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Bridging Theory and Practice: A Scoping Review of Clinical Placement Timing and Distribution in Entry-Level Physiotherapy Education

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Abstract

Objective: To examine how the sequencing and temporal placement of clinical education within entry-level physiotherapy curricula influence theory–practice integration, preparedness for practice, and competence-related outcomes among physiotherapy students.

Background: Clinical placements are a central component of physiotherapy education, supporting the application of theoretical knowledge in practice. Despite accreditation requirements, variation exists in the timing of placements, and evidence to guide optimal curriculum design remains limited.

Inclusion criteria: Using the Population, Concept, Context (PCC) framework, studies were included if they involved entry-level physiotherapy programs and examined timing or distribution of clinical placements in relation to student outcomes.

Methods: This scoping review was conducted using JBI methodology and reported in accordance with the PRISMA-ScR checklist and registered on the Open Science Framework. Four databases were searched, and findings were synthesized narratively and thematically.

Results: Eight studies were included with a combined total of 983 participants. Four themes were identified: theory–practice timing, integration models, simulation-based learning, and program structure. Alignment of theory and practice improved mid-placement performance but not final outcomes. Simulation consistently enhanced preparedness and performance.

Conclusion: Aligning placements with recent theoretical content and integrating simulation improves early performance, though timing benefits do not persist to final assessments.

Keywords: Physiotherapy education; Clinical education; Clinical placement; Curriculum design.

I INTRODUCTION

Clinical placements are a fundamental requirement of physiotherapy education, with accredited entry-level physiotherapy programs in Australia currently providing 750–1368 clinical learning hours (Australian Physiotherapy Council, 2025a; Australian Physiotherapy Council, 2025b; World Confederation for Physical Therapy, 2011). These supervised experiences allow students to integrate and develop their knowledge and skills required in real workplace settings, guided by qualified physiotherapists acting as clinical educators (Australian Physiotherapy Council, 2025a; Australian Physiotherapy Council, 2025b; Bates et al., 2007; Edgar & Connaughton, 2014; World Confederation for Physical Therapy, 2011). This training is imperative in preparing students with the professional skills and behaviours required to enter the workforce as competent health professionals (Edgar & Connaughton, 2014; World Confederation for Physical Therapy, 2011).

There are currently 31 approved Australian schools of physiotherapy offering 57 different accredited entry-level physiotherapy degree courses (Australian Health Practitioner Regulation Agency, 2025). All programs must align with the Australian Physiotherapy Council (2025a) accreditation requirements and standards, which ensure physiotherapy programs equip graduates with the necessary knowledge, clinical skills and professional attributes to practise in Australia. These programs differ structurally and pedagogically, with structural variations including undergraduate degrees, graduate-entry master's programs, and double degrees. Entry-level physiotherapy programs – whether the qualification awarded is at the bachelor's, master's, or doctor level – are designed to prepare students for initial registration as physiotherapists. In Australia, these programs may be undertaken either as a first degree or following prior tertiary study. Notably, this differs from other international entry-level physiotherapy pathways, such as those in the United States, where qualifications are offered exclusively at the Doctor of Physical Therapy (DPT) level and a prior tertiary degree is a mandatory requirement.

Pedagogically, programs differ in how theory and practical learning are integrated, with some universities embedding clinical placements throughout the degree from the first year, while others concentrate clinical experiences in the final year (McMeeken et al., 2005). The timing and duration of clinical education placements appear to be selected based on the program objectives, feasibility of the academic program and clinical site availability (McMeeken et al., 2005; Hakim et al., 2014). This has resulted in a lack of standardisation in placement length, number, type, and practice-setting expectations, both across Australian universities and internationally (Hakim et al., 2014; World Physiotherapy, 2022).

Preparing students for clinical learning involves not just gaining knowledge and skills, but also requires fostering personal qualities and effective interpersonal abilities (Chipchase et al., 2012). Early clinical integration is widely supported across health professions, allowing for development of problem-solving skills and clinical reasoning skills within authentic environments (Hakim et al., 2014). Conversely, it has been suggested that postponing clinical practice allows students to enter clinical placement experiences with a solid foundation of academic knowledge; however, this may delay their ability to integrate information and grasp essential professional behaviours (Hakim et al., 2014). Despite emerging research on predictors of clinical success (Horwitz et al., 2023; Paynter et al., 2023), few studies have specifically investigated how the sequencing of theoretical learning and clinical experiences affects student preparedness or performance in physiotherapy entry-level programs.

