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What do we know about pedagogical models in physical education so far? An umbrella review

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ABSTRACT

Background: Research on pedagogical models in physical education has exponentially increased over the last two decades [Casey, A., and D. Kirk. 2020. *Models-Based Practice in Physical Education*. London: Routledge]. Moreover, several literature reviews on the effectiveness of the different pedagogical models have been conducted. Due to the large amount of research conducted on pedagogical models, there seems to be a need to organize and evaluate the existing evidence to assimilate the main ideas, produce higher-level synthesis of evidence and provide a more solid identification of strengths, weaknesses and gaps of this methodological approach.

Purpose: To critically examine what is currently known on pedagogical models to provide a broader and contemporary picture on their implementation conducting an umbrella review. This paper aimed to answer the following research questions: (RQ1) Which pedagogical models have been systematically reviewed? (RQ2) Which strengths have been observed? (RQ3) Which weaknesses have been perceived? (RQ4) Finally, which research gaps have been identified?

Method: The protocol was registered at the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) with the number 202130025 and the DOI number 10.37766/inplasy2021.3.0025. Review studies met the following inclusion criteria: (1) Peer-reviewed journal articles (Journal Citation Reports) published and written in English before 31 December 2020, (2) included participants from elementary, middle and/or high school, (3) conducted in the physical education context, and (4) interventions studies implementing one, several or combined pedagogical models. Exclusion criteria were (1) Not review studies, and (2) Not about pedagogical models' implementation.

Findings and conclusion: Seventeen review articles were identified, involving 22,109 students (elementary, middle, high school), 1050 teachers and 171 preservice teachers. Two hundred and nine studies involved Sport Education, 84 Games-Centred Approach, 74 Cooperative Learning, 48 Teaching Personal and Social Responsibility, and 23 hybridizations among pedagogical models. A comprehensive literature synthesis is presented on the different pedagogical models and their learning outcomes. Findings showed strong evidence supporting the effectiveness of pedagogical models' implementation to improve students' learning in the different domains (cognitive, social, physical, affective). Nevertheless, some weaknesses were also uncovered by the umbrella review: *length of the implementation, time for skilful play,*

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struggle to implement pedagogical models, poor performance of student-coaches and model fidelity. Teachers and researchers must be aware of these weaknesses uncovered to conduct intervention programs that can really work and produce the claimed outcomes. Finally, reviews also identified several gaps in our understanding of pedagogical models: *individuals with special educational needs, girls, low-skilled children, the dynamics of the peer-teaching tasks, body expression and individual sports, and what happens after the initial unit of implementation.* They are all discussed to provide guidelines and future lines of research.

Introduction

Teaching and learning physical education at schools remains a big challenge in the twenty-first century (MacPhail and Lawson 2020). Researchers and scholars have made a significant effort to shed some light on the effectiveness of different pedagogical approaches, but aligning learning outcomes with teaching strategies is still a major theme to uncover (Kirk 2020). Three major conflicts of the dominant multi-activity, sport technique-based approach in physical education (Kirk 2010) have been highlighted: the integration of low-skilled students, the use of short learning units or the search for unattainable benefits for all kinds of students (Casey and Kirk 2020). In order to fight these negative issues, alternative pedagogical scenarios have been explored.

Over the last three decades, structures have evolved from traditional teacher-centred approaches to novel student-centred frameworks (Casey 2014). Curriculum models (Jewett, Bain, and Ennis 1995) and instructional models (Metzler 2005) gave way to models-based practice, based on pedagogical models (Haerens et al. 2011; Kirk 2013), offering alternative structures to improve students' experiences in the physical education classes (Casey and Kirk 2020). Hastie and Casey (2014, 422) described a pedagogical model as 'a way of organizing the interdependent elements of curriculum, learning and teaching to achieve specific learning outcomes'. Sport Education (SE), Cooperative Learning (CL), Teaching Games for Understanding (TGfU) and Teaching for Personal and Social Responsibility (TPSR) are the most widely recognized, implemented and researched pedagogical models in the world (Casey and Kirk 2020).

SE was 'designed to provide authentic, educationally rich sport experiences for girls and boys in the context of school physical education' (Siedentop, 2002, 409). To develop competent, literate and enthusiastic people are the three major goals of SE across six key structural features: seasons, affiliation, formal competition, culminating event, record keeping and festivity (Siedentop, Hastie, and Van Der Mars 2020). Learning with, by, and for each other is the main idea behind CL (Dyson and Casey 2016), where five essential elements (Johnson, Johnson, and Holubec 1994) should be promoted: interpersonal skills, processing, positive interdependence, promotive interaction, and individual accountability. The main idea behind TGfU is to shift the focus from the technique to the context (tactical considerations) of games' playing (Bunker and Thorpe 1982) through modification: representation and exaggeration (Mitchell, Oslin, and Griffin 2013). The focus 'is to place the learner in a game situation where tactics, decision-making and problem-solving are non-negotiable features, although skill drills are also used to correct any habit or reinforce any skill' (González-Víllora et al. 2021, 7). It is based on six structural steps: game, game appreciation, tactical awareness, make appropriate decisions, skill execution, and performance. The original TGfU model evolved in different parts of the world into several frameworks such as Tactical Games Approach (TGA; Griffin, Mitchell, and Oslin 1997), Game Sense (GS; den Duyn 1997; Light 2013), Play Practice (PP; Launder 2001), Tactical-Decision Learning Model (T-DLM; Gréhaigne, Richard, and Griffin 2005) or Developmental Games Stage Model (DGSM; Rink 2002), grouped under the term Game-Centred Approach (GCA). Finally, the main idea behind TPSR is to teach young individuals to develop personal and social responsibility through physical activity practice (Hellison 2003). Four major themes define

TPSR: integration, transfer, empowerment, and teacher-student relationships; structured around five goals of responsibility: respect for the rights and feelings of others, effort (self-motivation), self-direction, help (caring), and transfer ‘outside the gym’ (Hellison 2011).

