education sciences

MDPI

Systematic Review

Effect of the use of new technologies on mental health in Physical Education students: a systematic review

Abstract

Background/Objectives: In today's society, the use of new technologies in education has become increasingly relevant. In the subject of Physical Education, these tools offer resources to increase motivation and a better academic monitoring of students. However, their use has also generated academic debate. This systematic review aims to analyse the educational impact of the use of new technologies and their effect on mental health and academic performance in Physical Education students. **Methods**: The PRISMA Statement was used. A literature search was conducted from January 2020 to April 2025 in the databases Web of Science, Scopus, SPORTDiscus and Dialnet. To refine the search process, the following research question was posed, following the PICO model: In Physical Education students, what is the educational effect of the use of digital technology on mental health and academic performance in teaching practice? The Mixed Methods Appraisal Tool was used to assess the quality of the studies analysed. **Results**: From a total of 897 articles, 27 relevant papers were selected and classified according to: authors, manuscript title, year of publication, population, main objective, type of design, digital tool, results and conclusions. **Conclusions**: The findings of this systematic review underline the importance of adopting a constructivist approach to the use of technological resources in Physical Education classes, without losing sight of the motor component, competence learning and the mental well-being of students.

Keywords: digital technology; physical education; healthcare; academic performance.

1. Introduction

Currently, the use of digital technologies in education has represented a turning point in the teaching-learning processes, because it enables more personalised pedagogical experiences, promotes a higher degree of student involvement and contributes to improved academic performance (Gros, 2015; Herman, 2018). In this sense, one of the main contributions of these new tools to education is the possibility of providing different methodological resources based on multimedia elements, such as, for example, videos, simulations or interactive activities, with the main aim of achieving competent students (Espinosa et al., 2017). These elements not only make the teaching process more dynamic, but also offer multiple ways of working by interconnecting content, thus improving understanding and the acquisition of concepts, procedures and attitudes and, therefore, student learning (Barboto et al., 2025; Herrera et al., 2024; Huillca et al., 2024).

Another significant advance in the use of new technologies in the classroom is their use together with active methodologies (Arabait-García et al., 2023). Therefore, a clear example of this is gamified learning situations that, through new technologies, incorporate motivating and novel elements such as badges, classifications or interactive challenges, which can increase student participation (Céspedes, 2025; Tolentino et al.,

2023; Valencia et al., 2025; Zambrano et al., 2022). Apart from gamification, there are other methodologies that are currently relying on the use of digital media due to their multiple benefits, such as Project Based Learning, Flipped Classroom or Service-Learning (Caicedo, 2025; López & Lizcano, 2022; Santágueda et al., 2021).

On the other hand, digital technologies are positioned within the educational sphere as one of the most useful resources for increasing and strengthening student engagement, influencing their academic performance in a decisive way (Pérez-Díaz et al., 2023). In fact, research by Akpen et al. (2024) and Vieriu & Petrea (2025) highlights the importance of integrating digital tools into educational environments, as they promote academic performance and enhance student engagement in the classroom, provided they are used appropriately.

However, beyond their function as a means of accessing information, these technological resources promote flexible, personalised and motivating learning environments, in which all students can make decisions and manage their learning with greater autonomy (Larrañaga et al., 2023; Matheu-Pérez et al., 2024; Omarov et al., 2024; Zermeño et al., 2022). Within these innovative actions, the adaptive learning platforms stand out, which offer work guidelines adjusted to the characteristics of each student, offering additional support for those contents that require more attention, and, at the same time, allowing agile progress in those that are already consolidated (Jácome et al., 2025; Sanmartín et al., 2024).

In addition to improving student motivation and autonomy, the use of these tools brings many advantages in terms of sharing results and providing feedback on the activities carried out during the student's training process (Guaña et al., 2023; Posso et al., 2023). This is due to a faster and more direct form of communication, avoiding the long waits associated with more traditional methods, which often lead to disinterest or lack of commitment (Fernández-Baños & Baena-Extremera, 2018; Sepúlveda-Romero, 2019).

All these improvements are particularly relevant in Physical Education (PE), where the use of new technologies has increased exponentially, as they facilitate the monitoring of the teaching-learning process, improve the organisation of tasks and encourage student interest and participation (Díaz-Barahona, 2020; Fernández-Baños & Baena-Extremera, 2018; Pérez-Díaz et al., 2023). Within the context of this subject, continuous feedback is key for students to identify how to improve their skills and decision-making during the sessions, as the immediacy of the feedback helps to build their confidence and maintain their active motivation during physical-sport practice (Bofill et al., 2025; Magdaleno et al., 2023).

Also, in the area of PE, digital tools add value to learning by stimulating students' creativity and critical thinking (Nuraini et al., 2023). Several studies have shown how these resources facilitated the understanding of content by presenting information in an attractive and dynamic way, which helped students to develop creative skills to solve problems more effectively (Díaz-Barahona et al., 2020; Moreno, 2022; Quilindo, 2023).

Morever, the use of these technologies in PE should be worked with caution and never in excess, ensuring that the physical-sporting and active component that characterises this subject is not lost (García et al., 2015; Fernández-Espínola & Ladrón-Moreno, 2016). The presence of technological devices can alter the pace of the sessions or reduce the time dedicated to motor engagement, which requires reflection on when and how to integrate them appropriately (Carrasco et al., 2021; García et al., 2015).

Therefore, the use of these tools should be careful and planned, as excessive use can lead to negative physical effects such as eyestrain, poor sleep quality or difficulties in disconnecting from digital environments (Castillo-Riquelme et al., 2023; De la Hoz, 2018; Pascuas-Rengifo et al., 2020; Prieto, 2021). These effects are aggravated when healthy lifestyle habits related to the moderate use of mobile devices are not promoted or when clear limits on usage times are not established (Besolí et al., 2018; García-Soidán et al., 2020).

Furthermore, another negative aspect of the overuse of new technologies is their adverse effects on mental health, since uncontrolled use of these technologies affects the emotional regulation of students, as it causes an increase in anxiety levels or can even lead to social isolation (Almodóvar-Fuentes et al., 2023; Castillo-Riquelme et al., 2023), generating dependence or compulsive behaviour, especially at an early age (Pérez-Cabrejos et al., 2021). The need to constantly check the phone, even during study or break time, can lead to a loss of attention span and an increased level of stress (Besolí et al., 2018; Toctaguano & Eugenio, 2023).