The optimal sequencing of theoretical learning and clinical experiences within entry-level physiotherapy programs remains poorly understood. This lack of evidence-based guidance may influence curriculum design decisions that ultimately affect student confidence, clinical reasoning abilities, and preparedness for professional practice. Accordingly, this scoping review was guided by the following research question: What evidence exists regarding how the timing and distribution of clinical placements in entry-level physiotherapy programmes influence theory–practice integration, preparedness, performance, and related competence outcomes?

Given the paucity of research specific to Australian entry-level physiotherapy curriculum design, by mapping and synthesising the existing global literature, this review aims to inform curriculum design and identify priorities for future research in physiotherapy education.

II METHODS

A Protocol and registration

The study protocol was registered with the Open Science Framework (OSF) <https://osf.io/z4hb6> on 26 March 2025 (Center for Open Science, 2025). The OSF protocol was updated on 26 March 2026.

Eligibility Criteria

The review question was formulated using the PCC (Population, Concept, Context) framework to ensure comprehensive identification and mapping of available evidence on the timing of clinical placements in physiotherapy education (Peters et al., 2020).

Inclusion criteria

- **Population:** Students enrolled in entry-level physiotherapy programs (i.e., pre-registration physiotherapy programs leading to initial qualification), regardless of whether the physiotherapy qualification awarded is at bachelor's or master's or doctor level.
- **Concept:** Studies examining the timing, sequencing, frequency, or distribution of clinical placements throughout the curriculum and their impact on student outcomes, including clinical performance, preparedness, competence, skill development, clinical reasoning, confidence, or knowledge application and integration on clinical placement.
- **Context:** Published and unpublished literature of any design, from any geographical region, in English language or translatable to English.

Clinical placement refers to any face-to-face clinical education experience in a setting where physiotherapists provide care, such as hospitals, private practices, rehabilitation centres, community health services, or aged care facilities.

Studies were excluded if they:

- Were opinion pieces, letters, editorial comments, unstructured literature reviews, or available only in abstract form, for example, a conference abstract.
- Did not assess or discuss the timing or distribution of theory to practice.
- Population included other disciplines (e.g., allied health) without extractable physiotherapy data.
- Population included medical or nursing students
- Focused on the attributes or styles of clinical educators or students aimed at enhancing the clinical learning experience.
- Explored clinical placement models or preparation for clinical placement without considering theoretical knowledge acquisition and timing.

B Literature search

An initial search conducted on 10 April 2025 yielded 3,539 records; following discussion amongst authors, and in consultation with a Health Science and Medicine faculty librarian, the search terms were refined and a second, final search was undertaken on 12 July 2025, yielding 3704 records.

The final research question was divided into four components: 1) clinical placement, using broad terms like placement, clinical placement, student placement, clinical immersion*, clinical experience*, clinical learning, clinical learning experience*, clinical education, and practice immersion; 2) physiotherapy and allied health students, including physiotherapy*, physical therap*, and allied health; 3) students, using the term student*; and 4) placement preparedness, with terms such as prepar*, ready, readiness, experience, and performance. Synonyms and Boolean operators were applied to the search, and search terms were refined under the guidance of a Health Science and Medicine faculty librarian. Search terms were then tested using an advanced PubMed search string builder and TERA tools software (Clark et al., 2020a). The final PubMed strategy was adapted for CINAHL, Embase, and Scopus using the Polyglot Search tool (Clark et al., 2020b). Each search strategy for all databases is included in Appendix A.

C Study Selection

Citations were exported to Endnote 21.3 and screened using the automation tool Screenatron, within TERA Tools (Clark et al., 2020a). Duplicates were removed via the Deduplicator tool (Forbes et al., 2024). One independent reviewer screened titles and abstracts against the inclusion criteria (GP). Full texts of potentially relevant records were retrieved and independently assessed for eligibility by two reviewers (GP, LS). Full-text studies that did not meet the eligibility criteria were excluded with reasons reported. Any disagreements during the screening process were resolved through discussion with a third independent reviewer (WH) so that consensus could be reached.

D Data extraction

A purpose-built spreadsheet was developed to extract relevant information from each study, in accordance with the JBI Manual for Evidence Synthesis (Aromataris et al., 2024). Data charting was first piloted by two authors (GP, LS) for two studies to ensure validity, then subsequent extraction was conducted by one author (GP). Information recorded included: author(s), study title, year of publication, country of derivation, study aim(s), study type, population

(undergraduate/postgraduate entry-to-practice, program years, clinical placement timepoint in program, sample size), clinical experience type, study focus, outcomes, and results.