Although each pedagogical model has its own individual features, they also share common ideas (student-centred contexts, situated learning) that allow a solid transition into hybridization (e.g. SE-TPSR: Fernandez-Rio and Menendez-Santurio 2017). In a recent systematic review on the hybridization of pedagogical models in physical education, multiple combination between SE, TGfU, CL and TPSR were revealed (González-Víllora et al. 2019), and elements of one model are present in the outcomes of others. For example, Fernandez-Rio and Casey (2020) showed that SE can promote the essential elements of CL.

Research on pedagogical models in physical education has exponentially increased over the last two decades (Casey and Kirk 2020). As previously outlined, several literature reviews on the effectiveness of the different pedagogical models have been conducted. Most of them on single-model implementations, for example: SE (e.g. Bessa et al. 2019), TGfU (e.g. Harvey and Jarrett 2014), CL (e.g. Casey and Goodyear 2015), TPSR (e.g. Pozo, Grao-Cruces, and Pérez-Ordás 2018), and just one on their hybridizations (González-Víllora et al. 2019). Due to the large amount of research conducted on pedagogical models, there seems to be a need to organize and evaluate the existing evidence to assimilate the main ideas, produce higher level synthesis of evidence and provide a more solid identification of strengths, weaknesses and gaps (Alarcão et al. 2021). Umbrella reviews (Ioannidis 2017) are considered one of the next generation of systematic reviews, because they can provide a broader picture of findings that can help inform guidelines (Aromataris et al. 2015). Moreover, Fusar-Poli and Radua (2018) believe that umbrella reviews can overcome a gap of knowledge, because they are reviews of previously published reviews and represent one of the highest levels of evidence synthesis currently available. A further exploration by a review of reviews of pedagogical models could contribute to a better understanding of the existing literature on this pedagogical approach in physical education. Thus, the aim of this study was to critically examine what is currently known on pedagogical models to provide a broader and contemporary picture on their implementation by conducting an umbrella review. To our knowledge, no similar study has been published. The general research question was: What do we know about pedagogical models in physical education so far? More specifically, this paper aimed to answer the following research questions: (RQ1) Which pedagogical models have been systematically reviewed? (RQ2) Which strengths have been observed? (RQ3) Which weaknesses have been perceived? (RQ4) Finally, which research gaps have been identified?

Method

The umbrella review conducted in the present study followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines (PRISMA, Moher et al. 2015). The protocol was registered at the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) with the number 202130025 and the DOI number 10.37766/inplasy2021.3.0025.

Information sources and search strategy

Data (reviews) were selected through database search: Web of Science, Scopus, EBSCO, PsycInfo, PubMed/Medline, SportDiscus, Eric, Scielo and Taylor & Francis. Article title, abstract, and keywords were researched using the following query string: [(‘models-based practice’ OR ‘pedagogical model’ OR ‘cooperative learning’ OR ‘game-centred approach’ OR ‘teaching games for understanding’ OR ‘tactical games’ OR ‘sport education’ OR ‘teaching for personal and social responsibility’) AND (‘physical education’ OR ‘sport’) AND (‘review’)]. The keywords were the same for all the search engines. As suggested by Cochrane’s guidelines (Green and Higgins 2011), an external expert was contacted to (a) provide eligibility criteria and (b) verify the final list of reviews included. No changes were suggested, thus confirming the initial plan.

In an exploratory phase, the authors conducted a non-systematic search to verify the non-existence of an umbrella review on pedagogical models in physical education. In a second phase, a query string was designed based on the two main elements of the reviews found in the non-systematic search: (1) terms used in the title and keywords, and (2) terms used in search strategies. Finally, a query string that included the most repeated terms was designed. Some of the terms referred to models in general ('models-based practice' or 'pedagogical models') and others to particular models ('cooperative learning' ...). Related terms such as 'instructional model' or 'curriculum model' could have been included, but this broadening of the search would have led to a greater volume of studies excluded, because they were not within the more specific contemporary conceptualization on pedagogical models. To our knowledge, there are no published review studies that could be omitted for this reason. We believe that the terms used are the ones most directly related to the purpose of this umbrella review: pedagogical models.

Eligibility criteria

Review studies meeting the following inclusion criteria: (1) Peer-reviewed journal articles (Journal Citation Reports – JCR) published and written in English before 31 December 2020, (2) included participants from elementary, middle or/and high school, (3) conducted in the physical education context, and (4) intervention studies implementing one, several or combined pedagogical models. Exclusion criteria were: (1) Not scientific review studies, and (2) Not about pedagogical models' implementation.