Therefore, the role of teachers is key. The integration of technologies must be accompanied by teacher training that includes not only technical mastery, but also emotional management, psychosocial risk prevention and the promotion of a balanced use of digital tools (Castro-Palomino & Coras, 2024; Viñals & Cuenca, 2016).

In summary, the presence of technologies in the learning environment offers a dynamic and adaptive approach to learning, facilitating personalisation and access to content (La Rosa, 2021; Mateo-Orcajada et al., 2025). However, their intensive use can affect students' emotional well-being, so digital resources must be incorporated consistently and with the intention of keeping students active through social and dynamic activities (Kucera et al., 2022).

Therefore, the main objective of the research was to analyse the educational impact of the use of new technologies and their effect on the mental health of students in the area of PE.

2. Materials and Methods

The study carried out a systematic review following the PRISMA Statement (Preferred Reporting Items for Systematic reviews and Meta-Analyses) (Page et al., 2021) with the aim of providing a synthesis of the existing scientific literature on digital technology in the educational phenomenon, and specifically in the subject of PE.

The start of the process was to register the protocol with PROSPERO (CRD420251101732), to avoid duplication, reduce bias and ensure methodological transparency in the study.

Specifically, in May 2025, an exhaustive search was conducted of research published from January 2020 to April 2025, following specific guidelines and taking into account the points on the PRISMA statement checklist (Page et al., 2021) to ensure a comprehensive information process. The last five years were selected in order to understand the evolution and impact of the use of digital technology in PE classes following the global COVID-19 pandemic.

In order to refine the efficiency of the search process, the PICO model, consisting of the elements of population (P), intervention (I) and outcomes/effects (O), was used as a reference (Richardson et al., 1995). In this case, the 'C' (comparison) component was omitted due to the absence of comparative analyses with other variables. Based on these criteria, the following research question was formulated: In PE students, what is the educational effect of digital technology use on mental health in teaching practice?

As for the search strategy, the following string of words was used by combining Boolean operators, following the terms considered by the UNESCO Thesaurus: "Physical Education" AND ("Digitization" OR "Digital Technology") AND "Mental Health". Finally, the following eligibility criteria were applied to proceed with the selection of studies (Table 1).

Table 1. Eligibility criteria for the selection process

Inclusion Criteria	Exclusion Criteria
Type of document: scientific articles.	Types of documents other than research articles, as well as validation of

	questionnaires, systematic reviews, narratives and/or meta-analyses.
Articles published in the following databases: Web of Science, Scopus, SPORTDiscus and Dialnet.	Duplicate manuscripts and manuscripts without full access to information are excluded.
Research carried out in the educational field, exclusively in the subject of PE, and within the stage of Primary Education and/or Secondary Education and Spanish baccalaureate and/or in other countries similar to the Spanish educational system.	Studies that address digital technology outside educational contexts and in early childhood education, university degrees or bachelor's degrees, and postgraduate studies.
Studies that include digital technology in the subject of PE.	Studies that do not include digital technology in the subject of PE.
Publication period from January 2020 to April 2025.	Studies that do not fall within the established time period.

In the second phase of the process, we started with the selection of a total of 897 pieces of scientific evidence found in the selected databases (Table 2).

Table 2. Search strategy and Boolean combinations

Search strategy	WoS	Scopus	Dialnet	SPORTDiscus
"Physical Education" AND ("Digitization" OR "Digital Technology") AND "Mental Health"	n=306	n=494	n=47	n=50

WoS = *Web of Science*

As a first step, 11 studies were discarded as duplicate records, so that 886 publications were analysed in a first screening by title and abstract. This was followed by a second screening in which 68 scientific articles were analysed in full text. To conclude the search strategy, 27 manuscripts were finally selected for data extraction. All the above points about the selection process are detailed in the PRISMA flowchart (Figure 1).

