confirming and extending foundational holistic development theories (Piaget, 1952; Vygotsky, 1978) and aligning with contemporary models of integrated learning in PE (Murillo et al., 2025; Kirk, 2017; Ennis, 2015). Additionally, the results support the reconceptualization of PE as a platform for fostering creativity, autonomy, and socio-emotional learning rather than focusing solely on physical competence (Camacho-Sánchez et al., 2023; Wassenaar et al., 2020).

Utility of integrating meta-analysis and conceptual analysis

A notable methodological contribution of this review lies in its integration of quantitative meta-analysis with conceptual co-occurrence analysis, an approach that parallels mixed research synthesis and qualitative metasummary, enabling the aggregation of diverse findings and strengthening both internal validity and theoretical generalizability (Hong et al., 2017; Sandelowski et al., 2007). While the meta-analysis rigorously aggregates effect sizes (Borenstein et al., 2009), the conceptual analysis reveals latent patterns and interrelations among pedagogical constructs often operationalized inconsistently across studies (Torraco, 2005). This convergent triangulation approach (Creswell & Plano Clark, 2018) allows conceptual themes such as creativity, inclusion, and teacher behavior to complement and contextualize quantitative results. For example, the significant meta-analytic effect for creativity (g = 0.35) converges with the statistically validated co-occurrence between creativity and teacher behavior, reinforcing the pedagogical mechanisms underlying positive outcomes. This

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integrated approach addresses calls for methodological pluralism in educational research (Greenhalgh et al., 2018) and aids in understanding which contextual factors moderate intervention effectiveness.

Creative didactics and creativity outcomes

The observed positive effect of creativity-centered pedagogies (g = 0.35), particularly among younger students and in long-duration interventions, supports embodied cognition theories, which assert that higher-order cognitive processes including creative thinking, are grounded in physical experience and motor engagement (Barsalou, 2008; Wilson, 2002). Creative movement tasks, problem-solving games, and divergent thinking activities within PE are shown to enhance ideational fluency and originality (Domínguez et al., 2015; Latorre Román et al., 2017). Empirical studies further confirm these findings: Sánchez-Cortés et al. (2023) reported significant gains in creative originality and fluency following a 10-week creative dance intervention, and Wassenaar et al. (2020) observed increased creative confidence after movement improvisation sessions. Such evidence elucidates the pedagogical mechanisms including autonomy support and embodied cognition that drive benefits in creative didactics and validate inquiry-based, open-ended learning approaches in PE (Larsson et al., 2024; Quay et al., 2016).

Behavioral and social-emotional competencies

Moderate effect sizes for behavioral and social-emotional competencies (g = 0.40) reinforce self-determination theory's emphasis on autonomy, competence, and relatedness as essential psychological needs for motivation and behavioral regulation (Deci & Ryan, 2000). Interventions that fostered student voice, peer collaboration, and reflective practice were found to improve self-control, empathy, and interpersonal skills (Gil-Madrona et al., 2019; Cheon et al., 2018a). These findings resonate with Buchanan and Hinton (2018), who documented improved peer relationships and reduced behavioral disruptions in autonomy-supportive PE classrooms. They also align with broader social and emotional learning (SEL) literature demonstrating that integration of SEL principles enhances emotional regulation and academic outcomes (Cipriano et al., 2023; Tian et al., 2022; Durlak et al., 2011).

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Physical activity and engagement

Moderate gains in physical activity participation (*g* = 0.38), especially in inclusive and resource-rich settings, highlight the role of culturally responsive pedagogy and equity-focused instruction in increasing activity levels among underrepresented groups (Van Doren et al., 2021). These results are congruent with the Comprehensive School Physical Activity Program (CSPAP) model, which advocates for school-wide, multifaceted PA strategies (Watson et al., 2017; Burns et al., 2016). Application of the theory of planned behavior (Ajzen, 1991) clarifies how fostering positive attitudes and perceived behavioral control promotes sustained physical activity engagement. Supporting this, Centeio et al. (2022) found that that higher teacher efficacy in providing classroom-based physical activity is associated with increased implementation of active practices, promoting greater student engagement and participation.

