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Review

Exploring Physiotherapy Students' Competencies in Clinical Setting Around the World: A Scoping Review

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Abstract: Clinical education is a fundamental component of physiotherapy entry-level education programs, with practice education being a core element. The aim of this scoping review is to identify and define the competencies of physiotherapy students in clinical settings. This review followed the five steps of the Arksey and O'Malley framework, employing a search strategy that utilized Mesh terms. Searches were performed in PubMed, CINAHL, Scopus, ERIC, WOS, and PsycINFO, with additional exploration of the grey literature. The inclusion criteria were defined using Peter's concept: (population) physiotherapy students; (concept) competencies aligned with the WCPT educational framework; (context) clinical environment. A total of 1798 sources were identified, and 86 studies were finally selected. Studies originated from 14 countries, with the United States, Australia, and Canada being the most represented. Of the selected studies, 62 used specific tools to identify competencies. The "Clinical Performance Instrument" and the "Assessment of Physiotherapy Practice" were the most frequently used instruments and covered all of the World Physiotherapy competencies' domains. "Clinical Competence" emerged as the most widely recognized and utilized term across countries. Among the WCPT domains, "Physiotherapy Assessment and Intervention", "Ethical and Professional Practice", and "Communication" were the most represented, whereas "Evidence-Based Practice" and "Quality Improvement" were the least mentioned.

Keywords: physical therapy; student; clinical competence; professional competence; clinical education; practice education; clinical setting

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1. Introduction

Clinical education (CE) constitutes an important part of health professional education in higher education institutions. It integrates clinical experiences into the learning process, allowing students to apply their theoretical knowledge and develop professional skills (Cantatore et al., 2016). CE provides students with an opportunity to practice and

enhance their skills in practical, real-world environments, promoting the capabilities essential for achieving independence and professional competence (Hobbs et al., 2000; World Confederation for Physical Therapy, 2011).

Within entry-level physiotherapy education programs, CE plays a fundamental role (Hobbs et al., 2000). The World Confederation for Physical Therapy (WCPT), the leading global organization in the physiotherapy field, recommends that CE should comprise at least one-third of the curriculum (World Physiotherapy, 2021). It should encompass clinical training in different settings, such as institutional, primary health care, or community environments (World Physiotherapy, 2021). Additionally, WCPT refers to CE as practice education (PE) (World Physiotherapy, 2021, 2022), which should incorporate activities conducted in clinical and non-clinical contexts, under the supervision and guidance of experienced physiotherapists, referred to as clinical instructors. PE, developed in a clinical setting, includes practices with a variety of patients across different physiotherapy areas (cardiopulmonary, neuro-rehabilitation, and pediatrics, among others) (World Physiotherapy, 2022). This aspect provides students with the opportunity to refine and strengthen their competencies through interactions with patients with different diseases and exposure to several clinical settings (Higgs et al., 2017).

PE represents a dynamic learning context, the aspects of which must be understood by CI to ensure reflective and critical learning for students (Patton et al., 2013). The clinical environments are complex, situational, and relational learning spaces; student learning is influenced by various factors, including involvement in professional practices, the disposition of the CI, as well as the students' own attitudes (Patton et al., 2018). On one hand, CI plays the main role in this process by supervising, guiding, and providing support to students as they develop the essential competencies (Edgar & Connaughton, 2014). On the other hand, students integrate theoretical knowledge with practical skills, advancing toward becoming autonomous professionals (Ceelen et al., 2023) through reflective and ethical practices, communicative exchanges with patients, and interprofessional socialization (World Physiotherapy, 2021).

WCPT consists of physiotherapists and physiotherapy organizations representing 120 countries (World Physiotherapy, 2023). Based on the most recent data, there are an estimated 4031 entry-level physiotherapy programs across the globe (World Physiotherapy, n.d.; CountryMeters, n.d.). Currently, there is significant variability or heterogeneity in the structure of CE within these programs, including differences in the total hours dedicated, the variety of clinical settings employed, and the length of time allocated to PE (World Physiotherapy, 2022).

The WCPT established the "Physiotherapy Education Framework" to outline the essential competencies that physiotherapy students must acquire in clinical settings. This framework identifies 38 competencies into 8 domains, collectively referred to as "Practice Competence" (World Physiotherapy, 2021).

However, notable variations exist among WCPT member states in the terminology and classification of these competencies. For instance, in the United States, the American Physical Therapy Association (APTA) has defined 18 competencies under the denomination of "Performance Criteria" (Roach et al., 2012). In contrast, in Australia, some authors use the term "Clinical Competence" to describe these skills, which are assessed through the "Assessment of Physiotherapy Practice" which encompasses 20 competencies distributed across eight domains (Reubenson & Elkins, 2022). Even within the European Higher Education Area (EHEA), significant variations can be observed across different countries. In Spain, 23 competencies have been identified and categorized into three domains (Martiáñez-Ramírez et al., 2022), whereas in Italy, essential competencies are grouped

under "Professional Competence" which refers to the skills developed in clinical settings (Di Tondo et al., 2018).

As a result, there is a lack of clarity and systematization regarding the competencies that students should acquire during PE and that CIs should transmit. It is, therefore, necessary to carry out an exhaustive analysis of the existing literature to determine how these competencies are defined and to identify those deemed essential. This will help to establish a basis for naming them uniformly and identify them within a standardized framework that can be implemented worldwide. Consequently, the aims of this scoping review are: 1. To identify the terms used to define the set of competencies developed by physiotherapy students during clinical placements; 2. To determine the competencies that students need to acquire during clinical placements. 3. To explore these two aspects across different countries, detecting differences and similarities.

2. Materials and Methods

This scoping review was designed following the methodological guidance for conducting scoping reviews elaborated by the Joanna Briggs Institute (JBI) (Peters et al., 2020). This review method was selected as it best aligns with the topic under investigation and the established objectives, since it allows for mapping knowledge about a specific topic. In particular, it provides a comprehensive overview of the concept—in this case, the skills acquired by physiotherapy students in a clinical setting—and facilitates the definition of terms and concepts in this specific area where no clear consensus exists.

The original methodological framework proposed by Arksey and O'Malley was adopted (Arksey & O'Malley, 2005). This framework includes five interconnected stages, which are detailed below and in which this scoping review is structured. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) were also used (Tricco et al., 2018) from the contextualization to the reporting of the results.

Stage 1: Identifying the Research Question

This scoping review explored the following research question: Are the competencies that physiotherapy students learn in clinical placements clearly defined? This study aimed to synthesize the existing literature on the competencies that physiotherapy students need to learn and develop during their clinical placements.

Stages 2 and 3: Identification and Selection of Relevant Studies

A comprehensive search strategy was developed by the research team in collaboration with a librarian from the University of Seville (Spain), who has extensive experience in similar searches. The research terms are the following: "Mesh" terms: "Clinical Competence", "Professional Competence", "Education", "Clinical Clerkship", "Physical Therapy" and "student".

A broad search combined "Mesh" terms with keywords was conducted in MEDLINE (PubMed) to assess the suitability of the research terms, and the final search strategy was subsequently developed as follows: (("Clinical Performance" OR "Clinical Competence" OR "Clinical Skill" OR "Professional Competence" OR "Competenc*")) AND ("Practice Education" OR "Clinical Placement" OR "Clinical education" OR "Clinical Clerkship") AND (("Physiotherapy" OR "Physical Therapy") AND ("Student*")).

The search was carried out between July and August 2024 in the following international databases: MEDLINE (PubMed), CINAHL (Cumulative Index to Nursing and Allied Health Literature), Scopus, ERIC (Education Resources Information Center), Web of Science (WOS), PsycINFO. Additionally, it was extended to the following grey literature databases: OpenGrey and Grey Literature Report. To minimize the risk of bias, a search was conducted

using Google Scholar. To be included, studies had to meet the following criteria based on the population (i), concept (ii), and context (iii) method proposed by Peters et al. (2020) were as follows:

(i) physiotherapy students involved in clinical placements.
(ii) identification of core competencies in the learning of physiotherapy, PE, adopting the framework proposed by the WCPT (World Physiotherapy, 2021), which identifies eight domains of competencies: (D1) "Physiotherapy Assessment and Intervention"; (D2) "Ethical and Professional Practice"; (D3) "Communication"; (D4) "Evidence-Based Practice" ("EBP"); (D5) "Interprofessional Teamwork"; (D6) "Reflective Practice and Lifelong Learning"; (D7) "Quality Improvement"; (D8) "Leadership and Management". These domains include 38 specific competencies, detailed in Table S1 (Supplementary Materials).
(iii) all types of studies published in English, Spanish, and Italian, conducted in any geographical location or clinical placements, and covering all areas of physiotherapy.