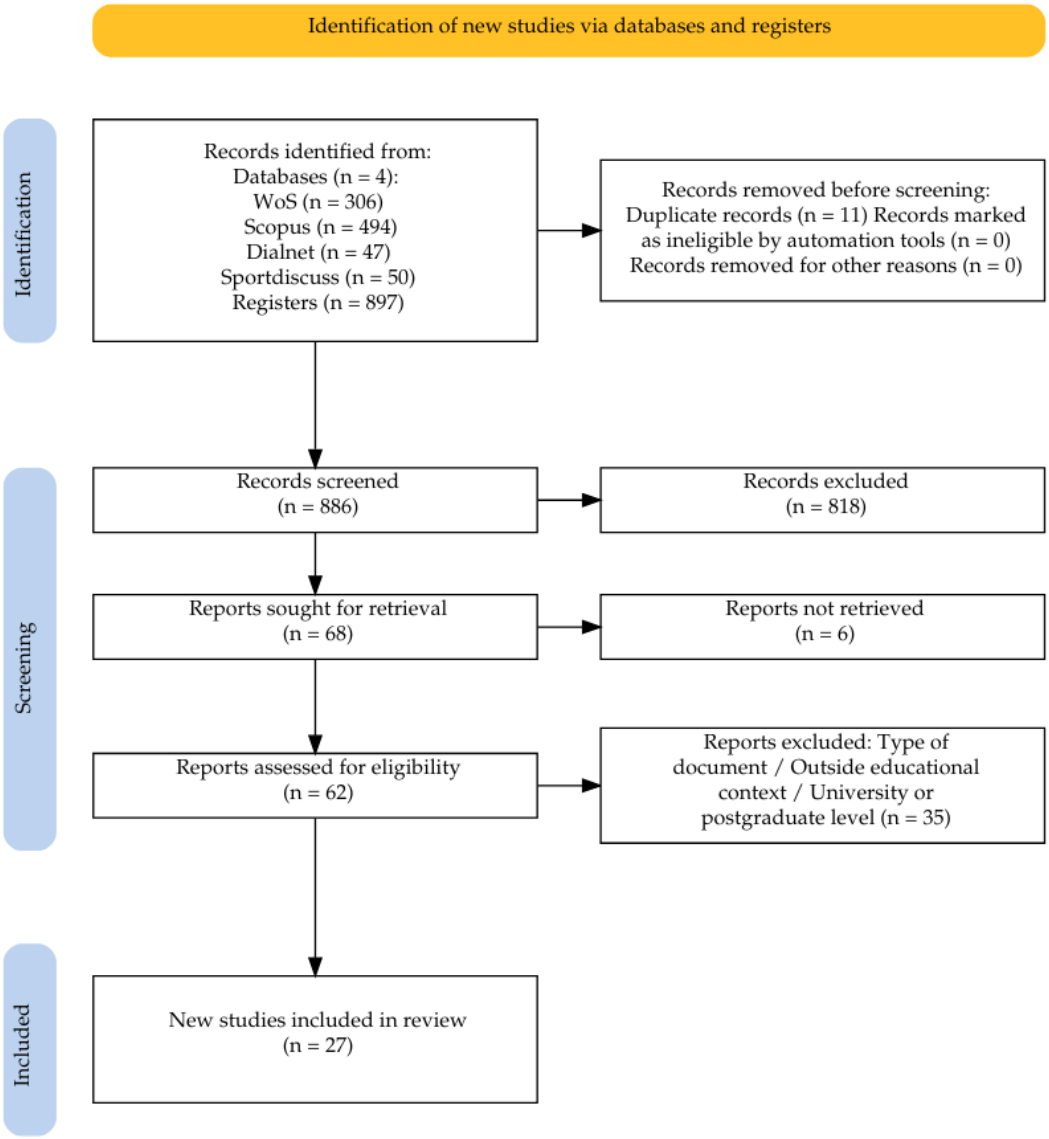


Figure 1. Flow diagram of included studies (PRISMA Statement 2020) (Haddaway et al., 2022)

Subsequently, the methodological quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT), designed to systematically appraise qualitative, quantitative and mixed methods studies within systematic reviews (Pluye et al., 2011). For this work, we used the updated 2018 version, which includes specific criteria and guidelines for summarising results descriptively or with a standardised scoring system (Hong et al., 2018).

In this review, four researchers independently assessed the 27 articles, applying the specific items according to the design of each study. Inter-rater agreement was high (Kappa index = 0.85), and, after this phase, discrepancies were discussed in consensus meetings until the final rating was agreed. Each study was categorised using this system to reflect the degree of compliance with the quality criteria: *(20 % of criteria), **(40 %), ***(60 %), ****(80 %) and *****(100 %) (Figure 2). All selected articles reached sufficient levels of quality for inclusion in the review. The distribution of the articles, according to these categories, is detailed in the corresponding column of the results section.

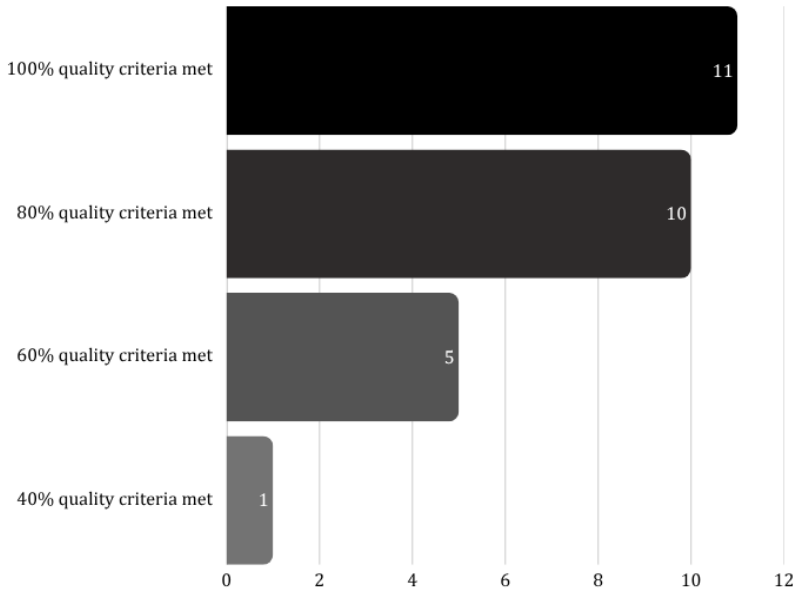


Figure 2. Article quality percentage based on the Kappa index

Finally, a coding manual with the main characteristics of the selected studies was developed in order to address the research question.

3. Results

Considering the results of the present review, 27 studies were selected for data extraction using a coding manual detailing the characteristics of the study, which were classified according to: authors, title of the manuscript, year of publication, target population, main objective, type of design, digital tool, results and conclusions. In this way, a synthesis was made, clearly detailing the characteristics of the manuscripts for subsequent reflection (Table 3).

According to the year of publication of the manuscripts, the year 2021 presented the highest number of published studies with a total of nine, followed by 2024 with six publications, four in 2022 and 2023, three in 2025 and one study in 2020 (Figure 3).

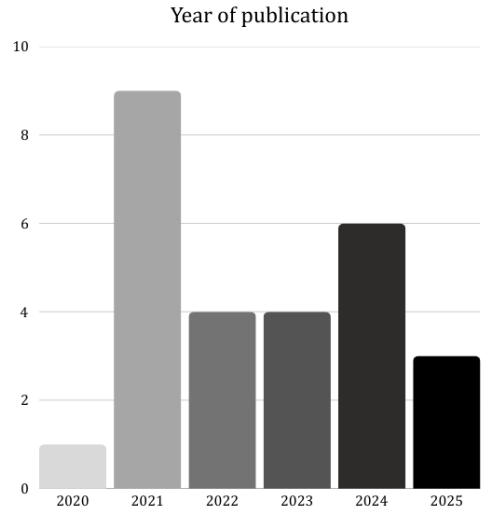


Figure 3. Distribution of studies by year of publication

Considering the population of the selected studies, six research studies were analysed at the Primary Education stage, eight at the Secondary Education stage, four included the two previous stages, one was studied at Baccalaureate, two combined Secondary Education and sixth form and, finally, six manuscripts focusing on teachers in the educational field were analysed (Figure 4).