Technology integration in physical education

Though technology integration yielded a smaller effect size (*g* = 0.29), its influence on personalized learning and student engagement is notable. Digital tools such as wearables, gamification, and feedback systems enhance motivation and self-monitoring when pedagogically aligned, as described by the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006). This insight addresses how teacher behaviors and digital technologies interact to influence engagement, creativity, and collaboration in PE. Empirical evidence from Larsson et al. (2024) indicates that technology-supported interventions in physical education can enhance student engagement and motivation, which in turn promote active participation and improved learning outcomes. Nevertheless, challenges related to infrastructure, teacher digital competence, and equity constrain technology's potential, especially in low-income and rural schools (Mulato et al., 2024).

Holistic and multidimensional development

Effect sizes across cognitive (*g* = 0.33), affective (*g* = 0.31), motor (*g* = 0.36), and self-efficacy (*g* = 0.39) domains support a holistic educational model in which physical activity facilitates comprehensive human development. This is consistent with ecological systems theory, which highlights the dynamic interaction between learners and their

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environments (Bronfenbrenner, 1979), and aligns with the World Health Organization's (2018) framework promoting integrated development through physical activity. These findings affirm how creative pedagogies in PE can support holistic, inclusive, and sustainable student development across diverse educational contexts (Murillo et al., 2025; UNESCO, 2024).

Methodological considerations and future directions

Despite its strengths, this review has limitations. Only two of the 43 included studies were randomized controlled trials, with most employing quasi-experimental or observational designs, limiting causal inference. Moderator analyses suggest that younger students, longer interventions, and well-resourced environments produce stronger outcomes; however, further research is needed on mediators such as teacher fidelity, school climate, and cultural adaptation. Integrating meta-analysis with conceptual analysis enhances construct validity, but synthesizing heterogeneous constructs remains challenging. Future systematic reviews should employ framework-based coding and sequential mixed-method designs, consider unified appraisal tools such as the Mixed Methods Appraisal Tool (Hong et al., 2018) to address heterogeneity in empirical studies, and explore locally co-designed interventions in low-resource or culturally diverse settings to support scalable, equitable creative PE practices.

Conclusion

This systematic review and meta-analysis demonstrates that creative, student-centered pedagogies in physical education (PE) effectively support students' cognitive, emotional, social, behavioral, and physical development. The integration of empirical and conceptual analyses reinforces theoretical frameworks such as self-determination theory, embodied cognition, and ecological systems theory. Contextual factors like age, duration, and school environment, as well as teacher behavior and technology use, were found to moderate outcomes. These findings highlight PE's potential as a holistic educational platform aligned with global policy goals. To maximize impact, future research should strengthen methodological rigor and explore culturally adaptable, sustainable implementations.

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Limitations

This review offers valuable insights into creative, student-centered pedagogies in physical education (PE), though some limitations warrant consideration. Most included studies were quasi-experimental, which may limit causal inference but still reflect authentic educational practice. Variation in participant characteristics, intervention duration, and contextual factors introduced heterogeneity, yet this diversity also enriched the analysis. Additionally, key elements such as teacher fidelity and cultural context were underreported, suggesting areas for deeper exploration. While the majority of studies were conducted in high-income settings, the consistency of positive outcomes supports the broader applicability of creative approaches. Future research in more diverse and low-resource contexts will further strengthen the evidence base and inform equitable implementation.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Almusawi, H. A., Durugbo, C. M., & Bugawa, A. M. (2021). Innovation in physical education: Teachers' perspectives on readiness for wearable technology integration. *Computers & Education, 167*, 104185. https://doi.org/10.1016/j.compedu.2021.104185

Amade-Escot, C., Elandoulsi, S., & Verscheure, I. (2015). Physical education in Tunisia: teachers' practical epistemology, students' positioning and gender issues. *Sport, Education and Society*, *20*(5), 656–675. https://doi.org/10.1080/13573322.2014.997694