The exclusion criteria were as follows: studies were excluded if they did not specifically address the competencies for physiotherapist students or if they were conducted in an educational setting other than a clinical environment.

Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia; http://www.covidence.org/, accessed on 2 July 2024) was used to support the screening process, in conjunction with Microsoft Excel (Microsoft, version 16.0, 2021; Redmond, WA, USA). After importing all sources and removing duplicates (E.M.), two researchers (E.M., I.D.J.O.) conducted two phases of screening: (i) title and abstract review and (ii) full-text review. Only sources that strictly met the inclusion criteria were selected, and in case of disagreement, a third researcher (E-I.M.T-D-C.) was consulted to reach a consensus.

Stage 4 and 5: Charting of the Data and the Result Report

Data were independently extracted by two reviewers (E.M. and I.D.J.O.) using Microsoft Excel (Microsoft, version 16.0, 2021; Redmond, WA, USA) following structured data recording forms. The collected data included: author/s, country, year of publication, type of sources, study design and sample, objective, clinical environment, and approach to define competencies. Other collected data related to competencies include the following: term use, country, number of studies, author/s, and year. For the last one, the collected data form addressed the following: an approach to defining competencies and the presence of WCPT's competences' domains (D1, D2, D3, D4, D5, D6, D7, and D8). The forms were consolidated, and in case of a disagreement, a third researcher was consulted (E-I.M.T-D-C.) to reach a consensus.

The extracted data were analyzed descriptively and presented through a narrative synthesis and tables in the results' section.

3. Results

3.1. Literature Search

After duplicates were removed, a total of 1798 sources were identified for evaluation. During the title and abstract screening process, 1633 studies were excluded for matching the exclusion criteria, leaving 165 studies to be assessed in full text. Out of these, 78 were excluded for not meeting the inclusion criteria and finally, 86 studies were included in this scoping review. The entire screening process was presented in the flow diagram (Figure 1).

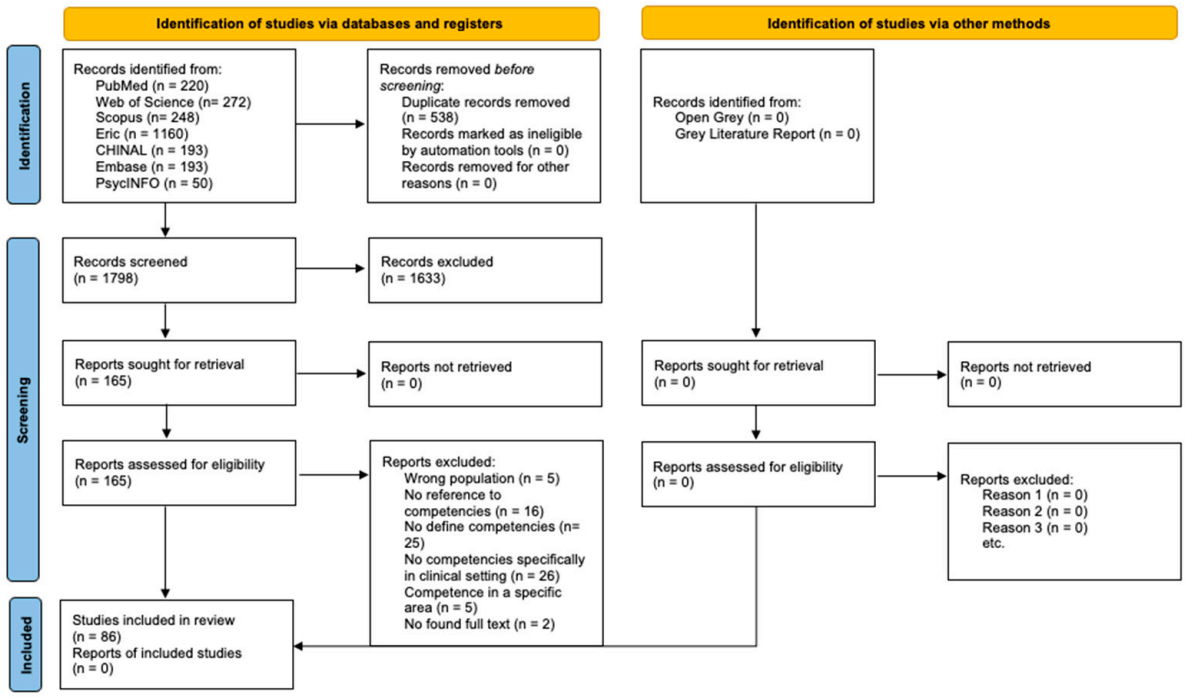

Figure 1. PRISMA 2020 flow chart for new systematic reviews, which included searches of databases, registers and other sources (Page et al., 2021).

3.2. Studies Characteristics

Of the included studies, 95.3% of them were scientific articles (n = 82) (Aljadi et al., 2017; Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2022, 2024; Blackstock et al., 2013; Bozzolan et al., 2014; Clouten et al., 2006; Colgrove & Rucker, 2023; Cox et al., 1999; Cross, 2001; Cross et al., 2001; Cross, 1998, 1999; Cross & Hicks, 1997; Dalton et al., 2011, 2012; DeClute & Ladyshewsky, 1993; Delany & Bragge, 2009; Dubouloz et al., 2010; English et al., 2004; Erdman & Black, 2021; Ernstzen et al., 2010; Ernstzen et al., 2009; Haladay et al., 2024; Hayes et al., 1999; Housel & Gandy, 2008; Hrachovy et al., 2000; Hu et al., 2020; Huhn et al., 2018; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Kelly et al., 1996; Lawton et al., 2021; Lo et al., 2015, 2016, 2017; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Meldrum et al., 2008; Meyer & Willett, 2007; Mori et al., 2016a, 2016b, 2024; Muhamad et al., 2015; Murphy et al., 2014; Neville & Crossley, 1993; Norman & Booth, 2015; North & Sharp, 2020; O'Connor et al., 2018; Oldmeadow, 1996; Olney, 1977; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rheault & Coulson, 1991; Rubertone et al., 2022; Scully & Shepard, 1983; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Shields et al., 2013; Simuzingili & Amosun, 1998; Sliwinski et al., 2004; Stickley, 2005; Talberg & Scott, 2014; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wolff-Burke, 2005; Wright et al., 2018; Zainuldin & Tan, 2021), 4.65% were theses (n = 2) (Fein, 2003; Wells, 1980), a report (n = 1) (Nayer, 1995) and a congress presentation (n = 1) (Dalton et al., 2015).