E *Assessment of methodological quality*

Two reviewers (GP, LS) independently assessed the methodological quality of included studies using the appropriate Joanna Briggs Institute (2020) critical appraisal tool, based on study design. This was done to ensure the quality of the included research and assist in accurate interpretation of results. Each criterion was assessed using a binary scale (Yes/No/Unclear/Not applicable), with disagreements resolved through discussion. To enable comparison of methodological quality across different study types, the proportion of checklist items marked "yes" was calculated for each study. Based on these proportions and following approaches adopted in a systematic review by Siddiqui et al. (2021) using JBI checklists, studies were categorized into three different levels of risk of bias. Studies were considered high risk of bias if 20 - 50% items scored yes, moderate risk of bias if 50 - 80% items scored yes, and low risk of bias if 80 - 100% items scored yes as per JBI checklist.

F *Data synthesis*

A comprehensive narrative and tabular synthesis was utilized to describe the findings from all individual studies. Study characteristics and outcomes were synthesized thematically, with data organized according to the primary research questions: the timing and sequencing of theoretical learning within entry-level physiotherapy programs, the distribution and timing of clinical placements, and the impact of these factors on students' theory-practice integration, clinical reasoning abilities, and professional preparedness. Studies were further categorized by their focus on student performance on placement, preparedness for placement, or both, with additional consideration of simulation-based activities and curriculum evaluation approaches. Tabular presentations were used to summarize key study features, population demographics, study designs, sample sizes, curriculum design variations, sequencing approaches, outcome measurement tools, and student outcomes across studies. Assessment of study heterogeneity was conducted through examination of study design diversity, population characteristics, outcome measurement variations including the heterogeneous nature of assessment tools used, and definitional differences for theory-practice integration and clinical preparedness across studies.

III RESULTS

A *Study selection*

The initial search yielded 3704 records with no additional relevant records retrieved. After 1736 duplicates were removed, a total of 1968 records were screened by title and abstract, leaving a remaining 52 reports for full text screening. After full-text screening, eight eligible studies were included, with reasons for exclusion reported on in Figure 1. PRISMA flow diagram of study screening and selection process. Forward and backward citation searching of the included articles did not identify any further studies for inclusion.

B *Characteristics of included studies*

Study characteristics are reported in Table 1. All included studies (n = 8) were published in peer-reviewed journals and examined the timing of clinical placements or differences in curriculum delivery and clinical placement integration. Study aims varied but focused primarily on student outcomes related to clinical placement including performance on placement (n = 4, 50%), preparedness for placement (n = 2, 25%), or both (n = 2, 25%). Study designs included cohort studies (n = 4, 50%), case series (n = 3, 37.5%), and quasi-experimental design (n = 1, 12.5%). Sample sizes ranged from 36 to 357 participants across the studies, with a total of 983

participants in the included studies. The physiotherapy students were all enrolled in entry-level programs of two to three years duration, either a Doctor of Physiotherapy (n = 5, 62.5%) or a Graduate Entry Masters program (n = 1, 12.5%), while the program details were not provided for two studies (n = 2, 25%). The timing of the first full-time clinical placement varied across studies, ranging from placement in the first year of the program (n = 1, 12.5%) to placements occurring in the second year or later semesters (n = 3, 37.5%). One study did not explicitly report the timing of the first full-time clinical placement (n = 1, 12.5%). The remaining studies described early integrated, contextual, or part-time clinical experiences rather than full-time placements and were therefore not classified by first full-time clinical placement timing (n = 3, 37.5%). Outcome measures were heterogeneous across studies; however, the most commonly used assessment tool was the Clinical Performance Instrument (CPI), employed in four studies (n = 4, 50%). Details for all included outcome measures are reported in Table 2.

C Methodological quality assessment

The methodological quality of included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist appropriate to each study design: case series (n = 3), cohort studies (n = 4), and quasi-experimental studies (n = 1). Four studies were rated as low risk of bias, three as moderate, and one as high risk of bias, primarily due to its single-group pre-post design and failure to address confounding factors. Critical appraisal scores for each study are reported in Appendix B.

IV RESULTS OF INDIVIDUAL SOURCES OF EVIDENCE

A Timing Between Theoretical Instruction and Clinical Application

Three studies examined the temporal relationship between theoretical learning and clinical placement application. Tuttle and Horan (2019) found that students commencing placement immediately after completion of related coursework scored significantly higher on mid-placement Assessment of Physiotherapy Practice (APP) assessments compared to those with delays of five weeks or more. Specifically, students with immediate application demonstrated superior performance in analysis and planning ($p = 0.034$) and intervention ($p = 0.009$) domains. While mid-placement scores showed a near-significant overall trend favouring immediate application ($p = 0.051$), no significant differences were observed in end-of-placement outcomes ($p = 0.476$).