Aromataris, E., & Munn, Z. (Eds.). (2020). *JBI manual for evidence synthesis*. Joanna Briggs Institute. https://jbi.global/critical-appraisal-tools

Artiluhung, R. R., Mahendra, A., Yulianto, A. G., & Aman, M. S. (2024). Systematic literature review of strategies for active and creative learning in elementary school physical education. *ACTIVE: Journal of Physical Education, Sport,*

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Health and Recreation, 13(3), 542–547. https://doi.org/10.15294/peshr.v13i3.13854

Banville, D., & White, C. S. (2014). Teacher development through master's coursework: Reflections one year later. *The Physical Educator, 71*(3), 452–474. https://js.sagamorepub.com/index.php/pe/article/view/6104

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology, 59*, 617–645. https://doi.org/10.1146/annurev.psych.59.103006.093639

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Wiley. https://search.worldcat.org/title/Introduction-to-meta-analysis/oclc/263294996

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press. https://search.worldcat.org/title/451363782

Buchanan, A. M., & Hinton, V. (2018). *Positive behavior support in physical education: A case from a pre-service field experience. International Journal of Learning, Teaching and Educational Research, 17*(2), 74–86. https://doi.org/10.26803/ijlter.17.2.5

Burns, R. D., Fu, Q., & Hannon, J. C. (2016). Comprehensive school physical activity programming and classroom behavior. *American Journal of Health Behavior,* https://doi.org/10.5993/AJHB.40.1.11

Byra, M., Sanchez, B., & Wallhead, T. L. (2014). Behaviors of students and teachers in the command, practice, and inclusion styles of teaching: Instruction, feedback, and activity level. European Physical Education Review, 20(1), 3–19. https://doi.org/10.1177/1356336X13495999

Camacho-Sánchez, R., Manzano-León, A., Rodríguez-Ferrer, J. M., Serna, J., & Lavega-Burgués, P. (2023). Game-based learning and gamification in physical education: A systematic review. *Education Sciences, 13*(2), 183. https://doi.org/10.3390/educsci13020183

Carl, J., Barratt, J., Wanner, P., Töpfer, C., Cairney, J., & Pfeifer, K. (2022). The effectiveness of physical literacy interventions: A systematic review with

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meta-analysis. *Sports Medicine, 52*(12), 2965–2999. https://doi.org/10.1007/s40279-022-01738-4

Cengiz, C., Güler, D., Güler, Y., & Tuncel, S. (2023). The effect of design thinking on the creative thinking of physical education and sports teachers. *African Educational Research Journal, 11*(1), 56–63. https://doi.org/10.30918/AERJ.111.23.009

Centeio, E. E., Moore, E. W. G., Barcelona, J., McKown, H. B., Erwin, H. E., & Garn, A. C. (2022). Development of the teacher efficacy toward providing physical activity in the classroom scale. *International Journal of Physical Activity and Health*, 1(1), Article 4. https://doi.org/10.18122/ijpah1.1.4.boisestate

Cheon, S. H., Reeve, J., & Ntoumanis, N. (2018a). A needs-supportive intervention to help PE teachers enhance students' prosocial behavior and diminish antisocial behavior. *Psychology of Sport and Exercise, 35*, 74–88. https://doi.org/10.1016/j.psychsport.2017.11.010

Cheon, S. H., Reeve, J., Lee, Y., & Lee, J.-W. (2018b). Why autonomy-supportive interventions work: Explaining the professional development of teachers' motivating styles. *Teaching and Teacher Education, 69*, 43–51. https://doi.org/10.1016/j.tate.2017.09.022

Cipriano, C., Strambler, M. J., Naples, L. H., Ha, C., Kirk, M., Wood, M., … & Durlak, J. A. (2023). The state of evidence for social and emotional learning: A contemporary meta-analysis of universal school-based SEL interventions. *Child Development, 94*(5), 1181–1204. https://doi.org/10.1111/cdev.13968