The design across the studies varied, being as follows: cross-sectional (n = 22, 25.6.7%) (Aljadi et al., 2017; Birkmeier et al., 2024; Clouten et al., 2006; Cox et al., 1999; Dalton et al., 2011; Dubouloz et al., 2010; English et al., 2004; Hrachovy et al., 2000; Huhn et al., 2018; Kelly et al., 1996; Lawton et al., 2021; Lo et al., 2015, 2016, 2017; Mori et al., 2024; Murphy et al., 2014; Nayer, 1995; Olney, 1977; Sliwinski et al., 2004; Van Duijn & Bevins, 2005; Vendrely, 2007; Wojkowski et al., 2021), qualitative (n = 16, 18.6%) (Anderson et al., 2014; Cross, 1998; Cross & Hicks, 1997; Delany & Bragge, 2009; Ernstzen et al., 2010; Hayes et al., 1999;

Meyer & Willett, 2007; Neville & Crossley, 1993; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Rowe, 2012; Scully & Shepard, 1983; Shields et al., 2013; Wolff-Burke et al., 2022; Wolff-Burke, 2005; Zainuldin & Tan, 2021), cohort (n = 11, 12.7%) (Birkmeier et al., 2022; Colgrove & Rucker, 2023; DeClute & Ladyshewsky, 1993; Housel & Gandy, 2008; Irwin et al., 2018; Kalu et al., 2019, 2021; Luedtke-Hoffmann et al., 2012; Proctor et al., 2010; Reilly et al., 2020; Terry et al., 2020), validation of psychometric properties (n = 11, 12.8%) (Dalton et al., 2012; Loomis, 1985; Meldrum et al., 2008; Mori et al., 2016a, 2016b; Muhamad et al., 2015; Reubenson et al., 2020; Rheault & Coulson, 1991; Shenoy & Vivian, 2019; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002), observational (n = 6, 6.9%) (Fein, 2003; Hu et al., 2020; Norman & Booth, 2015; Paynter et al., 2022; Talberg & Scott, 2014; Torres-Narváez et al., 2018), Delphi study (n = 5, 5.8%) (Cross, 1999, 2001; Cross et al., 2001; Haladay et al., 2024; Simuzingili & Amosun, 1998), randomized controlled trial (n = 4, 4.6%) (Atrash et al., 2023; Blackstock et al., 2013; Dalton et al., 2015; Sevenhuysen et al., 2014), quasi-experimental (n = 3, 3.4%) (Jones & Sheppard, 2011; Wells, 1980; Wright et al., 2018), case study/case series (n = 3; 3.4%) (Erdman & Black, 2021; Ernstzen et al., 2009; North & Sharp, 2020) narrative mixed-method (n = 3, 3.4%) (Bozzolan et al., 2014; Rubertone et al., 2022; Wetherbee et al., 2018), descriptive narrative (n = 1, 1.1%) (Oldmeadow, 1996), and systematic review (n = 1, 1.1%) (O'Connor et al., 2018).

Regarding the sample of the included studies, it involved the following: CIs and/or students or other professionals related to physiotherapy education, alone or in combination with CIs and/or students. Figure 2 details the percentage of studies related to this sample's aspect.

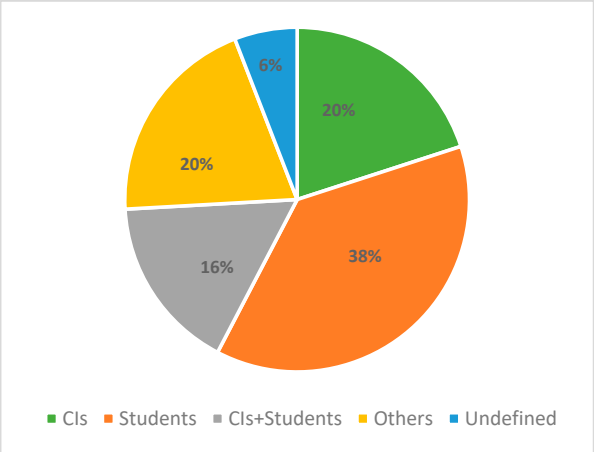

Figure 2. Composition of the sample of the included studies: only CIs (Aljadi et al., 2017; Anderson et al., 2014; Clouten et al., 2006; Cross et al., 2001; Cross & Hicks, 1997; Hayes et al., 1999; Hrachovy et al., 2000; Huhn et al., 2018; Lo et al., 2017; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Pechak & Black, 2014; Rubertone et al., 2022; Scully & Shepard, 1983; Shenoy & Vivian, 2019; Wetherbee et al., 2018; Wolff-Burke, 2005); only students (Blackstock et al., 2013; Bozzolan et al., 2014; Colgrove & Rucker, 2023; Cox et al., 1999; Dubouloz et al., 2010; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Kelly et al., 1996; Lawton et al., 2021; Lo et al., 2016; Luedtke-Hoffmann et al., 2012; Meyer & Willett, 2007; Mori et al., 2016b; Olney, 1977; Paynter et al., 2022; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rheault & Coulson, 1991; Rowe, 2012; Shields et al., 2013; Talberg & Scott, 2014; Terry et al., 2020; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wright et al., 2018); CIs and students (Atrash et al., 2023; Birkmeier et al., 2022; Dalton et al., 2012; Dalton et al., 2011; DeClute & Ladyshewsky, 1993; Delany & Bragge, 2009; Ernstzen et al., 2010; Ernstzen et al., 2009; Hu et al., 2020; Lo et al., 2015; Mori et al., 2016a; Murphy et al., 2014; Neville & Crossley, 1993; North & Sharp, 2020; Peters-Brinkerhoff, 2016; Wolff-Burke et al., 2022); other professionals related to physiotherapy education, alone or in

combination with CIs and/or students (Cross, 1998, 1999, 2001; Dalton et al., 2015; English et al., 2004; Haladay et al., 2024; Meldrum et al., 2008; Mori et al., 2024; Muhamad et al., 2015; O'Connor et al., 2018; Sevenhuysen et al., 2014; Simuzingili & Amosun, 1998; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Torres-Narváez et al., 2018; Zainuldin & Tan, 2021); undefined (Birkmeier et al., 2024; Nayer, 1995; Norman & Booth, 2015; Oldmeadow, 1996; Wojkowski et al., 2021).

The studies involved 14 countries, with the highest number conducted in United States (n = 31, 36.0%) (Birkmeier et al., 2022; Clouten et al., 2006; Colgrove & Rucker, 2023; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Haladay et al., 2024; Hayes et al., 1999; Housel & Gandy, 2008; Hrachovy et al., 2000; Huhn et al., 2018; Irwin et al., 2018; Kelly et al., 1996; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Meyer & Willett, 2007; Neville & Crossley, 1993; North & Sharp, 2020; Olney, 1977; Peters-Brinkerhoff, 2016; Reilly et al., 2020; Rheault & Coulson, 1991; Rubertone et al., 2022; Scully & Shepard, 1983; Sliwinski et al., 2004; Stickley, 2005; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wolff-Burke et al., 2022; Wolff-Burke, 2005), followed by Australia (n = 17, 19.7%) (Blackstock et al., 2013; Dalton et al., 2011, 2012, 2015; Delany & Bragge, 2009; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2015, 2016, 2017; Murphy et al., 2014; Oldmeadow, 1996; Paynter et al., 2022; Reubenson et al., 2020; Shields et al., 2013; Terry et al., 2020; Wright et al., 2018), and Canada (n = 12, 13.9%) (Anderson et al., 2014; DeClute & Ladyshewsky, 1993; Dubouloz et al., 2010; Kalu et al., 2019, 2021; Lo et al., 2016; Mori et al., 2024; Nayer, 1995; Norman & Booth, 2015; Proctor et al., 2010; Wells, 1980; Wojkowski et al., 2021). Nine (10.4%) countries had only one study conducted (Aljadi et al., 2017; Atrash et al., 2023; Bozzolan et al., 2014; Hu et al., 2020; Meldrum et al., 2008; Muhamad et al., 2015; Shenoy & Vivian, 2019; Torres-Narváez et al., 2018; Zainuldin & Tan, 2021).

In relation to the approach used to define the competencies, the studies used tool/s; narrative reports or narrative interviews; survey or questionnaire ("ad hoc"); a list of competences; and a model or construct. Figure 3 shows the methods used among the studies.