White et al. (2023) reported on an unforeseen event, where COVID-19 disruptions delayed first full-time clinical placements from semester 3 to semester 6, creating an extended gap between theoretical instruction and clinical application. Students expressed concerns regarding their preparedness compared to previous cohorts, prompting faculty to develop assessment tools to evaluate readiness. This delay necessitated additional preparatory interventions to bridge the extended theory-practice gap. Colgrove and Rucker (2023) demonstrated that students in an Integrated Clinical Education (ICE) model, where clinical experiences were strategically aligned with concurrent academic coursework, performed better on initial and intermediate Clinical Performance Indicators (CPI) compared to traditional sequential models, though no significant differences were observed in final placement performance. Across these studies, a consistent pattern emerged where closer temporal alignment between theoretical instruction and clinical application enhanced mid-placement performance, though this advantage did not persist to final placement outcomes.

B Clinical exposure integration models

Four studies examined different approaches to integrating clinical experiences throughout the curriculum. Two studies specifically investigated Integrated Clinical Education (ICE) models with contrasting findings regarding optimal timing. Colgrove and Rucker (2023) compared traditional curriculum delivery (clinical placements distributed across three years: four-, six-, and nine-week experiences alongside academic studies) with an ICE model that embedded five short clinical

courses in the first two years, strategically aligned with academic content, followed by 36 weeks of full-time placements in the third year. ICE students demonstrated higher scores in initial and intermediate clinical experiences, reported greater satisfaction, and showed better alignment between self-assessments and clinical instructor ratings. However, traditional students scored higher on terminal clinical experiences and Core Values and Professional Behaviours assessments. Both groups had similar remediation rates.

In contrast, Rabena-Amen et al. (2024) implemented part-time ICE during the first semester, requiring students to meet expectations in at least eight of ten clinical performance rubric areas for successful completion. While all students (36/36, 100%) reported the experience as beneficial, particularly for developing professional and communication skills and practicing psychomotor and documentation abilities, 25% of students (9/36) indicated the ICE experience may have occurred too early in their program or felt their limited theoretical knowledge reduced potential benefits.

Additional approaches to early clinical integration demonstrated positive outcomes when appropriately timed. Brueilly et al. (2009) examined early contextual learning integration and found significant improvements in both self-perceived and peer-perceived clinical abilities, with students reporting greater value in hospital patient experiences following the intervention. Carroll et al. (2024) described a hybrid program where some clinical placements occurred concurrently with didactic coursework, though the specific integration effects were not directly measured. Collectively, these studies suggest that clinical exposure integration can enhance student performance and satisfaction when implemented with sufficient theoretical foundation, though premature integration may limit potential benefits.

C Preparatory Interventions: Simulation-Based Learning

Three studies investigated simulation-based learning (SBL) as a bridge between theoretical instruction and clinical application, demonstrating consistent benefits across different implementation approaches. Tuttle and Horan (2019) replaced one week of traditional classroom teaching with SBL immediately before placement and found students in the simulation group scored significantly higher on APP assessments (3.12/4, SD = 0.25) compared to traditional instruction controls (3.01/4, SD = 0.22). Durham et al. (2024) implemented simulated inpatient laboratory experiences featuring patient and environmental scenarios specifically tailored to expected clinical settings. Students who participated in simulation scored significantly higher ($p < 0.001$) across all measured domains (safety, professionalism, and communication) at the end of their first clinical experience compared to traditional curriculum students.

White et al. (2023) utilized simulation-based assessment to identify students requiring additional preparation following COVID-19-related delays. The Student Readiness Faculty Assessment Tool (SRFAT) identified 15% of students (6/40) as needing additional preparation prior to their first full-time clinical experience. Following targeted remediation, all students (40/40) successfully completed their clinical placements without concerns. These findings illustrate that simulation-based interventions consistently improve student performance and readiness when used to bridge gaps between theoretical learning and clinical application, whether implemented as routine preparation or in response to curriculum disruptions.

D Curriculum design model comparisons

Three studies directly compared different educational program structures with mixed findings regarding the impact of program design on student outcomes. Durham et al. (2024) compared a traditional 3-year face-to-face program with a 2-year accelerated-hybrid model, finding significant advantages for the hybrid approach. Key structural differences included more didactic hours prior to first clinical experience in the hybrid program (68 vs. 43 hours), incorporation of simulated laboratory experiences, greater variety in clinical settings for first placements, and higher benchmark expectations for clinical performance. The hybrid cohort demonstrated significantly superior performance in safety, professionalism, and communication domains. In contrast, Carroll et al. (2024) compared traditional 3-year programs (≥ 30 weeks clinical education with all didactic

coursework completed prior to clinical experiences) to 2-year hybrid programs (31 weeks clinical education including two eight-week placements and one 15-week internship, some concurrent with didactic coursework) and found no performance differences. Clinical instructors perceived no differences in clinical readiness between hybrid-educated and traditionally trained students, rating both groups as performing at or above competent clinician levels.