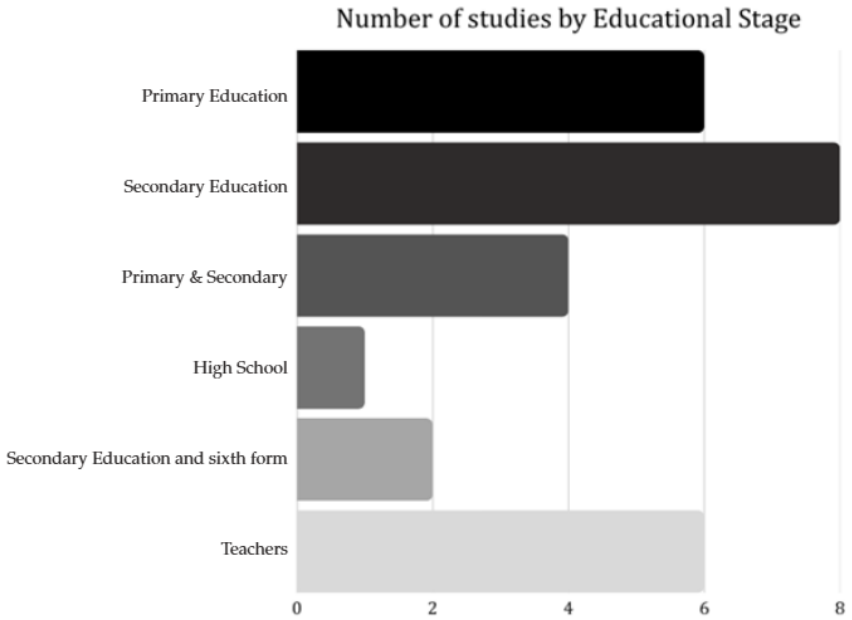


Figure 4. Distribution of studies according to educational stage

In terms of research design, 11 studies used a qualitative approach, 10 used a non-randomised quantitative methodological design, one study used a randomised controlled trial, two used a descriptive quantitative approach, and three used mixed methods. Figure 5 shows the distribution of studies with percentage data.

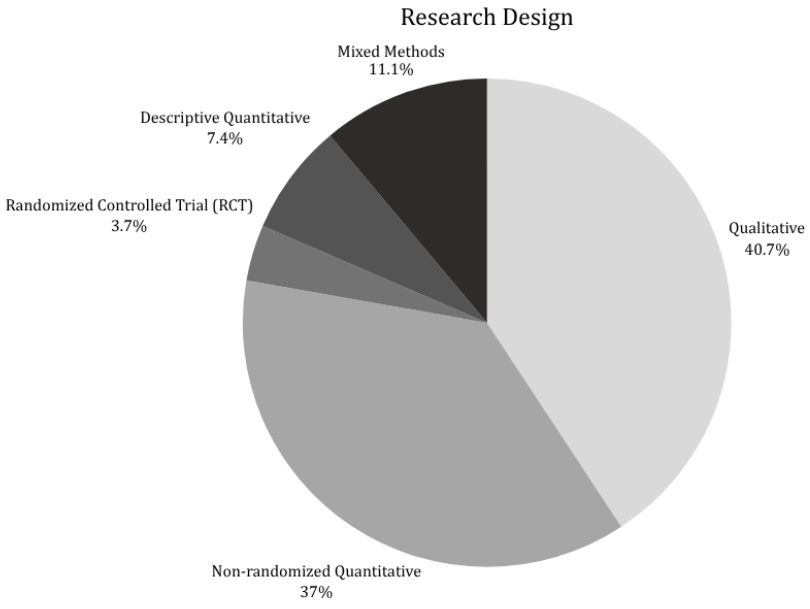


Figure 5. Distribution of studies according to methodological approach (N = 27). Qualitative (n = 11), Non-randomised Quantitative (n = 10), Mixed Methods (n = 3), Descriptive Quantitative (n = 2), Randomised Controlled Trial (n = 1)

In addition to the above, the following thematic fields were identified to analyse the articles; a) Methodologies and evaluation; b) Motivation, enjoyment and interest; c) Video games, Augmented Reality (AR) and video analysis systems; d) Physical and cognitive dimension; e) Teacher training; f) Digital technologies during COVID-19; g) Digital divide.

In the first area, studies by Fuentes-Nieto et al. (2023); Mateo-Orcajada et al. (2025); Petrušič & Štemberger (2021); Valdez et al. (2023) raised the need to reconfigure the PE curriculum by integrating digital technology, through the application of formative and innovative assessments and active methodologies such as gamification.

According to the second categorisation, the findings of Castillo-Peláez & Salazar-Ruiz (2021); Gomes et al. (2024); La Rosa (2021); Omarov et al. (2024); Papastergiou et al. (2021); Rutkauskaite et al. (2022); Sánchez-Martínez et al. (2024); Soto et al. (2020); Zapata-Agudelo et al. (2023) supported the improvement in motivation, enjoyment and interest in PE, reflecting the idea that digital resources are a potential enabler.

Regarding the next dimension, research by Cece et al. (2025); Faruk et al. (2025); Gomes et al. (2024); Mateo-Orcajada et al. (2025); Nuraini et al. (2023); Omarov et al. (2024); Sánchez-Martínez et al. (2024); Valdez et al. (2023) implemented video games, AR technology and visual interpretation systems, demonstrating that they can enrich the student learning process significantly.

Regarding the physical and cognitive component, there was evidence of improved academic performance and understanding of PE content, and attention, problem solving and creativity were enhanced by integrating interactive digital media (Abadi et al., 2024; Cece et al., 2025; Faruk et al., 2025; Frömel et al., 2021; Lan et al., 2022; Mödinger et al., 2024; Nuraini et al., 2023; Valdez et al., 2023; Zapata-Agudelo et al., 2023).

In the fifth area of teacher training, the authors' evidence (Castillo-Peláez & Salazar-Ruiz, 2021; Matheu-Pérez et al., 2024; Parris et al., 2022; Rutkauskaite et al., 2022; Webster et al., 2021; Wyant et al., 2021) pointed to the need for teachers to adapt to and be familiar with digital tools in order to provide quality teaching based on digital competence (Castillo-Peláez & Salazar-Ruiz, 2021; Matheu-Pérez et al., 2024; Parris et al., 2022; Rutkauskaite et al., 2022; Webster et al. 2021; Wyant et al., 2021).

The sixth category, related to digital media in PE that were used during the global pandemic, showed a significant increase in their application due to the situation caused by COVID-19. However, the need for effective use in subsequent years was raised (Fuentes-Nieto et al., 2023; Kucera et al., 2022; López-Secanell, 2021; Parris et al., 2022; Talero-Jaramillo & Guarnizo-Carballo, 2022; Valdez et al., 2023; Webster et al., 2021; Zapata-Agudelo et al., 2023).

In relation to the last area on the current presence of the digital divide, the studies of Fuentes-Nieto et al. (2023); Matheu-Pérez et al. (2024); Parris et al. (2022); Webster et al. (2021) detected technological inequalities, recognising the need to establish institutional support (Figure 6).

From each study, the values represented were grouped according to the main subject area. Thus, the figure reflects the number of studies associated with each dimension, which facilitates distribution and interpretation.