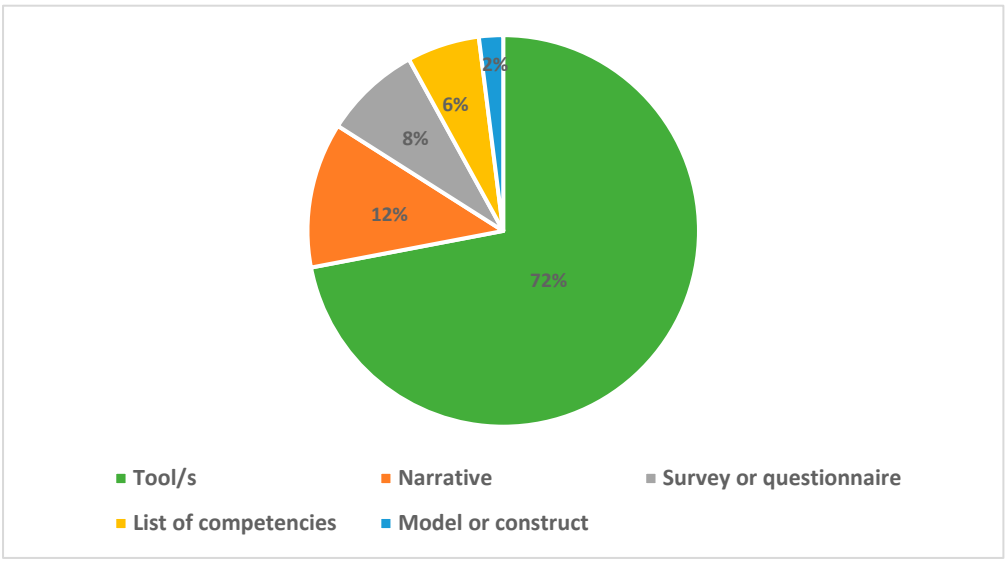

Figure 3. Approach used to define the competencies are as follows: tool/s (Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2024; Blackstock et al., 2013; Bozzolan et al., 2014; Clouten et al., 2006; Colgrove & Rucker, 2023; Cox et al., 1999; Dalton et al., 2011, 2012, 2015; DeClute & Ladyshewsky, 1993; Dubouloz et al., 2010; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Haladay et al., 2024; Housel & Gandy, 2008; Hrachovy et al., 2000; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Lawton et al., 2021; Lo et al., 2015, 2016; Loomis, 1985;

Luedtke-Hoffmann et al., 2012; Meldrum et al., 2008; Mori et al., 2016a, 2016b, 2024; Muhamad et al., 2015; Murphy et al., 2014; Norman & Booth, 2015; North & Sharp, 2020; O'Connor et al., 2018; Oldmeadow, 1996; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rheault & Coulson, 1991; Rubertone et al., 2022; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Simuzingili & Amosun, 1998; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018); narrative report or narrative interview (Birkmeier et al., 2022; Delany & Bragge, 2009; Ernstzen et al., 2010; Hayes et al., 1999; Meyer & Willett, 2007; Neville & Crossley, 1993; Rowe, 2012; Scully & Shepard, 1983; Shields et al., 2013; Wolff-Burke, 2005); survey or questionnaire ("ad hoc") (Aljadi et al., 2017; Ernstzen et al., 2009; Huhn et al., 2018; Kelly et al., 1996; Lo et al., 2017; Nayer, 1995; Talberg & Scott, 2014); list of competences (Cross et al., 2001; Cross, 1999, 2001; Olney, 1977; Zainuldin & Tan, 2021); and model or construct (Cross, 1998; Cross & Hicks, 1997).

Throughout the tools used in the studies, the "Clinical Performance Instrument" (CPI) (n = 20, 23.2%) (Anderson et al., 2014; Colgrove & Rucker, 2023; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Irwin et al., 2018; Norman & Booth, 2015; O'Connor et al., 2018; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Rubertone et al., 2022; Sliwinski et al., 2004; Task Force for the Development of Student Clinical Performance Instruments, 2002; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wolff-Burke et al., 2022) and APP (n = 17, 19.7%) (Atrash et al., 2023; Blackstock et al., 2013; Dalton et al., 2011, 2012, 2015; Hu et al., 2020; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2015, 2016; Murphy et al., 2014; O'Connor et al., 2018; Paynter et al., 2022; Reubenson et al., 2020; Sevenhuysen et al., 2014; Terry et al., 2020; Wright et al., 2018) were the most commonly used.

The most important characteristics of the studies are presented in Table S2 (Supplementary Materials).

3.3. Terms Used for Competencies

Among the selected studies, 15 different terms were used to describe the competencies that physiotherapy students' learn in PE. Table 1 lists all the terms used in each country. In 12 (13.9%) studies, different terms were used to describe these competencies (Birkmeier et al., 2022; Cross & Hicks, 1997; Dalton et al., 2012; Lo et al., 2015, 2016, 2017; Nayer, 1995; Neville & Crossley, 1993; Rowe, 2012; Scully & Shepard, 1983; Shields et al., 2013; Wolff-Burke, 2005).

The term "Clinical Competence" was the most frequently used (n = 36, 41.8%) and it was also the most commonly employed across the largest number of countries (n = 10, 71.4%) (Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2022; Blackstock et al., 2013; Cross, 2001; Cross et al., 2001; Cross & Hicks, 1997; Dalton et al., 2012; DeClute & Ladyshewsky, 1993; English et al., 2004; Erdman & Black, 2021; Ernstzen et al., 2010; Ernstzen et al., 2009; Fein, 2003; Housel & Gandy, 2008; Hrachovy et al., 2000; Jones & Sheppard, 2011; Kalu et al., 2021; Lawton et al., 2021; Lo et al., 2017; Lo et al., 2016; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Meldrum et al., 2008; Mori et al., 2016b; Muhamad et al., 2015; Norman & Booth, 2015; O'Connor et al., 2018; Oldmeadow, 1996; Olney, 1977; Rowe, 2012; Reubenson et al., 2020; Rheault & Coulson, 1991; Shenoy & Vivian, 2019; Wright et al., 2018; Zainuldin & Tan, 2021).

Table 1. Terms used for competence across countries.

Terms (Total Number of Studies)	Country	Number of Studies	Author/s, Year
Clinical Abilities (n = 1)	United States	1	(Irwin et al., 2018)
Clinical Behaviors (n = 1)	United States	1	(Wetherbee et al., 2018)
Clinical Competence (n = 36)	Australia	9	(Blackstock et al., 2013; Dalton et al., 2012 *; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2017 *; Lo et al., 2016 *; Oldmeadow, 1996; Reubenson et al., 2020; Wright et al., 2018)
	Canada	5	(Anderson et al., 2014; DeClute & Ladyshewsky, 1993; Kalu et al., 2021; Mori et al., 2016b; Norman & Booth, 2015)
	India	1	(Shenoy & Vivian, 2019)
	Ireland	1	(Meldrum et al., 2008)
	Israel	1	(Atrash et al., 2023)
	Malaysia	1	(Muhamad et al., 2015)
	Singapore	1	(Zainuldin & Tan, 2021)
	South Africa	3	(Ernstzen et al., 2010; Ernstzen et al., 2009; Rowe, 2012 *)
	United Kingdom	4	(Cross, 2001; Cross et al., 2001; Cross & Hicks, 1997 *; O'Connor et al., 2018)
	United States	10	(Birkmeier et al., 2024 *; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Hrachovy et al., 2000; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Olney, 1977; Rheault & Coulson, 1991)
Clinical Competencies (n = 11)	Australia	4	(Lo et al., 2016 *; Murphy et al., 2014; Paynter et al., 2022; Shields et al., 2013 *)
	Canada	1	(Proctor et al., 2010)
	Colombia	1	(Torres-Narváez et al., 2018)
	South Africa	3	(Rowe, 2012 *; Simuzingili & Amosun, 1998; Talberg & Scott, 2014)
	United States	2	(Birkmeier et al., 2024 *; North & Sharp, 2020)
Clinical Competency (n = 7)	Australia	2	(Lo et al., 2016 *; Lo et al., 2015 *)
	Canada	1	(Nayer, 1995 *)
	United States	4	(Hayes et al., 1999; Pechak & Black, 2014; Rubertone et al., 2022; Scully & Shepard, 1983 *)
Clinical skills (n = 16)	Australia	1	(Delany & Bragge, 2009)
	Canada	3	(Nayer, 1995 *; Wells, 1980; Wojkowski et al., 2021)
	Italy	1	(Bozzolan et al., 2014)
	United States	11	(Birkmeier et al., 2024 *; Colgrove & Rucker, 2023; Haladay et al., 2024; Huhn et al., 2018; Neville & Crossley, 1993 *; Kelly et al., 1996; Reilly et al., 2020; Stickley, 2005; Van Duijn & Bevins, 2005; Vendrely, 2007; Wolff-Burke et al., 2022 *)