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage Publications.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Domínguez, R., Díaz-Pereira, M. P., & Martínez-Vidal, A. (2015). The evolution of motor creativity during primary education. *Journal of Human Sport and Exercise, 10*(1), 275–281. https://doi.org/10.14198/jhse.2015.101.20

Drummy, C., Murtagh, E. M., McKee, D. P., Breslin, G., Davison, G. W., & Murphy, M. H. (2016). The effect of a classroom activity break on physical activity levels and adiposity in primary school children. *Journal of Paediatrics and Child Health, 52*(7), 745–749. https://doi.org/10.1111/jpc.13182

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405–432. https://doi.org/10.1111/j.1467-8624.2010.01564.x

Ennis, C. D. (2015). Knowledge, transfer, and innovation in physical literacy curricula. *Journal of Sport and Health Science, 4*(2), 119–124. https://doi.org/10.1016/j.jshs.2015.03.001

Gil-Espinosa, F. J., Nielsen-Rodríguez, A., Romance, R., & Burgueño, R. (2022). *Smartphone applications for physical activity promotion from physical education*. Education and Information Technologies, 27(8), 11759–11779. https://doi.org/10.1007/s10639-022-11108-2

Gil-Madrona, P., Gutiérrez-Marín, E. C., Cupani, M., Samalot-Rivera, A., Díaz-Suárez, A., & López-Sánchez, G. F. (2019). The effects of an appropriate behavior program on elementary school children's social skills development in physical education. *Frontiers in Psychology, 10*, 1998. https://doi.org/10.3389/fpsyg.2019.01998

Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., & Hughes, G. (2017). Beyond adoption: A new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. *Journal of Medical Internet Research, 20*(11), e367. https://doi.org/10.2196/jmir.8775

Hinton, V., & Buchanan, A. M. (2015). Positive behavior interventions and support in a physical activity summer camp. The Physical Educator, 72(4), 660–676. https://doi.org/10.18666/TPE-2015-V72-I4-7141

Hong, Q. N., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., … Vedel, I. (2018). *Mixed Methods Appraisal Tool (MMAT), version 2018: User guide*. Canadian Intellectual Property Office.

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https://doi.org/10.17979/sportis.2026.12.2.12602

Hortigüela-Alcalá, D., Fernández-Río, J., & Pérez-Pueyo, Á. (2016). Long-term effects of the pedagogical approach on the perceptions of physical education by students and teachers. *Journal of Physical Education and Sport, 16*(4), 1326–1333. https://doi.org/10.7752/jpes.2016.04210

Kirk, D. (2017). Teaching games in school physical education: Towards a pedagogical model. *Revista Portuguesa de Ciências do Desporto, 17*(S1A), 17–26. https://doi.org/10.5628/rpcd.17.S1A.17

Konstantinidou, E. (2014). Creativity in physical education: Emphasis and development. *Inquiries in Physical Education and Sport*, 12(2), 131–140. https://doi.org/10.26253/heal.uth.ojs.ispe.2014.1426

Konstantinidou, E. P., & Zisi, V. Z. (2017). Do physical educators promote students' creativity? An observational analysis study. *The Physical Educator, 74*(3), 7407. https://doi.org/10.18666/TPE-2017-V74-I3-7407

Larsson, H., Barker, D., Ekberg, J.-E., Engdahl, C., Frisk, A., & Nyberg, G. (2024). Creative dance – practising and improving … what? A study in physical education teacher education. *European Physical Education Review, 31*(1), 163–179. https://doi.org/10.1177/1356336X241254284

Latorre Román, P. Á., García Pinillos, F., Pantoja Vallejo, A., & Berrios Aguayo, B. (2017). Creativity and physical fitness in primary school-aged children. *Pediatrics International, 59*(11), 1194–1199. https://doi.org/10.1111/ped.13391

Li, M., & Ren, Y. (2023). Physical education graduate students' learning about innovation skill development. *Advances in Educational Technology and Psychology, 7*, 73–80. https://doi.org/10.23977/aetp.2023.070714