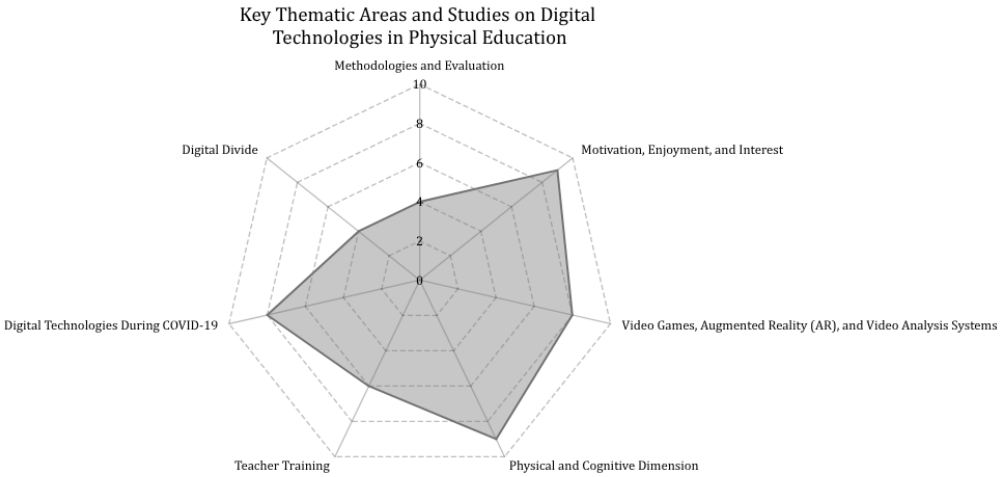


Figure 6. Number of studies associated with each subject area

The coding manual, including the 27 articles included for data extraction, is presented below (Table 3).

248 **Table 3.** Characteristics of the studies included in this systematic review and the use of new technologies in PE.

Author(s) and year	Title	Population	Main Objective	Design	Digital Tool	Results and conclusions	Quality
Soto et al. (2020)	Didactic innovations in PE, observation with LINCE PLUS software.	High School students (n= 24)	To propose activities that include the filming of rhythmic activities and to analyse their execution using the LINCE PLUS software as a technological tool, in order to observe possible improvements in practice and to favour self-learning and co-evaluation.	Quantitative non-randomised	Google Classroom, Moodle, LINCE PLUS, smartphones	The study showed an increase in satisfaction with an immersive experience using the new technologies, and had a positive effect in creating a motivating environment and enhancing learning in the digital environment. However, it is recommended to optimise the use of the software.	*****
Castillo-Peláez & Salazar-Ruiz (2021)	TICs and their use in the subject of PE in primary education	Primary School Teachers (N= 14)	To reflect on the evolution of digital technology in the field of PE and analyse the resources available to schools.	Mixed Methods	Tablets, digital whiteboards, games such as escape romos with ICT, Kahoots, Gymkana with tablets, Flipped Classroom with platforms, health monitoring apps, virtual reality or augmented for sports, JCLIC, GEOGEBRA, JUEDULAND, PASAPALABRA with PowerPoints.	The use of digital technologies in the PE classroom is recommended in order to create interactive and dynamic experiences. Furthermore, it is highlighted that they are beneficial and motivating for students. However, the teacher needs to be trained in ICT for teaching.	****
Frömel et al. (2021)	A higher step count is associated with the better evaluation of PE	Secondary school students (N= 4092)	To evaluate the recording of students' steps in PE sessions, analyse physical effort	Quantitative non-randomised	Yamax Digiwalker SW-700 Pedometers	A higher number of steps is associated with a positive evaluation towards PE. Therefore, the use of electronic devices in PE functions as an incentive and	*****

	lessons in adolescents	Average age: 16,27 years old	and its results, and investigate whether they comply with PE recommendations.			promotion of physical activity in school settings.	
La Rosa-Feijoó (2021)	Information and communication technologies in the learning of secondary school PE students.	Secondary students (N=92)	To analyse the influence of digital technologies on the development of learning in the subject of PE.	Quantitative non-randomised	Technological tools for PE content.	The use of digital technologies in the subject of PE demonstrated a positive and significant impact on student learning. Consequently, teachers are recommended to incorporate ICT as a highly dynamic resource, motivating students and improving their knowledge.	****
López-Secanell (2021)	Analysis of the use of digital tools in PE before and during the COVID-19.	PE Teachers n=256	To analyse the digital tools that were used before and during the COVID-19 pandemic.	Cuantitativo descriptivo	Kahoot, Blogs, wikis, Google suite, Skype, Hangouts, Zoom, Google Forms, Dropbox, Google Drive, Moodle, Google Classroom, Word, Excel, PowerPoint, e-mail and social media.	PE teachers increased their use of digital tools during COVID-19, but the need to learn about new digital platforms and their relationship with PE was raised.	****
Papastergiou et al. (2021)	Introducing tablets and a mobile fitness application into primary school PE	Primary school students (N=145) Ages 10-12 years)	To evaluate the impact on motivation in a Primary School PE class, by incorporating tablets and a mobile application for fitness development.	Randomised controlled trials	Tablets, mobile fitness app 'Sworkit Kids'.	The implementation of tablets and a mobile fitness application showed a positive effect on students' intrinsic motivation, increasing their interest and enjoyment towards the subject of PE.	****
Petrušič & Štemberger (2021)	Effective PE Distance Learning Models during the Covid-19 Epidemic	198 students in Primary and Secondary Education (Average age: 12,5 years)	To identify the PE teaching model that drives physical activity levels during COVID-19.	Quantitative non-randomised	Accelerometers (MMOXX1.07), Zoom platform, multimedia tools	Flipped Classroom/Flipped Learning model was the most effective model for teaching PE with respect to the degree of intensity of physical activity.	**
Talero-Jaramillo & Guarnizo-	PE curriculum in e-learning and b-	Aimed at primary school	To offer indications on Information and Communication	Qualitative	Wereable technology, Youtube, Vimeo, LINCE PLUS programme, Meet,	Due to COVID-19, an increase in the use of digital tools within the subject of PE was evidenced. It is for this reason that,	***