Data extraction

The potentially eligible studies were initially screened by two independent researchers (with experience in systematic reviews on physical education) by reading titles and abstracts, following the stipulated criteria prepared in advance, included in the search protocol (Viswanathan et al. 2018). In those studies with unclear abstracts or titles, a peer review was conducted and the articles were agreed upon, resolving discrepancies through discussion and consensus (Higgins et al. 2019). In a second phase, the two reviewers, independently, read the full text of the studies preselected in the previous phase, creating the final list of potentially eligible studies, going to a third external investigator, when no consensus was reached regarding acceptability (Van Sluijs, McMinn, and Griffin 2007). Finally, the full texts of the screened articles were carefully examined and analysed.

Quality appraisal and certainty of evidence

The quality assessment of review studies, including risk of bias, was checked using the Assessing the Methodological Quality of Systematic Reviews (AMSTAR-2) tool (Shea et al. 2017). Overall rating is calculated from 16 items (online supplementary Table 1) that assess methodological and reporting quality: (1) research questions and inclusion criteria including components of PICO (population, intervention, comparison, output), (2) protocol being registered before starting to review, (3) justification for inclusion of study designs in the review, (4) comprehensiveness of the literature search strategy, (5) study selection performed in duplicate, (6) adequacy of the literature search, (7) data extraction performed in duplicate, (8) justification of excluding individual studies, (9) adequate description of included studies, (10) risk of bias from individual studies being included in the review, (11) reporting on sources of funding for included studies, (12) appropriateness of meta-analytical methods, (13) consideration of risk of bias on meta-analysis, (14) consideration of risk of bias when interpreting the results of the review, (15) satisfactory explanation of heterogeneity in results of review, and (16) reporting any potential sources of conflict and assessment of presence and likely impact of publication bias. The AMSTAR-2 allows to classify reviews into four quality levels based on weaknesses or flaws: (1) High: no or just one non-critical weakness; the review provides an accurate and comprehensive summary of the results; (2) Moderate: more than one non-

critical weakness, but no critical flaws; the review provides an accurate summary of the results; (3) Low: one critical flaw, with or without non-critical weaknesses; the review may not provide an accurate and comprehensive summary of the results; and (4) Critically low: more than one critical flaw, with or without non-critical weaknesses; the review should not be relied on to provide an accurate and comprehensive summary of the results.

Results

A total of 163 records were identified. From an initial pool of 92 non-duplicate papers, 69 were excluded attending eligibility criteria (e.g. not written in English, not published in JCR journals). After reading the full texts, six more studies were excluded due to not being about pedagogical models ($n = 3$), not being a review paper ($n = 2$) and being a review paper about assessment instruments ($n = 1$). Finally, 17 review studies fulfilled the inclusion criteria and were selected for further analysis (online [supplementary Figure 1](#)). A chronological analysis of the studies considered in this umbrella review revealed the recent developments in this area of research, highlighting that 11 of 17 articles were published between 2018 and 2020 (the last three years). Four were published between 2014 and 2015, one in 2011 and the oldest in 2005.

Quality assessment

All the reviews finally included in this umbrella review obtained moderate quality, except three, which were rated as high (online supplementary Table 1, AMSTAR-2). The absence of meta-analyses in the majority of the reviews assessed led to this modest rating.

Scope

A summary of the scope of the 17 included reviews is shown in online supplementary Table 2. The purpose of six reviews was to investigate SE interventions (Araújo, Mesquita, and Hastie 2014; Bessa et al. 2019; Chu and Zhang 2018; Evangelio et al. 2018; Hastie, Martínez de Ojeda, and Calderón 2011; Wallhead and O'Sullivan 2005). CL (Bores-García et al. 2020; Casey and Goodyear 2015; Fernández-Espínola et al. 2020) and GCA/TGfU effectiveness (Abad et al. 2020; Barba-Martín et al. 2020; Harvey and Jarrett 2014; Miller 2015) were evaluated in three and four reviews, respectively. One review examined TPSR (Poza, Grao-Cruces, and Pérez-Ordás 2018) and another review was conducted on pedagogical models' hybridizations (González-Víllora et al. 2019). Finally, two reviews focused on several pedagogical models (Dyson, Howley, and Wright 2020; Sierra-Díaz et al. 2019).

Regarding geographical areas, the United States was the most represented country (118 studies). In Spain, the United Kingdom and Australia, there were registered 98, 49 and 33 studies, respectively. The rest of the investigations were conducted in Portugal (19), Russia (14), Canada (13), New Zealand (10), Hong Kong (9), Singapore (8), Germany (5), Korea (5), Finland (4), France (4), Greece (4), Malaysia (4), Belgium (2), Brazil (2), China (2), Sweden (2), Taiwan (2), Indonesia (1), Japan (1), Serbia (1) and Turkey (1). In 12 reviews, 4 or more databases were used as information sources. Only five studies presented a smaller motor engine. In 11 reviews, 20 or more studies were included. The reviews including more studies were conducted by Dyson, Howley, and Wright (2020) and Bessa et al. (2019) with 63 and 51 studies, respectively.

Regarding participants, a total of 22,109 students (elementary, middle, high school), 1050 teachers and 171 preservice teachers were involved in this umbrella review.