Table 1. *Cont.*

Terms (Total Number of Studies)	Country	Number of Studies	Author/s, Year
Core Competencies (n = 1)	United States	1	(Meyer & Willett, 2007)
Essential Competencies (n = 2)	Canada	2	(Mori et al., 2016a, 2024)
Practical Skills (n = 2)	Australia	1	(Terry et al., 2020)
	Kuwait	1	(Aljadi et al., 2017)
Physiotherapy Competency (n = 1)	Canada	1	(Cox et al., 1999)
Professional Behavior (n = 2)	Australia	1	(Lo et al., 2017 *)
	United States	1	(Clouten et al., 2006)
Professional Competence (n = 11)	Australia	3	(Dalton et al., 2015; Dalton et al., 2012 *; Dalton et al., 2011)
	China	1	(Hu et al., 2020)
	South Africa	1	(Rowe, 2012 *)
	United States	3	(Scully & Shepard, 1983 *; Sliwinski et al., 2004; Wolff-Burke, 2005)
	United Kingdom	3	(Cross, 1999; Cross, 1999; Cross & Hicks, 1997 *)
Professional Competencies (n = 5)	Australia	1	(Shields et al., 2013 *)
	Canada	3	(Dubouloz et al., 2010; Kalu et al., 2019; Lo et al., 2016 *)
	United States	1	(Birkmeier et al., 2024 *)
Skills (n = 1)	United States	1	(Peters-Brinkerhoff, 2016)
Student performance outcomes (n = 1)	Australia	1	(Sevenhuysen et al., 2014)

* Studies that used more than one term.

The other most utilized terms were "Clinical Skills" (n = 16, 18.6%) (Birkmeier et al., 2022; Bozzolan et al., 2014; Colgrove & Rucker, 2023; Delany & Bragge, 2009; Haladay et al., 2024; Huhn et al., 2018; Kelly et al., 1996; Nayer, 1995; Neville & Crossley, 1993; Reilly et al., 2020; Stickley, 2005; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wojkowski et al., 2021; Wolff-Burke et al., 2022), "Professional Competence" (n = 11, 12.7%) (Cross, 1998, 1999; Cross & Hicks, 1997; Dalton et al., 2011, 2012, 2015; Hu et al., 2020; Rowe, 2012; Scully & Shepard, 1983; Sliwinski et al., 2004; Wolff-Burke et al., 2022), and "Clinical Competencies" (n = 11, 12.7%) (Birkmeier et al., 2022; Lo et al., 2016; Murphy et al., 2014; North & Sharp, 2020; Paynter et al., 2022; Proctor et al., 2010; Rowe, 2012; Shields et al., 2013; Simuzingili & Amosun, 1998; Talberg & Scott, 2014; Torres-Narváez et al., 2018). The last two terms were also the ones used in the greatest number of countries after the term "clinical competence" (n = 5, 35.7%; n = 5, 37.5%).

In five studies (n = 5, 5.8%), generic terms were used, such as: "Core Competencies" (Meyer & Willett, 2007), "Essential Competencies" (Mori et al., 2024, 2016a), "Skills" (Peters-Brinkerhoff, 2016) and "Student Performance Outcomes" (Sevenhuysen et al., 2014).

The terms "Clinical Abilities" (n = 1, 1.1%) (Irwin et al., 2018), "Clinical Behaviors" (n = 1, 1.1%) (Wetherbee et al., 2018), and "Physiotherapy Competency" (n = 1, 1.1%) (Cox et al., 1999) were the specific terms least frequently used.

3.4. Identifying Competencies in Relation with WCPT's Domains

All the WCPT's domains were present in 42 studies (48.8%): 17 (18.3%) studies used the APP tool (Atrash et al., 2023; Blackstock et al., 2013; Dalton et al., 2011, 2012, 2015; Hu et al., 2020; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2015, 2016; Murphy et al., 2014; O'Connor et al., 2018; Paynter et al., 2022; Reubenson et al., 2020; Sevenhuysen et al., 2014; Terry et al., 2020; Wright et al., 2018); 20 (23.2%) studies employed the CPI tool (including all versions used in the selected articles) (Anderson et al., 2014; Colgrove & Rucker, 2023; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Irwin et al., 2018; Norman & Booth, 2015; O'Connor et al., 2018; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Rubertone et al., 2022; Sliwinski et al., 2004; Task Force for the Development of Student Clinical Performance Instruments, 2002; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wolff-Burke et al., 2022); 2 (2.3%) studies elaborated a list of desirable behaviors (Cross, 2001; Cross et al., 2001); 1 (1.1%) study developed the ACP 2.0 tool (Mori et al., 2024); 1 (1.1%) study used the PSCAT scale (Shenoy & Vivian, 2019); and 1 (1.1%) study utilized the MTCCP tool (Torres-Narváez et al., 2018).

The WCPT's domains identified in the studies are presented in Table 2.

Table 2. Approach to define competencies and its relationship with WCPT's domains of competence.

Approach to Define Competencies	D1	D2	D3	D4	D5	D6	D7	D8
APP (Atrash et al., 2023; Blackstock et al., 2013; Dalton et al., 2011, 2012, 2015; Hu et al., 2020; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2015, 2016; Murphy et al., 2014; O'Connor et al., 2018; Paynter et al., 2022; Reubenson et al., 2020; Sevenhuysen et al., 2014; Terry et al., 2020; Wright et al., 2018)	X	X	X	X	X	X	X	X
ACP (Kalu et al., 2019, 2021; Mori et al., 2016a, 2016b; O'Connor et al., 2018; Wojkowski et al., 2021)	X	X	X		X	X		X
ACP 2.0 (Mori et al., 2024)	X	X	X	X	X	X	X	X
Assessment form (Meldrum et al., 2008)	X		X			X		X
BLUE-MACS (Hrachovy et al., 2000; O'Connor et al., 2018)		X						
CAF (O'Connor et al., 2018)	X	X	X					
CCEVI-R (Muhamad et al., 2015; O'Connor et al., 2018)	X	X						
CCPE (Reilly et al., 2020)	X	X	X			X		
CCS (O'Connor et al., 2018; Rheault & Coulson, 1991)	X	X	X					
Clinical Competencies' survey instrument (Simuzingili & Amosun, 1998)	X	X	X					X
CIET (North & Sharp, 2020; O'Connor et al., 2018)	X	X	X			X		X
CPAF (O'Connor et al., 2018)	X	X	X		X			
CPI (CPI, PT-CPI, CPI'06) (Anderson et al., 2014; Colgrove & Rucker, 2023; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Irwin et al., 2018; Norman & Booth, 2015; O'Connor et al., 2018; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Rubertone et al., 2022; Sliwinski et al., 2004; Task Force for the Development of Student Clinical Performance Instruments, 2002; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wolff-Burke et al., 2022)	X	X	X	X	X	X	X	X

Table 2. *Cont.*

Approach to Define Competencies	D1	D2	D3	D4	D5	D6	D7	D8
ECC (Cox et al., 1999; DeClute & Ladyshewsky, 1993; Loomis, 1985; O'Connor et al., 2018)	X	X	X		X			
EPAs (Zainuldin & Tan, 2021)	X	X	X	X	X	X	X	
GAA (Clouten et al., 2006)			X			X		X
List of 89 observable behaviors (Cross, 2001; Cross et al., 2001)	X	X	X	X	X	X	X	X
List of 24 attributes (Cross, 1999)	X	X	X		X	X		
List of 10 competencies (Olney, 1977)	X	X			X	X		
McGill's University Clinical Assessment form (Wells, 1980)	X	X	X					
Melborne University Performance Criteria's final form (Oldmeadow, 1996)	X	X	X					
Model of professional competence (Cross, 1998)	X	X	X			X		
MTCCP (Torres-Narváez et al., 2018)	X	X	X	X	X	X	X	X
Narrative (Cross & Hicks, 1997)	X	X	X			X		
Narrative (Delany & Bragge, 2009)	X				X	X		
Narrative (Neville & Crossley, 1993)	X					X		
Narrative (Ernstzen et al., 2010)	X		X			X		
Narrative (Hayes et al., 1999)	X	X	X		X	X		
Narrative (Meyer & Willett, 2007)		X		X	X			
Narrative (Nayer, 1995)	X			X	X		X	
Narrative (Scully & Shepard, 1983)	X							
Narrative (Shields et al., 2013)	X		X					X
PSCAT (Shenoy & Vivian, 2019)	X	X	X	X	X	X	X	X
PT-MACS (Luedtke-Hoffmann et al., 2012; O'Connor et al., 2018; Stickley, 2005)	X	X	X			X	X	X
Questionnaire ("ad hoc") (Aljadi et al., 2017)	X	X	X					
Questionnaire ("ad hoc") (Ernstzen et al., 2009)			X			X		
Questionnaire ("ad hoc") (Kelly et al., 1996)	X		X					
Questionnaire ("ad hoc") (Talberg & Scott, 2014)	X		X					
Survey (Lo et al., 2017)	X	X						
RCIS (O'Connor et al., 2018)	X	X	X			X		
RIL, DMIL (Dubouloz et al., 2010)	X	X	X		X			
UOB: University Birmingham tool (O'Connor et al., 2018)	X	X	X		X			