van Duijn and Bevins (2005) examined pedagogical rather than structural differences, comparing traditional lecture-based instruction, mixed-model programs (25-75% problem-based learning (PBL)), and predominantly PBL curricula (>75% PBL). Students completed their first clinical experience following completion of all academic coursework, and no significant differences in clinical performance were found across the three curriculum types. These comparative studies suggest that specific curricular features such as simulation integration, didactic preparation intensity, and timing of clinical experiences may be more influential on student outcomes than overall program structure or pedagogical approach alone.

V DISCUSSION

This scoping review explored how the timing and distribution of clinical placements impact pre-registration physiotherapy students' ability to integrate theory into practice. Synthesis of eight studies reveals that closer temporal alignment between theoretical instruction and clinical application enhances mid-placement performance, yet this advantage does not persist to final assessments. Key findings indicate that early clinical integration can be beneficial when students possess sufficient theoretical foundation, although premature exposure may limit potential benefits; simulation-based interventions consistently improve student readiness and performance; and specific curricular features appear more influential on student outcomes than overall program structure or pedagogical approach alone.

Students who commenced clinical placements immediately following related coursework demonstrated superior mid-placement performance compared to peers with extended delays, yet these timing advantages consistently dissipated by final placement assessments (Tuttle & Horan, 2019; Colgrove & Rucker, 2023). Students with delayed application may demonstrate a "catch-up" effect through accumulated clinical experience and educator feedback. Alternatively, ceiling effects in assessment tools may mask subtle performance differences, or the natural developmental trajectory of clinical competence may ultimately outweigh initial timing advantages. This finding suggests that while strategic temporal alignment offers clear benefits for student confidence and early placement performance, other factors including clinical educator quality, breadth of clinical experiences, and students' capacity for reflective practice may also be influential in determining final outcomes.

The timing of clinical integration requires careful balance between foundational knowledge and clinical readiness. While early clinical experiences are widely advocated across health professions education (Hakim et al., 2014), premature integration may limit benefits, with 25% of students in one study indicating first-semester placement occurred too early given their limited theoretical knowledge (Rabena-Amen et al., 2024). Conversely, excessive delays between theoretical instruction and clinical application lead to skill decay, with both procedural knowledge and psychomotor skills declining significantly within months without reinforcement (Ginzburg & Dar-El, 2000; McCallister et al., 2023; White et al., 2023). These findings suggest an optimal temporal window for clinical integration, occurring after students develop sufficient foundational knowledge in professional behaviours, communication, and basic clinical skills, yet close enough to related theoretical instruction to prevent skill decay.

Simulation-based learning demonstrated the most consistent effectiveness across all three studies examining this approach (Tuttle & Horan, 2019; White et al., 2023; Durham et al., 2024). The consistency across different simulation approaches, student cohorts, and outcome measures suggests simulation addresses fundamental challenges in the theory-to-practice transition by providing safe environments for skill rehearsal, integration of theoretical knowledge, and development of clinical reasoning without patient risk. Simulation may also enhance student

confidence and reduce anxiety associated with first clinical experiences. Programs should prioritize simulation-based learning as preparation for clinical placements, particularly when temporal gaps exist between theoretical instruction and clinical application, though simulation should complement rather than replace authentic clinical experiences. The findings of this review suggest a complementary role for simulation-based learning in preparing students for clinical placements, particularly when gaps exist between theoretical instruction and clinical application.

Comparative studies of different program structures yielded mixed findings, suggesting overall program architecture may be less important than specific curricular features. While Durham et al. (2024) found advantages for a 2-year accelerated-hybrid model over traditional 3-year programs, the hybrid program incorporated multiple distinguishing features including substantially more didactic preparation, simulation integration, diverse clinical settings, and higher performance benchmarks. In contrast, Carroll et al. (2024) and van Duijn and Bevins (2005) found no performance differences when comparing different program structures or pedagogical approaches. These apparent contradictions likely reflect differences in specific implementation features rather than fundamental program design, with increased didactic preparation, simulation integration, and strategic clinical timing appearing more influential than accelerated structure or pedagogical approach alone.

From an educational perspective, the notion of sending learners into clinical environments without recent theoretical instruction and structured opportunities to rehearse skills is difficult to justify, particularly when early placement periods are characterised by high supervision needs and heightened patient safety considerations. Across the included studies, a consistent message emerges; learners benefit when theory and practice of skills are deliberately aligned before initial clinical exposure.