A great heterogeneity was observed regarding the length of the interventions. They ranged from one week to five years. Considering each pedagogical model, the intervals were SE (4–28 lessons), CL (4 weeks–3 months), TPSR (10–56 lessons), TGfU (5 lessons–5 years), and hybridizations (7–26 lessons).

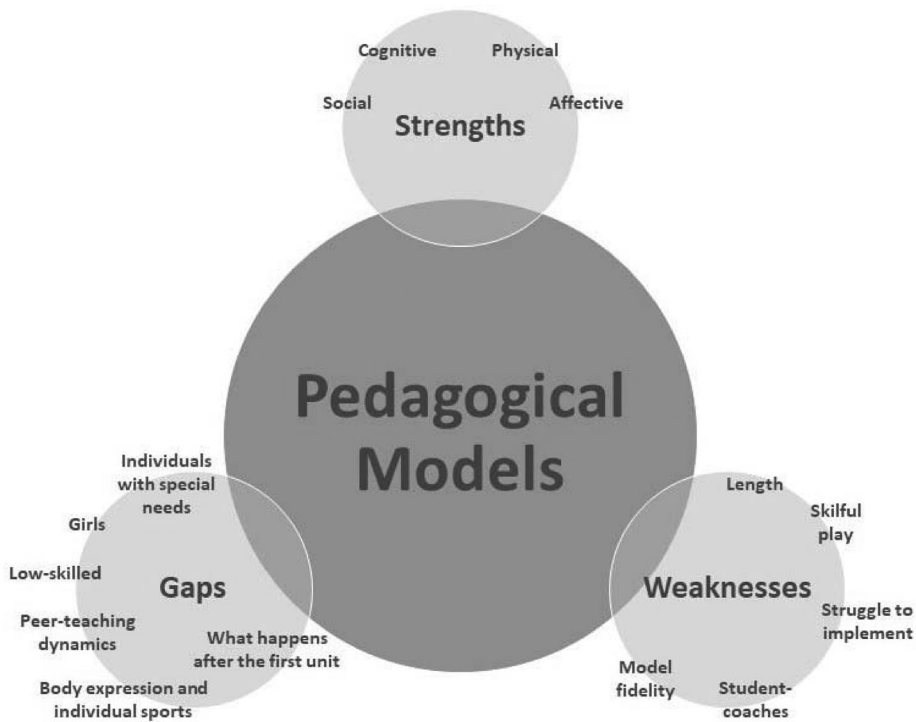


Figure 1. Strengths, weaknesses and gaps found in pedagogical models.

A summary of the results reported in the 17 included reviews is shown in online supplementary Table 3. Grouped by the model implemented, 209 articles mentioned SE, 74 CL, 84 GCA (49 TGfU, 10 GS, 9 TGM, 1 PP), 48 TPSR, and 23 hybridizations among pedagogical models. Finally, [Figure 1](#) portrays the main findings grouped in three categories: strengths, weaknesses and gaps. Next, each category is fully explained.

Strengths in pedagogical models' implementation

The findings revealed that the most widely researched pedagogical model was SE, with more than 200 studies grouped in seven literature reviews from 2005 to 2019: Araújo, Mesquita, and Hastie (2014), Bessa et al. (2019), Chu and Zhang (2018), Evangelio et al. (2018), Hastie, Martínez de Ojeda, and Calderón (2011), Sierra-Díaz et al. (2019), and Wallhead and O'Sullivan (2005). The most prolific SE review was conducted by Bessa et al. (2019), covering a large set of positive learning outcomes: responsibility, affiliation and ownership, inclusion, peer support and equity, teamwork, cooperation and compliance, autonomy, empathy and friendship, fair-play, empowerment, problem-solving and decision-making, leadership, trust and confidence, self-determination, and assertiveness. Other reviews focused on some of these outcomes: Araújo, Mesquita, and Hastie (2014) and Evangelio et al. (2018) on students' learning at the social, cognitive and affective domains. Psychosocial factors like students' motivation were also the focus of Chu and Zhang (2018) and Sierra-Díaz et al. (2019) reviews. Regarding students' personal and social development, improvements in key variables for learning in physical education were observed by Bessa et al. (2019) (e.g. enjoyment, satisfaction, enthusiasm and engagement). In the same line, Wallhead and O'Sullivan (2005) and Hastie, Martínez de Ojeda, and Calderón (2011) focused on variables like cooperation, empathy or self-discipline, but also on attitudes (enthusiasm, enjoyment), and values (affinity,

equity, culture). SE has the potential to promote the positive cultural dimensions of sport and physical activity and offer a challenge to the exclusionary discourses of much of institutionalized sport (Wallhead and O'Sullivan 2005). Finally, in the review conducted by Hastie, Martínez de Ojeda, and Calderón (2011), an increase was observed in the diversity of settings, quality of research designs and sample size (larger).

Regarding CL, in the first review (Casey and Goodyear 2015) results showed improvements in physical, cognitive and social domains, while affective learning was reported anecdotally. Nevertheless, the recently published updated CL review (Bores-García et al. 2020) did include the affective domain, being social learning the most frequently assessed. A step further was taken by Dyson, Howley, and Wright (2020), focusing their review on social and emotional learning in CL, Fernández-Espínola et al. (2020) on intrinsic motivation, and again Sierra-Díaz et al. (2019) on motivation. All these reviews confirmed the positive impact of CL on students' social and emotional learning.