Abbreviations: ACP: Canadian Physical Therapy Assessment of Clinical Practice; APP: Assessment of Physiotherapy Practice; CAF: Common Clinical Assessment Form; CCS: Clinical Competence Scale; CCPE: Clinical Competence Performance Examination; CIET: Clinical Internship Evaluation Tool; CPAF: Clinical Performance Assessment Form CPI: Clinical Performance Instrument; CPI'06: Clinical Performance Instrument: Version 2006; D1: Physiotherapy Assessment and Intervention; D2: Ethical and professional practice; D3: Communication; D4: Evidence-Based Practice; D5: Inter Professional Teamwork; D6: Reflective Practice and Lifelong Learning; D7: Quality Improvement; D8: Leadership and Management; DMIL: Description of a Meaningful Interprofessional Learning Situation Tool; ECC: Evaluation of Clinical Competence; EPAs: Entrustable Professional Activities; GAA: Generic Ability Assessment; MTCCP: Measurement Tool for Clinical Competencies in Physical Therapy; NPTE: National Physical Therapy Examination; PSCAT: Physical Student Clinical Assessment tool; PT-MACS: Physical Therapist Manual for the Assessment of Clinical Skills; RCSI: Royal College of Surgeons Ireland tool; RIL: Readiness for Interprofessional Learning scale; UoB: University Birmingham tool.

Among all the studies, six of them (6.9%) focused on a specific competency/ies to be developed in clinical practice, such as clinical reasoning skills (Huhn et al., 2018; Rowe, 2012), evidence-based practice (Bozzolan et al., 2014; Haladay et al., 2024), reflective practice

(Rowe, 2012), clinical thinking (Rowe, 2012), professional behavior (accepting responsibility for learning, communication skills, empathy, and professionalism) (Wolff-Burke, 2005), and practical skills related to various clinical environments (Birkmeier et al., 2022).

WCPT's domain 1 "Physiotherapy Assessment and Intervention" was the most represented in the remaining studies (Aljadi et al., 2017; Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2024; Blackstock et al., 2013; Colgrove & Rucker, 2023; Cox et al., 1999; Cross et al., 2001; Cross, 1998, 1999, 2001; Cross & Hicks, 1997; Dalton et al., 2011, 2012, 2015; DeClute & Ladyshewsky, 1993; Delany & Bragge, 2009; Dubouloz et al., 2010; English et al., 2004; Erdman & Black, 2021; Ernstzen et al., 2010; Fein, 2003; Hayes et al., 1999; Housel & Gandy, 2008; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Kelly et al., 1996; Lawton et al., 2021; Lo et al., 2015, 2016, 2017; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Meldrum et al., 2008; Meyer & Willett, 2007; Mori et al., 2016a, 2016b, 2024; Muhamad et al., 2015; Murphy et al., 2014; Nayer, 1995; Neville & Crossley, 1993; Norman & Booth, 2015; North & Sharp, 2020; Oldmeadow, 1996; Olney, 1977; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rheault & Coulson, 1991; Rubertone et al., 2022; Scully & Shepard, 1983; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Shields et al., 2013; Simuzingili & Amosun, 1998; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018; Zainuldin & Tan, 2021) and the least represented was domain 4 "EBP". All other domains, except for domain 4 "EBP", appeared in more than half of the studies (Anderson et al., 2014; Atrash et al., 2023; Blackstock et al., 2013; Colgrove & Rucker, 2023; Cross et al., 2001; Cross, 1999, 2001; Dalton et al., 2011, 2012; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2015, 2016; Meyer & Willett, 2007; Mori et al., 2024; Murphy et al., 2014; Norman & Booth, 2015; O'Connor et al., 2018; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rubertone et al., 2022; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Sliwinski et al., 2004; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wolff-Burke et al., 2022; Wright et al., 2018; Zainuldin & Tan, 2021). The presence of each domain in the included studies is illustrated in Figure 4.

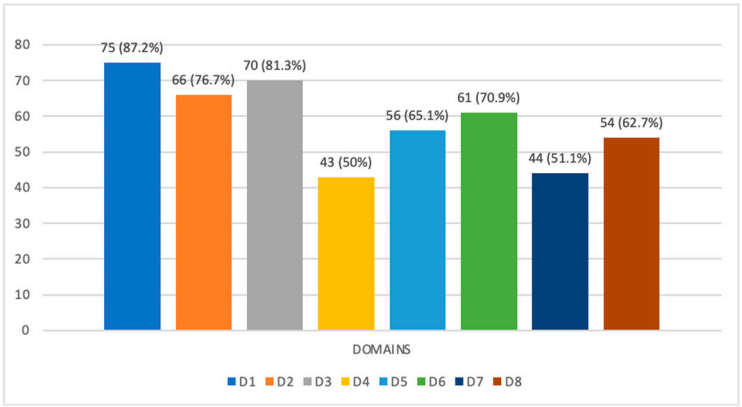

Figure 4. The number of studies where each domain is identified are as follows: (D1) "Physiotherapy Assessment and Intervention"; (D2) "Ethical and Professional Competence" (Aljadi et al., 2017; Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2024; Blackstock et al., 2013; Colgrove & Rucker, 2023;