López Jiménez, J., Valero-Valenzuela, A., Anguera, M. T., & Díaz Suárez, A. (2016). Disruptive behavior among elementary students in physical education. *SpringerPlus, 5*, 1154. https://doi.org/10.1186/s40064-016-2764-6

Luteijn, P. J., van der Wurff, I. S. M., Tuijl, P., Singh, A. S., Savelberg, H. H. C. M., & de Groot, R. H. M. (2023). The effect of standing versus sitting on creativity in adolescents -A crossover randomized trial: The PHIT2LEARN study. *Mind, Brain, and Education, 17*(3), 209–218. https://doi.org/10.1111/mbe.12381

Review. Creative student-centered pedagogies in physical education: a systematic review and meta-analysis of multidimensional outcomes. Vol. 12, n. º 2; p. 1-37, April 2026.
https://doi.org/10.17979/sportis.2026.12.2.12602

Mast, D., Schipper, S., van Doorn, F., Schut, A., Gielen, M., & de Vries, S. (2018). *Creativity in co-design for physical education: Comparing contributions of children and professionals*. In Interactivity, Game Creation, Design, Learning, and Innovation. ARTSIT & DLI 2017, *Lecture Notes in Computer Science* (LNICST, Vol. 229, pp. 469–478). Springer. https://doi.org/10.1007/978-3-319-76908-0_45

McKenzie, T. L., & Lounsbery, M. A. F. (2014). The Pill Not Taken: Revisiting Physical Education Teacher Effectiveness in a Public Health Context. *Research Quarterly for Exercise and Sport*, *85*(3), 287–292. https://doi.org/10.1080/02701367.2014.931203

Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Heliyon, 9*(6), Article e16348. https://doi.org/10.1016/j.heliyon.2023.e16348

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine, 6(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097

Mong, H. H., & Standal, Ø. F. (2019). Didactics of health in physical education – a review of literature. *Physical Education and Sport Pedagogy, 24*(5), 506–518. https://doi.org/10.1080/17408989.2019.1631270

Mulato, N., Hidayatulloh, F., Purnama, S. K., & Syaifullah, R. (2024). Optimization of learning physical education in digital era: A systematic review. *Retos, 54*, 844–849. https://doi.org/10.47197/retos.v54.105211

Murillo-Pulido, J. L., Amar-Cantos, F. E., Aguilar-Herrero, M. D., Rodríguez-Cano, A., & Armada-Crespo, J. M. (2025). Emotional intelligence in physical education in primary education: A systematic review. *Healthcare, 13*(23), 3166. https://doi.org/10.3390/healthcare13233166

Oh, H., & Rana, S. (2014). Pedometer-assessed physical activity levels of rural Appalachian youth. The Physical Educator, 71(4), 539–557. https://js.sagamorepub.com/index.php/pe/issue/view/559

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, n71. https://doi.org/10.1136/bmj.n71

Pahlawani, K. A., & Nining, N. (2023). Teacher creativity and innovation influence the quality of learning, which impacts learning achievement in physical education. *Jurnal Konseling dan Pendidikan, 11*(4), 330–338. https://doi.org/10.29210/1105000

Peng, S., Khairani, A. Z., Yuan, F., Uba, A. R., & Yang, X. (2024). Behavior change techniques in physical activity interventions targeting overweight and obese children and adolescents: A systematic review. *Behavioral Sciences, 14*(12), 1143. https://doi.org/10.3390/bs14121143

Piaget, J. (1952). *The origins of intelligence in children.* (M. Cook, Trans.). W. W. Norton & Company. https://doi.org/10.1037/11494-000

Piya-amornphan, N., Santiworakul, A., Cetthakrikul, S., & Srirug, P. (2020). Physical activity and creativity of children and youths. *BMC Pediatrics, 20*, 118. https://doi.org/10.1186/s12887-020-2017-2

Pollock, M., Fernandes, R. M., Becker, L. A., Pieper, D., & Hartling, L. (2021). Chapter V: Overviews of reviews. In J. P. T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page, & V. A. Welch (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021)*. Cochrane. Available from https://training.cochrane.org/handbook