Carballo (2021)	learning modes during confinement	teachers and secondary school teachers.	Technologies (ICT), in order to organise in a didactic way the curriculum of the subject of PE.		Zoom, Teams, OBS, Tiny Tap educational application, tablets, mobile devices, social networks, Mobile Learning education and gamified applications.	in the digital era, teachers are recommended to promote cross-curricular education between motor and technological competences.	
Webster et al. (2021)	PE in the COVID Era: Considerations for Online Program Delivery Using the Comprehensive School Physical Activity Program Framework	Aimed at Secondary school and sixth form students	To provide and promote a physical activity programme in the school environment through an online PE, addressing challenges such as the digital divide.	Qualitative	Social networking, blogging, video analytics, video games, virtual reality, tablets, smartphones, Microsoft Teams, Blackboard Collaborate, Zoom, Webex, wearables	The study highlighted the need for accessible digital platforms, digital-supported PE programmes, and adequate digital tools training for teachers. However, it highlighted digital inequalities as a current critical factor.	*****
Wyant et al. (2021)	Insights from teachers on the digitization of the PE knowledge base.	Students in PE, Primary and Secondary PE teachers and university lecturers.	To identify what kind of online resources PE teachers use and investigate possible barriers and challenges.	Mixed Methods	Online resources: PE Universe, Youtube, Pinterest, SHAPE América, SPARK, Twitter, Google, Go Noodle, PE Central, Physical Educator, PE-Kansas.com, Facebook, Supportteacher.org	Digital technology is generating transformations in the teaching of PE. Consequently, teachers need to be aware of reliable digital resources and have the competences to offer higher quality in the teaching-learning process.	****
Kucera et al. (2022)	Teaching online PE during social distancing using google sites: pedagogy, strategies, reflections and barriers of a teacher	Primary School Teachers	To examine the experience of digital technology in PE education	Qualitative	Google Sites	The study envisaged that the incorporation of digital resources should be consistent and focused on what really works, keeping students active and applying social and dynamic activities.	*****
Parris et al. (2022)	Physical activity for health, COVID-19 and social media: what, where and why?	PE secondary school teachers (N=26)	To study the use of social networks for teaching PE and physical activity for	Qualitative	Social Media, Youtube, Instagram, Padlet	There is a need for PE teachers to have initial and continuous training in digital media. In addition, the need for governments to reduce technological inequalities was raised.	*****

			health by teachers during COVID-19.				
Rutkauskaite et al. (2022)	Students' Skills and Experiences Using Information and Communication Technologies in Remote PE Lessons	Secondary school and sixth form students (N=268)	To identify student experiences between technology resources and PE	Mixed Methods	YouTube, Zoom, MS Teams, Tamo.It, pedometers, sports and exercise apps	Students offered a positive attitude towards the use of ICT in PE. However, specific training on digital skills to enhance learning is recommended.	*****
Lan et al. (2022)	Sports training for primary and secondary school students. Training solutions in the context of digital transformation	Primary and secondary school students	To propose recommendations on physical activity and sport for primary and secondary school students using digital tools.	Qualitative	Digital media	The need to provide different sports programmes to obtain physical and mental health benefits was raised. Likewise, the use of digital technologies was recommended to allow the experience of movements and manipulations through virtual interactions prior to the real context, with the purpose of acquiring physical and social development.	*****
Fuentes-Nieto et al. (2023)	Teachers' use of ICT during COVID-19 confinement and students' level of connection in PE.	Primary and secondary school teachers (N= 526) Age: 31- 40 and 41 - 50 years.	To explore the digital tools used by PE teachers, assess what factors have influenced their use and analyse the impact of the digital divide during COVID-19.	Quantitative descriptive	E-mail, OneDrive, Google Drive, Word, PowerPoint, PDF, YouTube, Vimeo, Stream, Office 365, Genial.ly, Classroom, webs, blogs, Twitter, Instagram, TikTok, Genial.ly, ClassDojo	The situation arising from COVID-19 increased the use of ICT in PE. In this line, the use of digital media for formative assessments involved students more. However, the digital divide needs to be addressed.	***
Nuraini et al. (2023)	Games-Based Interactive Multimedia to Increase Student Creativity in PE Course	Primary school students. Age: 9 and 10 years old	To explore whether the game-based interactive multimedia application has an impact on students' cognitive aspects	Quantitative non-randomised	Interactive multimedia applications based on games.	The multimedia technology proved to be positive in the learning process, significantly enhancing students' creativity, learning, problem solving and critical thinking.	****
Valdez et al. (2023)	Using Mobile Gaming in	Aimed at Secondary	To explore the incorporation of a	Qualitative	"Mobile Legends" mobile game	Mobile games are a viable alternative for the development of student	****

	Virtual PE: Challenges and Opportunities	school and sixth form students	mobile game as a PE alternative during COVID-19 and develop soft skills in students.			engagement, as they help improve critical thinking and communication skills. However, they need to incorporate more physical activity and the PE curriculum needs to be reconfigured to integrate them with innovative activities and assessments.	
Zapata-Agudelo et al. (2023)	ICT in PE as a teaching tool in times of pandemic.	Secondary school students (N=94)	To implement pedagogical activities integrating ICT in the subject of PE during COVID-19, and eliminate the perception that PE and ICT are incompatible.	Qualitative	Educational blog, forums, forms, Tablets and smartphones	The use of ICT enhanced learning and understanding of PE content. It also enhanced physical fitness, improved physical and mental health and increased motivation towards physical activity. In this sense, the integration of new technologies in teachers' teaching is promoted.	*****
Abadi et al. (2024)	Interactive learning media development in Purwokerto city: cognitive aspects of school basketball	Secondary school students (experimental group) n=36 Secondary school students (control group) n=36	To develop an interactive medium for teaching basketball in PE and to evaluate its effectiveness in cognitive terms.	Quantitative non-randomised	Interactive learning media, multimedia, Adobe Flash CS6 software for creation, .exe format for computers and .apk for Android.	Integrating interactive learning media had a great impact, and significantly improved students' cognitive skills and positive learning outcomes in basketball content.	*****
Gomes et al. (2024)	Adolescents' Perspectives on Smartphone Applications for Physical Activity Promotion: Insights from Focus Group Discussions	39 high school students (23 females and 16 males) (Average age: 12,9 ± 1,2 years).	To understand expectations, experiences and perceptions about the use of Physical Activity Apps (PA APPS).	Qualitative	PA APPS for Smartphones, portable devices/wearables, TikTok, videogames such as Pokémon Go	Improvements in convenience and compatibility of PA APPS are needed. There was a demand for initial support and guidance on PA APPS to improve healthy habits. Interest and engagement in physical activity was shown when using PA APPS. PA APPS were required to promote effective interfaces to promote adherence to physical activity.	*****
Matheu-Pérez et al. (2024)	Perceptions of teachers and students about the	Secondary school students (N=5)	To analyse the perception of ICT implementation in PE	Qualitative	Computers, tablets, loudspeakers, projectors, internet, smartwatches,	Students considered that ICT facilitated and motivated learning, although they presented difficulties in monitoring	*****