Cox et al., 1999; Cross et al., 2001; Cross, 1999, 2001; Cross & Hicks, 1997; Dalton et al., 2011, 2012, 2015; DeClute & Ladyshewsky, 1993; Dubouloz et al., 2010; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Hayes et al., 1999; Housel & Gandy, 2008; Hrachovy et al., 2000; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Lawton et al., 2021; Lo et al., 2015, 2016, 2017; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Meyer & Willett, 2007; Mori et al., 2016a, 2016b, 2024; Muhamad et al., 2015; Murphy et al., 2014; Norman & Booth, 2015; O'Connor et al., 2018; Oldmeadow, 1996; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rheault & Coulson, 1991; Rubertone et al., 2022; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Shields et al., 2013; Simuzingili & Amosun, 1998; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018; Zainuldin & Tan, 2021); (D3) "Communication" (Aljadi et al., 2017; Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2024; Blackstock et al., 2013; Clouten et al., 2006; Colgrove & Rucker, 2023; Cox et al., 1999; Cross, 2001; Cross et al., 2001; Cross, 1999; Cross & Hicks, 1997; Dalton et al., 2011, 2012, 2015; DeClute & Ladyshewsky, 1993; Dubouloz et al., 2010; English et al., 2004; Erdman & Black, 2021; Ernstzen et al., 2010; Ernstzen et al., 2009; Fein, 2003; Hayes et al., 1999; Housel & Gandy, 2008; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Kelly et al., 1996; Lawton et al., 2021; Lo et al., 2015, 2016; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Meldrum et al., 2008; Mori et al., 2016a, 2016b, 2024; Murphy et al., 2014; Neville & Crossley, 1993; Norman & Booth, 2015; North & Sharp, 2020; O'Connor et al., 2018; Oldmeadow, 1996; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rheault & Coulson, 1991; Rubertone et al., 2022; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Shields et al., 2013; Simuzingili & Amosun, 1998; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018; Zainuldin & Tan, 2021); (D4) "EBP"; (D5) "Interprofessional teamwork" (Anderson et al., 2014; Atrash et al., 2023; Blackstock et al., 2013; Colgrove & Rucker, 2023; Cox et al., 1999; Cross, 2001; Cross et al., 2001; Cross, 1999; Dalton et al., 2011, 2012, 2015; DeClute & Ladyshewsky, 1993; Delany & Bragge, 2009; Dubouloz et al., 2010; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Hayes et al., 1999; Housel & Gandy, 2008; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Lawton et al., 2021; Lo et al., 2015, 2016; Loomis, 1985; Meyer & Willett, 2007; Mori et al., 2016a, 2016b, 2024; Murphy et al., 2014; Norman & Booth, 2015; O'Connor et al., 2018; Oldmeadow, 1996; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rubertone et al., 2022; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Sliwinski et al., 2004; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018; Zainuldin & Tan, 2021); (D6) "Reflective Practice and Lifelong Learning" (Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2024; Blackstock et al., 2013; Clouten et al., 2006; Colgrove & Rucker, 2023; Cross et al., 2001; Cross, 1999, 2001; Cross & Hicks, 1997; Dalton et al., 2011, 2012, 2015; Delany & Bragge, 2009; English et al., 2004; Erdman & Black, 2021; Ernstzen et al., 2010; Ernstzen et al., 2009; Fein, 2003; Haladay et al., 2024; Hayes et al., 1999; Housel & Gandy, 2008; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Lawton et al., 2021; Lo et al., 2015, 2016; Luedtke-Hoffmann et al., 2012; Meldrum et al., 2008; Mori et al., 2016a, 2016b, 2024; Murphy et al., 2014; Neville & Crossley, 1993; Norman & Booth, 2015; North & Sharp, 2020; O'Connor et al., 2018; Oldmeadow, 1996; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rubertone et al., 2022; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018; Zainuldin & Tan, 2021); (D7) "Quality Improvement" (Anderson et al., 2014; Atrash et al., 2023;

Blackstock et al., 2013; Colgrove & Rucker, 2023; Cross, 2001; Cross et al., 2001; Dalton et al., 2011, 2012, 2015; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2015, 2016; Luedtke-Hoffmann et al., 2012; Mori et al., 2024; Murphy et al., 2014; Norman & Booth, 2015; O'Connor et al., 2018; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rubertone et al., 2022; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wells, 1980; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018; Zainuldin & Tan, 2021); (D8) "Leadership and Management" (Anderson et al., 2014; Atrash et al., 2023; Birkmeier et al., 2024; Blackstock et al., 2013; Clouten et al., 2006; Colgrove & Rucker, 2023; Cross, 2001; Cross et al., 2001; Dalton et al., 2011, 2012, 2015; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Hu et al., 2020; Irwin et al., 2018; Jones & Sheppard, 2011; Kalu et al., 2019, 2021; Lawton et al., 2021; Lo et al., 2015, 2016; Luedtke-Hoffmann et al., 2012; Meldrum et al., 2008; Mori et al., 2016a, 2016b, 2024; Murphy et al., 2014; Norman & Booth, 2015; North & Sharp, 2020; O'Connor et al., 2018; Paynter et al., 2022; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Reubenson et al., 2020; Rubertone et al., 2022; Scully & Shepard, 1983; Sevenhuysen et al., 2014; Shenoy & Vivian, 2019; Shields et al., 2013; Simuzingili & Amosun, 1998; Sliwinski et al., 2004; Stickley, 2005; Task Force for the Development of Student Clinical Performance Instruments, 2002; Terry et al., 2020; Torres-Narváez et al., 2018; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wojkowski et al., 2021; Wolff-Burke et al., 2022; Wright et al., 2018).

4. Discussion

This scoping review explores the clinical performance of physiotherapy students to identify and define the entry-level competencies required for independent professional practice. Among all the terms used to define these competencies, "Clinical Competence" was the most frequently employed and widely recognized across countries. Specific evaluation scales were used in most of the selected articles to measure these competencies, serving as essential instruments for their identification. The CPI and APP were identified as the most widely used. Furthermore, both were also distinguished as instruments that cover all the key competency domains outlined by the WCPT. Competencies in physiotherapy assessment and intervention, ethical and professional practice, and communication were the most prominently recognized among these domains, being considered crucial for development during clinical practice. On the other hand, "Quality Improvement" and "Evidence-Based Practice" were the least identified.

4.1. Studies Characteristics

Nearly all the studies included in this review featured students and/or CIs in their samples, underscoring the importance of these two key actors in the PE process (Edgar & Connaughton, 2014; Ceelen et al., 2023). According to Neville and Crossley (1993), CIs play a pivotal role in teaching and mentoring students as they acquire and consolidate their competencies.

Additionally, students can utilize self-assessment tools, as demonstrated in studies by Atrash et al. (2023) and Lo et al. (2016). These instruments can help students recognize their strengths and areas for improvement, fostering self-reflective learning.

Regarding the study designs, and in line with research conducted in the educational field (Daniel et al., 2024), most of the studies selected methodological designs appropriate to the research objectives. Seventy percent of the studies were focused on validating the psychometric properties of assessment instruments (Dalton et al., 2012; Loomis, 1985; Meldrum et al., 2008; Mori et al., 2016a, 2016b; Muhamad et al., 2015; Reubenson et al., 2020; Rheault & Coulson, 1991; Shenoy & Vivian, 2019; Stickley, 2005; Task Force for the

Development of Student Clinical Performance Instruments, 2002) or used cross-sectional, (Aljadi et al., 2017; Birkmeier et al., 2024; Clouten et al., 2006; Cox et al., 1999; Dalton et al., 2011; Dubouloz et al., 2010; English et al., 2004; Hrachovy et al., 2000; Huhn et al., 2018; Kelly et al., 1996; Lawton et al., 2021; Lo et al., 2017; Lo et al., 2015, 2016; Mori et al., 2024; Murphy et al., 2014; Nayer, 1995; Olney, 1977; Sliwinski et al., 2004; Van Duijn & Bevins, 2005; Vendrely, 2007; Wojkowski et al., 2021) qualitative (Anderson et al., 2014; Cross, 1998; Cross & Hicks, 1997; Delany & Bragge, 2009; Ernstzen et al., 2010; Hayes et al., 1999; Meyer & Willett, 2007; Neville & Crossley, 1993; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Rowe, 2012; Scully & Shepard, 1983; Shields et al., 2013; Wolff-Burke et al., 2022; Wolff-Burke, 2005; Zainuldin & Tan, 2021), and cohort designs (Birkmeier et al., 2022; Colgrove & Rucker, 2023; DeClute & Ladyshewsky, 1993; Housel & Gandy, 2008; Irwin et al., 2018; Kalu et al., 2019, 2021; Luedtke-Hoffmann et al., 2012; Proctor et al., 2010; Reilly et al., 2020; Terry et al., 2020). With respect to the approach used to define competencies, seventy-two percent of the studies employed an assessment scale, which allowed for the identification of essential competency domains in a less subjective manner (Cavanagh & Romanoski, 2006). Moreover, as noted by O'Connor et al. (2018), this highlights not only the importance of identifying and defining competencies but also the critical need for objectively evaluating students' attainment of these competencies.

In terms of the countries where the studies were conducted, the United States, Australia, and Canada were the most represented. These countries are among the few (12%) with more than 10,000 physiotherapists affiliated with the WCPT, presenting a ratio of entry-level education programs of 9.82 (Australia), 4.1 (United States), and 1.93 per 5,000,000 inhabitants, respectively (World Confederation for Physical Therapy, 2011). This fact may explain why research in this field is more developed in these countries.

4.2. Terms Used for Competencies

The term "Clinical Competence" seems to be the most suitable for describing the skills students acquire in clinical settings, as it is widely recognized across articles and in the greatest number of countries. However, this terminology does not align with the most recent term introduced by the WCPT, which is "Practice Competence" (World Physiotherapy, 2021), highlighting the ongoing need to establish a universally accepted term.