The rapid expansion of physiotherapy programs and growing healthcare system pressures have made securing quality clinical placements increasingly difficult (Forbes & Nolan, 2018; Hobbs et al., 2000; Taylor et al., 2017). While alternative approaches including simulation-based placements and student-led clinics are necessary responses to capacity constraints (Bostick et al., 2014; Dairo et al., 2024; Forbes & Martin, 2020), programs should consider prioritizing strategic temporal alignment between theory and practice through simulation-based preparation, ensuring adequate foundational knowledge before early clinical experiences, and implementing skill refresher activities when delays occur between instruction and clinical application. Future research should investigate why timing advantages dissipate by final evaluations, optimal temporal windows for different content areas, long-term outcomes beyond graduation, and whether timing effects vary based on student characteristics. The heterogeneity in outcome measures across included studies, with some relying on student self-assessment without established validity, highlights the need for standardized assessment tools to enable robust cross-program comparisons.

An additional consideration identified from this review is the need for developmentally differentiated expectations across entry-level physiotherapy programs. Early learners are still consolidating foundational knowledge and clinical reasoning, so benefit from developmentally appropriate experiences that align with their knowledge, skills, and confidence (Cole & Wessel, 2006). Applying uniform expectations across early and later placements risks conflating exposure with readiness and obscuring whether observed performance reflects genuine learning or adaptive coping within appropriately supervised contexts.

The strengths of this scoping review include the first comprehensive synthesis of evidence on clinical placement timing and distribution in entry-level physiotherapy education, employing systematic search methods, registered protocol, and quality appraisal of included studies. However, several limitations warrant consideration. Only eight studies were included, with considerable variation in design, outcome measures, and settings, restricting direct comparison. Some studies employed custom surveys without established validity or relied on student self-assessment, which may not accurately reflect clinical competence (Yates et al., 2022). Seven of

the eight included studies were conducted in North American Doctor of Physiotherapy programs, potentially limiting generalizability to other educational contexts and demonstrating the importance future research in Australian and other international settings. The heterogeneity in timing models, placement structures, and confounding variables makes it difficult to isolate the specific impact of timing alone on student outcomes.

VI CONCLUSION

Strategic temporal alignment between theoretical learning and clinical practice, adequate foundational preparation, and simulation-based bridging emerge as key determinants of student readiness and performance in physiotherapy education. While a range of program structures are capable of preparing students for clinical practice, the evidence indicates that outcomes may be shaped more by how curricula are implemented, with features such as including simulation integration, didactic preparation intensity, and strategic placement timing, than by the overarching program design itself. The finding that timing advantages enhance early but not final placement performance suggests both strategic alignment and quality clinical education throughout placements contribute to ultimate competence development. The results of the review would inform curricula that rely on early immersion alone, and suggest a developmentally staged approach, in which early placements are supported by aligned theory, simulation, and explicit assessment expectations. This may ensure meaningful learning while safeguarding patients and clinical learning environments. As programs navigate increasing constraints on clinical placement capacity, maintaining attention to evidence-based principles, particularly simulation integration and prevention of skill decay through timely clinical application, can optimize student outcomes within diverse curriculum frameworks.

VII FUNDING

No funding was received to conduct this scoping review.

VIII DISCLOSURE OF INTEREST

The authors report there are no competing interests to declare.

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Appendices

Appendix A. Search strategies for all databases

Database	Search Terms
PubMed	(Placement OR "Clinical Placement*" OR "Student Placement*" OR "Clinical Immersion*" OR "Clinical Experience*" OR "Clinical Learning" OR "Clinical Learning Experience*" OR "Clinical Education" OR "Practice Immersion") AND (Physiotherap* OR "Physical Therap*" OR "Allied Health") AND Student* AND (Prepar* OR Ready OR Readiness OR Experience* OR Performance)
CINAHL (EBSCO)	(Placement OR "Clinical Placement*" OR "Student Placement*" OR "Clinical Immersion*" OR "Clinical Experience*" OR "Clinical Learning" OR "Clinical Learning Experience*" OR "Clinical Education" OR "Practice Immersion") AND (Physiotherap* OR "Physical Therap*" OR "Allied Health") AND Student* AND (Prepar* OR Ready OR Readiness OR Experience* OR Performance)
Embase (Elsevier)	(Placement OR 'Clinical Placement*' OR 'Student Placement*' OR 'Clinical Immersion*' OR 'Clinical Experience*' OR 'Clinical Learning' OR 'Clinical Learning Experience*' OR 'Clinical Education' OR 'Practice Immersion') AND (Physiotherap* OR 'Physical Therap*' OR 'Allied Health') AND Student* AND (Prepar* OR Ready OR Readiness OR Experience* OR Performance)
Scopus	(Placement OR "Clinical Placement*" OR "Student Placement*" OR "Clinical Immersion*" OR "Clinical Experience*" OR "Clinical Learning" OR "Clinical Learning Experience*" OR "Clinical Education" OR "Practice Immersion") AND (Physiotherap* OR "Physical Therap*" OR "Allied Health") AND Student* AND (Prepar* OR Ready OR Readiness OR Experience* OR Performance)