In regards to the GCA, the first review conducted by Harvey and Jarrett (2014) showed improvements in skill development, tactical knowledge, game performance, fitness, personal and social development and students' attitudes. It included studies on TGfU (24), GS (10), TGM (9) and PP (1), and all of them showed a positive impact on the mentioned outcomes. These findings were in line with Miller's earlier review (2015). An updated systematic review carried out by Barba-Martín et al. (2020) on TGfU showed that motor and cognitive learning were the most frequent outcomes assessed (decision-making and skill execution) with positive effects. These findings were corroborated by Abad et al. (2020). Finally, a positive impact of the CGA on students' motivation and psychosocial factors was also found in the review conducted by Sierra-Díaz et al. (2019).

On the other hand, TPSR implementation was assessed in the review conducted by Pozo, Grao-Cruces, and Pérez-Ordás (2018). It showed that students' values improved. Participants reduced their aggressiveness and disruptive behaviours, improving self-control, caring, conflict resolution, responsibility, enjoyment, relatedness, empathy, self-confidence, self-esteem, self-efficacy, truancy, tardiness, grades, and their vision and motivation towards their academic and professional future. Recently, the positive outcomes linked to social and emotional learning were confirmed in the review conducted by Dyson, Howley, and Wright (2020).

Finally, pedagogical models' hybridizations have been also assessed in a recent systematic review conducted by González-Víllora et al. (2019). Multiple forms of combining pedagogical models were observed: SE-TGfU (seven studies), SE-TPSR (five studies), SE-SGA (four studies), SE-IGCM (two studies) and CL-TGfU (two studies). Cognitive, social, motor and affective learning outcomes were assessed. Findings indicated that the combination of pedagogical models extended the effects of the implementation of single pedagogical models.

Weaknesses in pedagogical models' implementation

When implementing pedagogical models, the reviews identified different flaws that scholars and educators should carefully consider. The first one was *length*: most reviews acknowledged that many interventions included short units that do not allow learning to progress beyond an introductory level (Casey and Goodyear 2015), regardless if the implementation was based on CL, GCA (Harvey and Jarrett 2014), SE (Araújo, Mesquita, and Hastie 2014) or TPSR (Pozo, Grao-Cruces, and Pérez-Ordás 2018). In line with short units, the second weakness highlighted was *time for skilful play*: the implementation of novel approaches (like pedagogical models) with complex frameworks (e.g. roles, competitions, points) demands more management time and detracts time for motor skill practice (Evangelio et al. 2018), resulting in less time available for practice and possible negative consequences on learning (Araújo, Mesquita, and Hastie 2014). Connected to this idea, the third weakness was that both, novel and experienced teachers, *struggle to implement pedagogical models* because of their limited knowledge/experience. Previous training on the content, the framework or both is needed to successfully implement any pedagogical model (Barba-Martín et al. 2020), as well as the support of a community of practice (Harvey and Jarrett 2014) to help in the teacher's

professional development (Casey and Goodyear 2015; Hastie, Martínez de Ojeda, and Calderón 2011). The fourth weakness identified was *poor performance of student-coaches*. When implementing TGfU, Harvey and Jarrett (2014, 285) highlighted ‘the potential for the negative transfer of tactical awareness and decision making ... When the coach did not get the game right’. Similarly, but in SE, Araújo, Mesquita, and Hastie (2014, 854) believed that ‘the devolution of content knowledge from the teacher to the student-coach and student-coach leadership skills have been identified as potentially problematic for content development during peer-teaching tasks’. Therefore, the role of student-coach/teacher can be problematic and needs to be carefully monitored. Finally, *model fidelity* was also considered a sensitive issue. Hastie, Martínez de Ojeda, and Calderón (2011, 126) warned that some teachers implemented ‘fewer and/or modified down the Sport Education elements stipulated within the unit plan’, describing the ‘versions’ of SE: full, ‘watered-down’ and ‘cafeteria-style’ (Curtner-Smith, Hastie, and Kinchin 2008). CL implementation is also under ‘probation’ because many studies did not provide details of the framework used (Bores-García et al. 2020). This was even more evident when implementing hybridizations (Evangelio et al. 2018), because there are more elements to consider and it is harder to integrate all the correct ones.