Regarding all the terms used to define competencies, twelve studies employed more than one term (Birkmeier et al., 2022; Cross & Hicks, 1997; Dalton et al., 2012; Lo et al., 2017; Lo et al., 2015, 2016; Nayer, 1995; Neville & Crossley, 1993; Rowe, 2012; Scully & Shepard, 1983; Shields et al., 2013; Wolff-Burke, 2005), while five studies opted for generic terms (Meyer & Willett, 2007; Mori et al., 2016a, 2024; Peters-Brinkerhoff, 2016; Sevenhuysen et al., 2014), adding confusion to their definition and further justifying the need for this scoping review.

It is important to underline that the use of the different terms is not directly related to the authors or the countries of the studies. This is evident in countries such as Australia (Blackstock et al., 2013; Dalton et al., 2011, 2012, 2015; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2017; Lo et al., 2016; Oldmeadow, 1996; Reubenson et al., 2020; Wright et al., 2018), the United States (Birkmeier et al., 2022; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Hrachovy et al., 2000; Loomis, 1985; Luedtke-Hoffmann et al., 2012; Olney, 1977; Rheault & Coulson, 1991; Scully & Shepard, 1983; Sliwinski et al., 2004; Wolff-Burke et al., 2022), and the United Kingdom (Cross, 2001; Cross et al., 2001; Cross, 1998, 1999; Cross & Hicks, 1997; O'Connor et al., 2018), where both the terms "Clinical Competence" and 'Professional Competence' have been used.

Similarly, authors such as Dalton et al. (2012) and Cross and Hicks (1997) used both terms within the same article.

4.3. Identifying Competencies in Relation with WCPT's Domains

All WCPT domains were covered in less than half of the studies (Atrash et al., 2023; Blackstock et al., 2013; Dalton et al., 2011, 2012, 2015; Hu et al., 2020; Jones & Sheppard, 2011; Lawton et al., 2021; Lo et al., 2015, 2016; Murphy et al., 2014; O'Connor et al., 2018; Paynter et al., 2022; Reubenson et al., 2020; Sevenhuysen et al., 2014; Terry et al., 2020; Wright et al., 2018), 20 (23.2%) studies employed the CPI tool (including all versions used in the selected articles) (Anderson et al., 2014; Colgrove & Rucker, 2023; English et al., 2004; Erdman & Black, 2021; Fein, 2003; Housel & Gandy, 2008; Irwin et al., 2018; Norman & Booth, 2015; O'Connor et al., 2018; Pechak & Black, 2014; Peters-Brinkerhoff, 2016; Proctor et al., 2010; Reilly et al., 2020; Rubertone et al., 2022; Sliwinski et al., 2004; Task Force for the Development of Student Clinical Performance Instruments, 2002; Van Duijn & Bevins, 2005; Vendrely, 2007; Wetherbee et al., 2018; Wolff-Burke et al., 2022), 2 (2.3%) studies elaborated a list of desirable behaviors (Cross, 2001; Cross et al., 2001), 1 (1.1%) study developed the ACP 2.0 tool (Mori et al., 2024), 1 (1.1%) study used the PSCAT scale (Shenoy & Vivian, 2019), and 1 (1.1%) study utilized the MTCCP tool (Torres-Narváez et al., 2018), which highlights, according to the WCPT (World Physiotherapy, 2021), despite physiotherapy being a globally recognized discipline, considerable variability continues to exist in the organization and implementation in the area of CE.

Regarding the tools that cover all domains, it is observed that all of them, except for the CPI (Task Force for the Development of Student Clinical Performance Instruments, 2002), are relatively recent (Dalton et al., 2011; Shenoy & Vivian, 2019; Torres-Narváez et al., 2018) or represent improved versions of previous tools (Mori et al., 2024). Additionally, three of these tools are predominantly used in countries that, as noted earlier, have high representation in the WCPT (n.d.). These are the APP (Australia) (Dalton et al., 2015), the ACP 2.0 Tool (Mori et al., 2024), and the CPI (United States) (Task Force for the Development of Student Clinical Performance Instruments, 2002).

Analyzing the domains individually, domain 1, "Physiotherapy Assessment and Intervention", due to the nature of practice education (World Physiotherapy, 2021), features in almost all studies, highlighting the importance of practical procedures in this profession (Sattelmayer et al., 2020).

Regarding the most frequently represented domains, the findings suggest that competencies related to "Ethical and professional competence" (D2), "Communication" (D3), and "Reflective Practice and Lifelong Learning" (D6) are the most valued in clinical environments. According to Cross (1998), clinical instructors regard these competencies as key and highly desirable skills in students. Similarly, attributes such as "safety", "good communication", and "awareness of one's own limitations" stand out as priorities for physiotherapy students (Cross, 1999). Furthermore, possessing good communication skills also seems to positively influence interprofessional collaboration (D5), as highlighted by Robson and Kitchen (2007). These authors found that promoting positive interprofessional collaboration not only enhances students' learning experiences but also leads to substantial improvements in clinical outcomes for patients.

"EBP" (D4) and "Quality Improvement" (D7) have proven to be the least represented domains. These two domains are closely related in PE, as the implementation of EBP facilitates more effective participation in data collection, interpretation, and analysis to assess the quantity and quality of outputs (a competency included in D7) (Paci et al., 2021). The adoption of EBP continues to pose challenges in physiotherapy largely due to enduring barriers such as conflicting patient expectations, which often conflict with EBP, time constraints, restricted access to scientific articles, and systemic issues such as the lack of financial incentives to promote its adoption (Gleadhill et al., 2022).

This perception is also reflected among physiotherapy students. In this regard, the study by Bozzolan et al. (2014), which examined students' perceptions following the introduction of an integrated EBP-based curriculum, revealed that while students recognize EBP as valuable practice, its implementation is hindered by various challenges, including insufficient time, resources, and support from clinical tutors during its application. Therefore, it is essential to enhance physiotherapists' training in this area. By mastering the effective use of patient-collected data, professionals can transfer this competency to students, thereby enriching their training and improving their clinical preparedness (Paci et al., 2021).

4.4. Strenght and Limitation

This scoping review provides valuable insights into the competencies that physiotherapy students develop in clinical environments. A notable strength of this study is the absence of time filters in the search process, which enabled a wider exploration of these competencies over time.

However, this review has certain limitations. First, the large number of included studies and their methodological heterogeneity posed challenges for comprehensive comparisons. Additionally, methodological deficiencies in many studies, such as the lack of socio-demographic data, among others, negatively influenced the analysis of the results.

Another limitation arises from the language filters applied (English, Spanish, and Italian), which may have excluded relevant studies published in other languages. Additionally, the analysis was conducted using the educational framework proposed by the WCPT. While this framework provides an internationally recognized standard and a systematic approach to organizing information, it also restricts the scope to this specific perspective.

Improving the clarity and consistency in defining the competencies of physiotherapy students is essential. This objective could be achieved through a Delphi study, involving an international panel of experts to develop a universally recognized framework that can be adopted by the global scientific community.

5. Conclusions

This review analyzed studies conducted in 14 countries, with the United States, Australia, and Canada being the most frequently represented. The term "Clinical Competence" appears to be the most appropriate to describe the competencies that students acquire in clinical environments, as it is the most widely used across countries and studies. In the majority of the studies, assessment scales were employed, providing tools to identify the key competencies to be developed during clinical practice. The "Clinical Performance Instrument" and the "Assessment of Physiotherapy Practice" are recognized as the most widely used instruments worldwide, and both cover all the domains considered essential by World Physiotherapy. Among the identified domains, "Physiotherapy Assessment and Intervention", "Ethical and Professional Practice", and "Communication" are the most frequently represented. In contrast, "Quality Improvement" and "Evidence-Based Practice" were the least emphasized. The findings of this scoping review have the potential to positively influence the development of clinical practice for both students and clinical instructors. By systematizing the existing international evidence on these competencies, this review can enhance knowledge and awareness in the teaching–learning process, contributing to making it more effective. Further investigations are necessary to enhance clarity regarding these competencies and develop a more uniform and comprehensive understanding of them.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/educsci15020200/s1, Table S1: World Physiotherapy's Education Framework: Domains and Competencies; Table S2: Main characteristics of included studies.

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