Quay, J., Kokkonen, J., & Kokkonen, M. (2016). Finnish interpretations of Creative Physical Education. *Asia-Pacific Journal of Health, Sport and Physical Education*, *7*(2), 173–190. https://doi.org/10.1080/18377122.2016.1196115

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Scientific Technical Journal of School Sport, Physical Education and Psychomotricity

Ramon-Romance, A., Nielsen-Rodríguez, A., Mendes, R. S., Dobado-Castañeda, J. C., & Dias, G. (2023). The influence of physical activity on the creativity of 10- and 11-year-old school children. *Thinking Skills and Creativity, 48*, Article 101295. https://doi.org/10.1016/j.tsc.2023.101295

Rodríguez-Negro, J., Pasarín-Lavín, T., & Suarez-Manzano, S. (2024). Creativity outcomes of physical activity interventions for children and adolescents: A systematic review. *Thinking Skills and Creativity, 54*, Article 101644. https://doi.org/10.1016/j.tsc.2024.101644

Sandelowski, M., Voils, C. I., & Barroso, J. (2007). Using qualitative metasummary to synthesize qualitative and quantitative descriptive findings. *Research in Nursing & Health*, 30(1), 99–111. https://doi.org/10.1002/nur.20176

Schellenberg, B. J. I., Verner-Filion, J., Gaudreau, P., & Mbabaali, S. (2021). The two dimensions of passion for sport: A new look using a quadripartite approach. *Journal of Sport and Exercise Psychology, 43*(6), 459–476. https://doi.org/10.1123/jsep.2021-0048

Simonton, K. L., Layne, T. E., & Irwin, C. C. (2021). Project-based learning and its potential in physical education: an instructional model inquiry. *Curriculum Studies in Health and Physical Education, 12*(1), 36–52. https://doi.org/10.1080/25742981.2020.1862683

Tian, L., & Shen, J. (2023). *The effect of perceived teachers' interpersonal behavior on students' learning in physical education: a systematic review.* Frontiers in Psychology, 14, 1233556. https://doi.org/10.3389/fpsyg.2023.1233556

Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review, 4*(3), 356–367. https://doi.org/10.1177/1534484305278283

United Nations Educational, Scientific and Cultural Organization & Loughborough University. (2024). *The global state of play: Report and recommendations on quality physical education*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000390593

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Van Doren, N., De Cocker, K., De Clerck, T., Vangilbergen, A., Vanderlinde, R., & Haerens, L. (2021). The relation between physical education teachers' (de-)motivating style, students' motivation, and students' physical activity: A multilevel approach. *International Journal of Environmental Research and Public Health, 18*(14), 7457. https://doi.org/10.3390/ijerph18147457

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wassenaar, T. M., Williamson, W., Johansen-Berg, H., Dawes, H., Roberts, N., Foster, C., & Sexton, C. E. (2020). A critical evaluation of systematic reviews assessing the effect of chronic physical activity on academic achievement, cognition and the brain in children and adolescents: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 17*(1), 79. https://doi.org/10.1186/s12966-020-00959-y

Watson, A., Timperio, A., Brown, H., Best, K., & Hesketh, K. D. (2017). Effect of classroom-based physical activity interventions on academic and physical activity outcomes: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 14*, 114. https://doi.org/10.1186/s12966-017-0569-9

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review, 9*(4), 625–636. https://doi.org/10.3758/BF03196322

World Health Organization. (2018). *Global action plan on physical activity 2018–2030: more active people for a healthier world*. World Health Organization. https://iris.who.int/handle/10665/272722

Zhou, D., Zhu, D., Zhang, F., Li, G., & Zong, K. (2021). Modern physical education and its influence on students' entrepreneurial psychology in sports universities. *Frontiers in Psychology, 12*, 751176. https://doi.org/10.3389/fpsyg.2021.751176

Zhou, X., & Qi, Y. (2022). Development of creativity in physical education teachers using interactive technologies: Involvement and collaboration. *Education and Information Technologies, 28*(5), 5763–5777. https://doi.org/10.1007/s10639-022-11422-9