Research gaps in pedagogical models’ implementation

Several reviews highlighted that pedagogical models have been scarcely implemented, and consequently researched, in groups of *individuals with special educational needs*. Harvey and Jarrett (2014) when talking about GCA and Bessa et al. (2019) when reviewing SE, both in educational and sport club contexts, mentioned that this population is not present in the literature. To our knowledge, only one study on SE focused on this population (Fernandez-Rio and Menendez-Santurio 2017) and TPSR is the only pedagogical model interested in at-risk youth (Dyson, Howley, and Wright 2020), which can be considered of special needs (e.g. educational, relational). Therefore, there is still a long way to go. Another two gaps uncovered in two pedagogical models (SE, GCA) involved *girls* and *low-skilled children*. SE reviews acknowledged that some implementations favoured high-skilled boys (Araújo, Mesquita, and Hastie 2014), while others mentioned that girls obtained higher levels of success (Evangelio et al. 2018). Some even found that SE can reinforce gender stereotypes (Wallhead and O’Sullivan 2005), giving power to boys. Results have been contradictory and future implementations should ‘control students participation in order to guarantee equitable participation’ in SE (Araújo, Mesquita, and Hastie 2014, 855). Similar conflicting ideas were reported when implementing GCA (Harvey and Jarrett 2014). Therefore, the gender and skill-level issues should be the focus of future research to clarify their connections with pedagogical models. In line with this gap, *the dynamics of the peer-teaching tasks* has not been investigated (Araújo, Mesquita, and Hastie 2014) to prevent one of the weaknesses pointed out in the previous section: poor performance of the students when performing the role of coaches/teachers because, among other things, they might not be prepared to complete this duty successfully. Regarding the content implemented, reviews highlighted that *body expression* and *individual sports* are noticeably underrepresented in the literature (Bessa et al. 2019; Evangelio et al. 2018). Team sports are the most widely research content and the focus should move to other contents. The final gap that needs to be filled is *what happens after the initial unit of implementation*. There is a need to understand ‘how the school contextual factors constrain or facilitate teachers’ use of a model’ (Casey and Goodyear 2015, 68) once the first learning unit has been implemented. In the same line, scholars and practitioners need to know if the benefits obtained are sustained overtime after the unit is over.

Discussion

The purpose of this umbrella review was to critically examine what is currently known on pedagogical models to provide a broader and contemporary picture on their implementations and identify strengths, weaknesses and gaps.

The first research question was: (RQ1) Which pedagogical models have been systematically reviewed? SE, CL, CGA, TPSR and hybridizations were assessed, but the greatest amount of evidence comes from the implementation of the first one. SE has become very popular all over the world, showing that it can be successfully adapted to many different contexts (Hastie, Martínez de Ojeda, and Calderón 2011). One reason behind this success could be that it focuses on sport contents, which still are the most popular in physical education everywhere (Casey and Kirk 2020; Kirk 2013). CL and GCA have been both largely implemented too. The first one has a longstanding tradition in education and it has become increasingly popular in physical education over the last four decades, probably because it can emphasize students' social and emotional learning (Dyson, Howley, and Wright 2020), a prominent part of today's educational landscape (Barlett 2019). Like SE, GCA focuses on sport contents, probably the most widely implemented content in physical education, and it has evolved into several variations in different parts of the world, greatly expanding its impact (Harvey and Jarrett 2014). Finally, TPSR has been less researched, probably because it was originally developed in extracurricular contexts (Hellison 2003), and later moved to physical education. Nevertheless, the positive outcomes it promotes are making scholars and practitioners more interested in its implementation in educational contexts (Dyson, Howley, and Wright 2020; Pozo, Grao-Cruces, and Pérez-Ordás 2018). Finally, the hybridization of pedagogical models 'is here to stay'. Although it is not as popular as single-models implementation, it has slowly increased its presence in physical education.

The second research question was: (RQ2) Which strengths have been observed? Results showed a strong efficacy of the different pedagogical models. SE, the most extensively used, was found to promote students' game performance, tactical knowledge, skill development, empathy, assertiveness, fair-play, enthusiasm, enjoyment, and motivation (Araújo, Mesquita, and Hastie 2014; Bessa et al. 2019; Evangelio et al. 2018; Hastie, Martínez de Ojeda, and Calderón 2011; Sierra-Díaz et al. 2019; Wallhead and O'Sullivan 2005). The improvements in competence, autonomy and relatedness are in direct harmony with the theoretical claims of the SE model: develop sport-specific techniques and strategic knowledge, provide responsible leadership, work effectively within a group, make reasoned decisions about sport concerns (Siedentop, Hastie, and Van Der Mars 2020). Moreover, these goals have been achieved in very different contexts and contents (Bessa et al. 2019). Therefore, SE is a consistent pedagogical model that can be used by teachers to achieve the claimed outcomes.

Regarding CL, the last two systematic reviews conducted in physical education (Bores-García et al. 2020; Casey and Goodyear 2015) highlighted its effectiveness to improve students' performance in all the learning domains. Motor (Darnis and Lafont 2015; O'Leary et al. 2015), social (Fernandez-Rio et al. 2017; Wallhead and Dyson 2017), physical (Altinkok 2017), cognitive (Dyson, Colby, and Barrat 2016) and affective benefits (Goodyear, Casey, and Kirk 2014) have been well documented. Three different classroom goals structures have been identified: individualistic, competitive and cooperative (Johnson and Johnson 2017). Alternatively to work alone or against each other, in cooperative learning contexts students work together to achieve common goals (Dyson and Casey 2016), and results from the reviews reinforced the idea that they promote positive outcomes in physical education contexts. In spite of the connections between physical education and competition, caused by a dominant multi-activity, sport technique-based approach (Kirk 2010), reviews have shown that there is room for CL in the physical education class, since it can promote students' learning in the four domains. Regarding social and emotional learning, Dyson, Howley, and Wright (2020) found that CL is effective to promote variables such as students' tolerance, empathy and compassion. Social and emotional learning has gained enormous attention in education (Barlett 2019), probably because it can provide individuals with the needed skills to succeed in any social context (e.g. school, work, sport) (Jones et al. 2017). This umbrella review has uncovered that CL can provide the needed contexts to develop these skills (e.g. empathy, tolerance) through its five essential elements (Johnson, Johnson, and Holubec 1994): interpersonal skills, processing, positive interdependence, promotive interaction, and individual accountability.