	use of ICTs in PE classes: uses, advantages, and projections	Age: 15 to 18 years PE secondary school teachers (N=3) Age: 24 to 35 years	among students and teachers.		smartphones, video players, etc.	appropriate use, while teachers stated that communication was facilitated, although they presented possible technological failures and inequalities. In this respect, ICT offered a significant role in PE learning. However, teachers need to familiarise themselves with new technologies and institutions need to support their effective use.	
Mödinger et al. (2024)	Motor learning with digital media in PE - A digital-based methodological teaching concept for implementing visual feedback	Secondary school students (N=95) Mean age: ± 15,22 years)	To test whether the implementation of visual feedback through video analysis improves shot put technique in PE students.	Quantitative non-randomised	Digital media, video analysis, Smartphones	Teaching through digital media based on video analysis improved the students' motor skills with respect to sport technique.	****
Omarov et al. (2024)	Applying an augmented reality game-based learning environment in PE classes to enhance sports motivation	Primary and secondary school students (N=60) divided into two groups of 30	To assess the levels of physical activity and motivation by introducing Augmented Reality (AR) in PE classes.	Quantitative non-randomised	AR technology integrated into the online game Subway Surfers	The findings demonstrated an increase in motivation and physical activity levels when AR was implemented as an educational tool, making it effective in the educational context.	***
Sánchez-Martínez et al. (2024)	Geocaching, socio-educational intervention with mobile devices	Primary and secondary school students n=35	To analyse the impact of digital technology through a socio-educational intervention related to geolocation and the natural environment.	Qualitative, narrative-descriptive	Smartphones, GPS, Geocaching application	The intervention of the geocahing application had a positive impact, as a result of increased motivation, increased enjoyment and enjoyment, and improved conflict resolution by working cooperatively. In addition, the students demonstrated their satisfaction with the practice, acquiring environmental awareness and meaningful learning about digital technology.	*****

Cece et al. (2025)	Multidisciplinary teaching with an active video game: the effecton learning in mathematics and PE	Primary students (N= 216) Mean age ± 11,06 years	To explore whether the implementation of active video games on motor and mathematical content has an impact on learning and interest in the subjects of PE and Mathematics.	Quantitative non-randomised	Lü® MÖBIL, platform Lü®, applications SphYnX® and Constello®	The study showed a high level of interest, improving the learning of the Cartesian coordinate system and ball throwing technique. In this respect, the incorporation of active video games provides pedagogical benefits and new learning opportunities through play, movement and knowledge.	*****
Mateo-Orcajada et al. (2025)	Analyzing the keys to the design of a mobile application for physical activity for school and out-of-school use from the perspective of adolescents, teachers, coaches, managers, and experts	Secondary school students in four focus groups (n=38) (average age: 13,74 ± 1,24 years)	To identify key elements to include in a physical activity mobile application and encourage continuity in students' daily practice.	Qualitative	Mobile physical activity applications (PA APPS).	The study found that the use of PA APPS outside the school environment is desirable. Among the characteristics for the design of PA APPS were: information on healthy recommendations, methodologies such as gamification, quick and easy interfaces, multimedia sections, among others.	*****
Faruk et al. (2025)	The interventions of PE by using augmented reality based mobile learning can significantly improve gross motor skills in elementary school students	Primary School Students (N=60)	To test whether learning based on Augmented Reality (AR) through an application improves motor skills in primary school students.	Quantitative non-randomised	AR-based mobile application	The use of AR significantly improved students' gross motor skills. In this sense, mobile AR had a positive impact on the motor component.	****

Note. *20 % of the criteria; ** 40 % of the criteria; ***60 % of the criteria; ****80 % of the criteria; *****100 % of the criteria

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4. Discussion

The main objective of the study presented was to answer the following research question: what is the educational effect of the use of digital technology on mental health in teaching practice?

The review of the scientific literature showed that the use of digital technology had a positive impact on competency learning within the student learning process. In particular, improvements in physical and mental processes such as academic performance [68], problem solving, critical thinking (Valdez et al., 2023), creativity (Nuraini et al., 2023), understanding of pedagogical content and improved motor actions (Cece et al., 2025; Faruk et al., 2025; Frömel et al., 2021; Mödinguer et al., 2024) were perceived. In fact, these findings coincide with studies that have shown a positive correlation between academic performance and the practice of physical activity when using digital resources or tools in PE Education sessions (Lima et al., 2024; Rasdiana et al., 2024). Furthermore, evidence has supported the great potential they present, as they improve motor skills and abilities, which favours the development of healthy habits and, therefore, their quality of life (Sotoca-Orgaz et al., 2025).

In relation to the affective and socioemotional component, it has been shown that the application of digital tools in the classroom increases motivation and interest in the subject of PE (Castillo-Peláez & Salazar-Ruiz, 2021; Gomes et al., 2024; La Rosa, 2021; Omarov et al., 2024; Papastergiou et al., 2021), generating a positive and enjoyable atmosphere in the classroom (Sánchez-Martínez et al., 2024; Soto et al., 2020). Similar data showed that there was an increase in participation and commitment to the subject, which confirms the positive use of these media in the educational environment (Oshanova et al., 2025).

On the other hand, in terms of mental health, the studies included in the review showed that the use of digital technologies in PE sessions led to motivating and participatory situations, which was related to the emotional well-being of students (Castillo-Peláez & Salazar-Ruiz, 2021; La Rosa et al., 2021; Papastergiou et al., 2021). Furthermore, the use of ICT resources, such as video games or mobile applications, offered more attractive experiences, which favoured the reduction of anxiety associated with physical-sports practice and reinforced the student's confidence to face new challenges (Magdaleno et al., 2023; Papastergiou et al., 2021; Zapata-Agudelo et al., 2023). These findings can also be interpreted from a constructivist perspective, as the use of digital tools encourages active knowledge construction through interaction, exploration and problem solving. In this sense, students are not limited to receiving information, but actively participate in the creation of meaning and the practical application of content, which enhances both intrinsic motivation and autonomy in learning (Papastergiou et al., 2021; Valdez et al., 2023).