Appendix B. Methodological quality scores

JBI critical appraisal checklist for case-series studies ¹													
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Overall score (%)	Risk of Bias rating	
Carroll et al. (2024)	+	+	+	+	+	-	+	+	-	+	8/10 (80%)	Low	
Rabena-Amen et al. (2024)	+	-	-	+	+	-	+	+	-	+	6/10 (60%)	Moderate	
White et al. (2023)	+	+	+	+	+	-	+	+	-	-	7/10 (70%)	Moderate	
JBI critical appraisal checklist for cohort studies ²													
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	% Yes	Risk of Bias rating
Brueilly et al. (2009)	NA	NA	+	-	-	+	-	+	-	NA	+	4/11 (36%)	High
Durham et al. (2024)	+	+	+	+	+	+	+	+	+	NA	+	10/11 (91%)	Low
Tuttle and Horan (2019)	+	+	+	+	+	+	+	+	+	NA	+	10/11 (91%)	Low
van Duijn and Bevins (2005)	+	+	+	+	-	+	+	+	+	+	+	10/11 (91%)	Low
JBI critical appraisal checklist for quasi-experimental studies ³													
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	% Yes	Risk of Bias rating		
Colgrove and Rucker (2023)	+	+	+	+	+	+	+	?	?	7/9 (78%)	Moderate		

¹ Q1 – Q10: JBI critical appraisal checklist for case-series studies

² Q1 – Q11: JBI critical appraisal checklist for cohort studies

³ Q1 – Q9: JBI critical appraisal checklist for quasi-experimental studies

A '+' indicates yes, a '-' indicates no, a '?' indicates unclear; and 'NA' stands for not applicable. The risk of bias was considered high if the study achieved up to 20-50% of 'yes' scores, moderate if it scored between 50% and 80% of 'yes' scores, and low with more than 80% of 'yes' scores.

Table 1. Characteristics of included studies

Author, Year, Country	Title	Study design, Sample size	Program level, Duration	Clinical placement timing within program, type of clinical placement experience	Study focus
Brueilly et al., 2009; USA	The effect of early contextual learning on student physical therapists' self-perceived level of clinical preparedness.	Prospective cohort n = 39	Doctor of Physiotherapy, 3 years	First year, part-time early contextual learning	Integrated clinical education, student preparedness
Carroll et al., 2024; USA	Clinical instructor perception of clinical readiness in hybrid educated Doctor of Physical Therapy students.	Case series n = 81	Doctor of Physiotherapy, 2 years	Second year, full-time clinical placement	Program comparison, student preparedness, clinical performance, stakeholder perceptions
Colgrove and Rucker, 2023; USA	Beginning with the end in mind: a product evaluation of integrated clinical education courses.	Quasi-experimental n = 134	Doctor of Physiotherapy, 3 years	First and second years, part-time integrated clinical experience (PT-ICE)	Integrated clinical education, student preparedness, clinical performance, professionalism, communication
Durham et al., 2024; USA	Professionalism and safety of DPT students in first, full-time clinical experiences: accelerated hybrid versus traditional programs.	Retrospective cohort n = 186	Doctor of Physiotherapy, 3 years or 2 years accelerated	NR, full-time clinical placement	Program comparison, clinical performance, professionalism, safety, communication
Rabena-Amen et al., 2024; USA	Student physical therapists' perceptions of a first semester integrated clinical experience: a descriptive study.	Case series n = 36	Doctor of Physiotherapy, 2 years and 1 month	First semester, PT-ICE	Integrated clinical education, student preparedness, clinical performance
Tuttle and Horan, 2019; Australia	The effect of replacing 1 week of content teaching with an intensive simulation-based learning activity on physiotherapy student clinical	Retrospective cohort n = 629	Masters of Physiotherapy, 2 years	First year, full-time clinical placement	Simulation-based learning, clinical performance

	placement performance.				
van Duijn and Bevins, 2005; USA	Clinical performances of physical therapist students in problem-based, mixed-model, and traditional curricula.	Retrospective cohort n = 110	Physiotherapy Professional Education Programs (various), Not Reported (NR)	Final year, full-time clinical placement	Program comparison, curriculum evaluation, clinical performance
White et al., 2023; USA	Assessment of student readiness for clinical education in mixed-mode curriculum delivery: a case study.	Case series n = 40	Doctor of Physiotherapy, 8 semesters	Semester 6 (delayed from semester 3 due to COVID-19), fulltime clinical placement	Curriculum evaluation, student preparedness