On the other hand, the different frameworks included in the CGA (TGfU, GS, TGM and PP) showed a positive impact on the students' skill development, tactical knowledge, game performance, fitness, personal and social development, attitudes, and motivation (Barba-Martín et al. 2020; Harvey and Jarrett 2014; Sierra-Díaz et al. 2019). The use of modified games (representation and exaggeration), as well as the work on tactical awareness, game appreciation and making appropriate decisions, without forgetting skill execution, are key elements to improve students' performance and achieve the positive outcomes outlined (González-Víllora et al. 2021; Mitchell, Oslin, and Griffin 2013). Moreover, personal and social development has also been the focus of the CGA (Barba-Martín et al. 2020), since the social-interactive elements of gameplay influence social relations between players, and these can determine students' learning in these domains (Harvey and Jarrett 2014). Therefore, the GCA frameworks allow teachers to work on all the learning domains, as long as they are properly implemented (the weaknesses previously mentioned and later discussed support this idea).

In the same line, ample evidence supports TPSR as a great framework to promote students' values (Poza, Grao-Cruces, and Pérez-Ordás 2018), showing a great connection with their social and emotional learning (Dyson, Howley, and Wright 2020). TPSR implementations have uncovered the benefits highlighted by Hellison (2011) when the model was introduced in extracurricular contexts. The models' basic feature, the five responsibility goals (respect for the rights and feelings of others, self-motivation, self-direction, caring and transfer) are directed to work on students' social and emotional development. The model also tries to empower students, transferring responsibility from the teacher to the students, and integrating responsibility into physical activity practice (Hellison 2003). Both features make TPSR a perfect framework to produce positive outcomes in our students.

Finally, in recent years, there has also been a growing interest in the hybridization of different pedagogical models. Evidence supports the summative idea of the working structures defined in isolated models (González-Víllora et al. 2019). A general overview of the effectiveness of pedagogical models in physical education seems to indicate that these work structures maintain a solid connection with quality physical education including personal and social development, and motor skills learning. Hybridizations reinforce the joint impact of the combinations implemented, since pedagogical models share several features (Barker, Quennerstedt, and Annerstedt 2015; Harvey, Pill, and Almond 2018; Joyce, Weil, and Calhoun 2015; Ní Chróinín and Cosgrave 2013): learn-to-learn-competency (help students transfer knowledge to other contexts), constructivist approach (students build their own knowledge with the help of others), scaffold the learning process (using progressions to learn), on-going formative assessment (to help students continuously monitor their progress), collaborative skills (since students work in small groups), global awareness (to develop physical literacy), and creativity promotion (encouraging divergent thinking). They all help hybridizations achieve the uncovered outcomes.

The third research question was: (RQ3) which weaknesses have been perceived? This was a difficult question to answer, because studies with positive results are more represented in the scientific literature than studies with negative results. This causes the so-called publication bias, which can be particularly problematic in systematic reviews (Lin and Chu 2018). Nevertheless, results showed some issues that need to be carefully considered for a successful implementation of any pedagogical model. The *duration of the intervention* was highlighted in the different reviews (Bores-García et al. 2020; Casey and Goodyear 2015), because the positive impacts (e.g. cooperation) caused by a pedagogical model (SE) can fade over time (Fernandez-Rio and Casey 2020). All reviews suggested longer time periods to allow learning to progress beyond an introductory level. Certainly, the implementation of pedagogical models is not easy for teachers, especially for preservice and novice teachers (Silva, Farias, and Mesquita 2021), because they include new, complex frameworks difficult to master, and teachers *struggle when trying to implement* them, becoming, many times, frustrated because they do not progress as fast as expected (Casey and MacPhail 2018). In their seminal work entitled: 'Between hope

and happening: Problematizing the M and the P in models-based practice', Casey et al. (2021, 10) highlighted the mismatch that, many times, happens 'between the hope (in the case of a model) and the happening (in this case of a practice)'. Teachers read (or are told) all the benefits derived from implementing pedagogical models (hope), but they are not aware of the problems that they can face (happening) and become frustrated. One of these problems is the large amount of time that is dedicated to managerial duties, which leaves students with *less time for skilful play*. Therefore, teachers should be aware of this problem and modify certain elements (e.g. information to include in the group's portfolio) to avoid damaging students' learning. In the same line, the inclusion of roles like student-coaches has been pointed as one critical element, since students' learning relies on peers, and some might not be ready to perform the role correctly. Teachers must help students with aids (e.g. learning cues) or specific training or guidance (e.g. individual feedback). Finally, the hybridization of pedagogical models is not an easy task, because many elements should be considered and it is harder to integrate them all (González-Víllora et al. 2019). Teachers should seek help to implement pedagogical models, but specially when trying to hybridize them.