It was also observed that those proposals in which gamification-based methodologies were used had a very positive impact on factors such as empathy and communication among students (Castillo-Peláez & Salazar-Ruiz, 2021; Faruk et al., 2025; Omarov et al., 2024). In this sense, there are numerous studies that show how these dynamics based on digital technologies can become effective tools for strengthening personal bonds and preventing feelings of isolation or demotivation (Kucera et al., 2022; Sánchez-Martínez et al., 2024; Parris et al., 2022).

However, it is essential to highlight that several studies have highlighted that the misuse of technologies can have negative effects on students' mental health, generating compulsive behaviour, technological dependence, increased anxiety, decreased attention or difficulties in emotional regulation (Almodóvar-Fuentes et al., 2023; Castillo-Peláez & Salazar-Ruiz, 2021; Matheu-Pérez et al., 2024).

Added to this is the concern that many young people spend several hours a day playing video games or using mobile phones, as prolonged use of these devices can be associated with difficulties in mental well-being or lower academic performance (Castillo-Riquelme et al., 2023; Skripkauskaite & Fazel, 2021). In addition, another negative aspect that should be taken into account is the digital divide and unequal access to resources, as these limit equal participation in activities, developing feelings of frustration, exclusion or demotivation in students with fewer opportunities (Fuentes-Nieto et al., 2023; Parris et al., 2022). Therefore, collaboration between educators, psychologists, and policy makers is a very relevant aspect of addressing the mental health challenges that arise in the digital age (Burnell et al., 2023; Shuangli et al., 2025; Vuorre et al., 2021).

However, detrimental aspects in the use of digital resources in PE classes were also detected, such as the lack of initial and continuous teacher training (Rutkauskaite et al., 2022; Wyant et al., 2021; Zapata-Agudelo et al., 2023), the presence of technological inequalities (Fuentes-Nieto et al., 2023; Parris et al., 2022), limitations in accessibility (Mateo-Orcajada et al., 2025; Webster et al., 2021) and possible technological failures (Matheu-Pérez et al., 2024). In addition to the above, similar results emphasised that PE teachers had basic training in digital resources. In this regard, the literature reviewed has stated the need for aids to bridge the digital divide and thus ensure that students can engage in physical activity and sport through the use of technology (Ting et al., 2023; Zhu & Dragon et al., 2016). Therefore, it is essential for teachers to keep themselves constantly updated in order to offer quality teaching and face the challenges posed by the new digital era, since, without these competences, it will not be possible to make appropriate use of technological media (Menescardi et al., 2021).

Furthermore, it is important to highlight the increase in studies that have emerged in this field after the COVID-19 pandemic, as this situation marked a turning point in the way digital technologies were incorporated into the teaching environment (Fuentes-Nieto et al., 2023; Parris et al., 2022; Valdez et al., 2023). As a result, approaches focused on reinforcing their educational value by revising the objectives, contents and methodologies used in the educational field began to be developed (Webster et al., 2021; Zapata-Agudelo et al., 2023).

Several studies underlined that the pandemic created opportunities to share experiences and implement strategies with a more inclusive approach (López-Secanell, 2021; Valdez et al., 2023). Consequently, there has been an evolution towards proposals that are not limited to responding to specific needs, but which aim to enrich the teaching and learning processes in PE classes in a stable way (Matheu-Pérez et al., 2024; Webster, 2021).

On the other hand, this increase in research has made it possible to identify areas that require further development, such as the integration of these tools into the curriculum or their long-term impact on student learning (Fuentes-Nieto et al., 2023; Parris et al., 2022). However, beyond responding to specific needs, it is essential to move towards proposals that strengthen teaching and learning processes in physical education classes in a stable manner, guaranteeing both educational quality and the overall well-being of students (Matheu-Pérez et al., 2024; Webster, 2021). In this regard, it is necessary to develop a critical and reflective approach to the use of technology in education, oriented towards pedagogical models that ensure the mental health of students at all educational stages (Li & Wang, 2024; Talero-Jaramillo & Guarnizo-Carballo, 2022; Zapata-Agudelo et al., 2023).

5. Conclusions

The aim of the systematic review was to analyse the educational impact of the use of new technologies and their effect on the mental health of students in the area of PE, from which it can be deduced that the appropriate use of digital resources and tools in PE classes, at any educational stage, has a positive impact on the mental health of students, as well as on the acquisition of skills. Moreover, thanks to digital media, it is possible to

improve students' motor engagement time, facilitating continuous and constructive feedback and encouraging autonomous learning on the part of the students.

However, it is necessary for teachers to be well trained and constantly updated in this area, since an inappropriate use of digital resources can cause problems, both in mental health and in the training of students, causing the opposite effect to what is really intended with the use of active methodologies and the use of new technologies.

In summary, the findings of this systematic review underline the importance of adopting a constructivist approach to the use of technological resources in PE classes, without losing sight of the motor component, competency learning and the mental well-being of students, seeking loyalty to physical-sports practice and cooperation with peers.

However, the systematic review has certain limitations that must be taken into account. One of these relates to the heterogeneity of the studies included, as most of them use different designs, a small sample size or very specific contexts, aspects that make it difficult to make direct comparisons or draw solid conclusions. In addition, some results differ from one another, indicating the importance of considering these variations when interpreting the evidence. In this sense, the set of articles provides a valuable overview, but also shows the need to continue advancing in systematic reviews that allow for further comparison and deeper analysis of the results.

Another limitation relates to the scope of the analysis, as the review has focused particularly on the Spanish education system, which helps to better contextualise the conclusions but also limits generalisation to other international settings or areas with different education systems.

Furthermore, the literature search was restricted to a limited number of databases, which may have resulted in the exclusion of some relevant studies and a corresponding limitation in the scope of the review. In this regard, future research could broaden the scope of the search by including a larger number of databases in order to obtain a more comprehensive overview. Furthermore, it would be advisable to analyse, in a more specific manner, how the digital divide or the integration of technology affects students' academic performance by making a comparison at each stage of education.

Finally, in view of current needs and the evolution of society towards an increasingly digital world, this study proposes future lines of research that could focus on: a) comparison of different active methodologies and their effectiveness on mental health and academic performance in different contexts, b) integration of advanced technologies for the improvement of students' basic motor skills and physical abilities and c) the relationship between the use of technological resources in terms of the different blocks of content worked on in PE classes.

Author Contributions: Delete for peer review

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Conflicts of Interest: The authors declare no conflicts of interest.

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