Table 2. Results of outcomes of included studies

Authors	Study aim	Outcome measures	Results
Brueilly et al. (2009)	To evaluate whether early contextual learning enhances entry-level physical therapy students' self-perceived clinical readiness.	Intervention surveys: Self-perceived preparedness (0-10 modified VAS), perceived preparedness of classmates (0-10 modified VAS), value of real hospital patient experiences (5-point Likert scale), and qualitative feedback on usefulness of real patient encounters.	Self-perceived and classmates' clinical abilities significantly increased post-intervention. Students valued contextual learning experiences with hospital patients more after the intervention.
Carroll et al. (2024)	To evaluate clinical instructors' perceptions of hybrid, 2-year DPT students versus traditionally trained DPT students regarding clinical performance quality.	Clinical Internship Evaluation Tool (CIET)	Clinical instructors perceived no differences in student preparedness for clinical placement between hybrid-educated and traditionally trained DPT students.
Colgrove and Rucker (2023)	To describe the product evaluation of a curriculum with integrated clinical education implemented into a DPT program.	Multiple assessment tools: CPI ratings, remediation rates, self-assessment aptitude, student satisfaction during full-time clinical education experiences (CEEs), APTA Student Evaluation of Clinical Experience and Clinical Instruction (SECE), exit survey, Level of Clinical Preparedness Survey (LCP), Patient-Practitioner Orientation Scale (PPOS), Core Values Self-Assessment, Professional Behaviours Self-Assessment,	ICE students: Excelled in initial/intermediate full-time clinical education experiences (FTCEs), demonstrated higher satisfaction, and showed better alignment between self-assessments and clinical instructor ratings. Traditional students: Felt better prepared for terminal FTCEs and rated higher on Core Values and Professional Behaviours. Both groups: Similar remediation rates.

		and qualitative clinical instructor feedback during site visits.	
Durham et al. (2024)	To compare clinical performance indicators for professionalism, safety, and communication between accelerated-hybrid and traditional DPT programs.	Clinical Performance Indicators (CPI): Mid-term and final scores, converted from VAS scale to Likert scale.	Accelerated-hybrid learners outperformed traditional students, with the greatest impact on communication, followed by safety and professional behaviour.
Rabena-Amen et al. (2024)	To explore first-year physical therapy students' perceptions of early PT-integrated clinical education and to assess whether early ICE emphasizes expected professional behaviours and helps students apply new skills in the clinic.	Mixed methods assessment: Likert scale ratings and open-ended qualitative questions.	Student perceptions of first semester PT-ICE were overall positive. Key findings: (1) Students agreed that ICE emphasized the importance of professional and communication skills through practice; (2) ICE allowed students to practice psychomotor skills and documentation skills.
Tuttle and Horan (2019)	To assess the impact of substituting one week of traditional teaching with one week of simulation-based learning (SBL) on clinical placement performance and to evaluate whether delay between content and clinical placement leads to performance impairment.	Academic Performance Indicators (API): Student performance on clinical placement, including mid and end unit placement marks.	Simulation-based learning (SBL) effectiveness: SBL before placement significantly improved student performance. Timing impact: Delay between teaching and placement affected mid-placement performance but not end-of-placement performance.
van Duijn and Bevins (2005)	To determine whether clinical performance indicator differences exist among physical therapy students in problem-based learning, mixed-model problem-based learning, and traditional curricula.	Clinical Performance Indicators (CPI)	No significant differences were found in mean ratings for any Clinical Performance Indicator (CPI) items, overall CPI ratings, or subset scores of professional behaviours and clinical problem-solving skills among the three curriculum groups.
White et al. (2023)	To describe a simulation-based assessment ensuring student readiness for first full-time clinical education experience in a mixed-mode DPT program during COVID-19.	Student Readiness Faculty Assessment Tool (for student readiness and implementation plans) and Clinical Performance Indicators (CPI)	Student Readiness Faculty Assessment Tool (SRFAT): Effective in identifying students needing extra preparation. Thirty-four students had no concerns, six required remediation prior to first clinical education experience. Clinical outcomes: All students completed their first clinical education experience.

Figure 1. PRISMA flow diagram of study screening and selection process