Deepening on the problems faced by all kinds of teachers mentioned earlier, communities of practice (Harvey and Jarrett 2014) can help teachers in their professional development (Hastie, Martínez de Ojeda, and Calderón 2011), making 'things easier'. On the other hand, it is not easy for researchers either, because they must follow precise guidelines to design interventions faithful to the original model (Hastie and Casey 2014), and many times, the context does not help, making model fidelity a difficult issue. However, there is no doubt that pedagogical models can offer teachers the option to select a wide range of sound evidence-based choices to fit their school context (Baker 2016; Casey 2017). Moreover, as Casey et al. (2021) recently argued, pedagogical models should not be considered a 'finished framework', since it needs to evolve with the help of researchers and teachers, acknowledging weaknesses like the ones uncovered in this umbrella review and providing solutions. In this line, pedagogical models should connect future teachers, in-service teachers and teacher educators (Lawson, Kirk, and MacPhail 2020) for the benefit of physical education and the students.

The final research question was: (RQ4) which research gaps have been identified? and results showed that there are still a few lines of study that need to be considered. First, *individuals with special educational needs* and their connection with the different pedagogical models have been scarcely researched. To our knowledge, only one study has been conducted and it produced positive outcomes (Fernandez-Rio and Menendez-Santurio 2017). Our classes are becoming increasingly diverse and pedagogical models can fit these students' needs (Kirk 2020). Students with special needs have been defined as those having behavioural, communication, intellectual or physical exceptionalities or a combination (Ontario Ministry of Education 2000). Therefore, some of these students lack enough movement and physical activity in their lives, others lack confidence in their capabilities, while others have difficulties controlling themselves. Pedagogical models can increase these students' practice time since they work in small groups (CL), help them build their confidence using small-sided games (GCA), and set individual responsibility goals to help them develop self-direction skills (TPSR).

Connected to this gap, research on *girls* and *low-skilled children* has produced contradictory results, since some studies found no differences, while others did (Araújo, Mesquita, and Hastie 2014; Evangelio et al. 2018). As discussed earlier, teachers read (or are told) all the benefits derived from implementing pedagogical models (hope), but they are not aware of the problems that they can face (happening) and some do not pay attention to the needs of girls and low-skilled children when dealing with sports. For example, in GCA they can benefit from small-sided games and/or a change in the rules to provide them with more opportunities to be successful and learn. More research is needed to clarify this issue and provide scientifically relevant information to improve pedagogical models. These two gaps are probably connected to the following one: *the dynamics of the peer-teaching tasks*, since it can explain why some students do not obtain the same benefits. This matter is at the heart of the student-centred pedagogies, and it should be carefully considered

to be truly positive. As discussed earlier, teachers must help students with aids (e.g. learning cues) or specific training or guidance (e.g. individual feedback) when performing these peer-teaching tasks in any pedagogical model. To end this sub-section, we want to highlight that the concept of low-skilled children should not be connected exclusively to sport skills and include all contents. Research on pedagogical models should open the scope to incorporate all kinds of skills (e.g. physical, rhythmic, expressive).

Regarding the content implemented, *body expression* and *individual sports* have been pointed as being underused when implementing pedagogical models, which can be adapted to any context and any content (Casey et al. 2021). Students must experience a wide array of contents to develop a healthy lifestyle (Haerens et al. 2011).

On the other hand, some researchers warned about *what happens after the initial unit of implementation* (Casey and Goodyear 2015). As discussed earlier, teachers become, many times, frustrated when implementing pedagogical models because they do not progress as fast as expected (Casey and MacPhail 2018). Once the novel unit is over, many teachers go back to more traditional pedagogical approaches, where they feel more comfortable (Goodyear and Casey 2015) and where the learning outcomes experienced can fade away. Certainly, future research should explore the temporal sustainability of the changes produced when the teacher shifts to more traditional teaching approaches or after the 'novel effect' of the pedagogical models' framework is over. This issue remains a challenge for researchers and practitioners and it is key to produce long-standing effects (beyond the initial impact) in any of the four learning domains of our students.

Finally, the hybridization of pedagogical models is not different from single pedagogical models, and the previously mentioned gaps apply. Nevertheless, there are even more gaps because of the novelty of the framework. For some, 'more is better' and they believe that implementing several pedagogical models is better than just one, making hybridization a 'fashion' that 'trendy' teachers must follow. More research is needed on the complexities of its implementation.

This umbrella review aimed at addressing what we know about pedagogical models in physical education so far. This is the first umbrella review to systematically review the literature on the impact of pedagogical models on pupils' learning outcomes. The included reviews were of moderate to high quality. The absence of meta-analysis in most of them prevented a higher score (the heterogeneity in the duration of the interventions did not allow to conduct meta-analysis). Future research should focus on a temporal 'standard' to facilitate meta-analysis, but it is difficult to achieve in educational contexts.

Conclusions

The umbrella review conducted in the present study has provided an opportunity to assess the implementation of several pedagogical models and hybridizations from a global perspective, and try to understand them using a single lens. There is ample evidence supporting the strength of pedagogical models' interventions to promote positive outcomes in the four learning domains: physical, cognitive, social and affective. However, this connection does not always happen and some weaknesses have also been identified: *length of the implementation, time for skilful play, struggle to implement pedagogical models, poor performance of student-coaches and model fidelity*. Teachers and researchers must be aware of the weaknesses uncovered to conduct intervention programs that can really work and produce the claimed outcomes. Finally, reviews have identified several gaps in our understanding of the implementation of pedagogical models: *individuals with special educational needs, girls, low-skilled children, the dynamics of the peer-teaching tasks, body expression and individual sports, and what happens after the initial unit of implementation*. They all need to be addressed to obtain a better and wider view of the implementation of pedagogical models.

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